A SURVEY OF BUILDING MATERIALS USED IN HOUSE CONSTRUCTION IN WESTERN AUSTRALIA 1983

by J. Glass and P. Shedley

FORESTS DEPARTMENT OF WESTERN AUSTRALIA

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Forests Department of W.A.
P.J. McNamara
Acting Conservator of Forests
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PREFACE

One of the election platforms of the present Labor Government was to establish a mechanism to co-ordinate the production and marketing of Western Australia's hardwood timber, to improve the utilization and productivity of our hardwood forests.

Pursuing this initiative, I invited the Forest Products Association, the Housing Industry Association and the Guild of Furniture Manufacturers to nominate industry representatives who together with representatives from the Forests Department would form a Western Australian Timber Utilization and Marketing Task Force.

The terms of reference for this Task Force are:

1. Produce a timber industry marketing plan designed to identify all markets, potential markets and customers with some indication of their needs and expectations.

2. To identify local resources which would be used to supply those markets.

3. To indicate the likely manufacturing processes and overall economics to grow the resources and supply the markets.

4. To propose research and product development requirements to service the marketing plan.

The Task Force quickly recognized a need for improved market information. This survey of materials used in house construction in Western Australia aimed to meet some of this need in an area vital to the timber industry.

The contribution of local government authorities has been vital to the successful operation of this survey. The request for information was made to every local authority in Western Australia and I gratefully acknowledge that a one hundred per cent positive response was received.

The survey and reporting has been arranged by the staff of the Utilization and Marketing Branch of the Forests Department under the direction of the Acting Conservator of Forests, Mr P. J. McNamara.

The aim of this survey is to determine the needs of house owners. I am confident it will be the forerunner of many such surveys which place the needs of consumers uppermost in planning for the efficient use of our forest resources.

Brian Burke

PREMIER AND MINISTER FOR FORESTS

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INTRODUCTION

House construction is a major market for timber. Because market demands are changing rapidly in present day conditions, there is an increasing urgency to examine trends in the use of building materials, to enable the continuing needs of the housing industry to be met. Due to the long lead times required to grow timber, decisions made must be based on reliable current information.

Although general data (such as population growth and expected economic expansion) can be obtained from various sources, little information specifically relevant to the timber industry has been available in the past.

This survey was designed to correct this deficiency, and to establish a framework for ongoing information collection. Also examined are the ease of data collection, degree of detail available, and the accuracy of data obtainable.

Only a limited attempt has been made to identify reasons for the popularity or disfavour of particular material because this was not the intent of the survey, and would require further study.

The Victorian Forests Commission's survey (Dymowski, 1982), provides a reference for this report and is referred to throughout.

PART 1

SUMMARY OF RESULTS

FLOOR AREA: with the exception of the Southwest Region, the majority of houses are between 100 to 149 m^2 (33.4%) followed by 150-199 m^2 (30.7%).

FOOTINGS: 98.1% of footings are concrete. In the metropolitan area this figure rose to 99.8%. The only other significant materials are steel and hardwood used in the Great Southern Regions.

FLOOR FRAME: Concrete is the major material accounting for 99.3% of the metropolitan, and 89.2% of the country floor framing materials.

FLOOR SURFACE: Concrete is dominant with 96.8% of total flooring surface and 99.2% of metropolitan. Only in area of timber framing are other materials significant.

OUTER WALL CLADDING: Brick is the main material cladding outer walls, being 92.6% of state total. Alternative materials, mainly asbestos cement, are significant in country areas.

WALL FRAME: 87.3% of houses had brick wall framing. Unseasoned hardwood and steel have minor usage.

INNER WALL CLADDING: Brick is most popular in 86.7% of houses. This figure falls to 48.7% in country regions where plaster board is popular.

ROOF TYPE: The pitched roof is used in 95.1% of houses. Trusses are the only other significant alternative with 4.2% of the total.

ROOF FRAME: Unseasoned hardwood accounts for 83.0% of roof framing. Minor materials include seasoned hardwood, unspecified timber and steel.

ROOF CLADDING: Tile roofing is used in 84.9% of houses, metal sheeting in 14.8%. The ratio of tile to metal cladding changes significantly outside the metropolitan area, being 56.6% to 42.2% in country areas.

CEILING JOISTS: The two main materials used are unseasoned hardwood (60.0%) and pine (26.3%). Regional fluctuations are noticeable.

CEILING CLADDING: The plaster board type ceilings account for 90.8% of all ceilings.

OUTER DOOR FRAMES: The combination of timber framed front door with aluminium sliding rear side doors comprises 53.2% of this category.

INNER DOOR FRAMES: Metal door frames occupy 81.3% of this category.

WINDOW FRAMES: Metal (i.e. aluminium window frames) holds 97.1% of the total market with very little variation.

UPPER STOREY DETAILS: These are regarded as discrete from other survey data, and are presented separately.

PART 2

SURVEY METHODS

This initial survey was undertaken to establish base information for ongoing data collection from the new house construction market in Western Australia. All Local Government Authorities throughout the State were surveyed. The response rate was 100%, and in all but a few cases where assistance was requested, the data collection was carried out entirely by the Authority concerned. All building permits issued from 1 September to 30 November 1983 inclusive, were covered.

2.1 DATA SOURCE

As in Dymowski (1982), this survey is based on building approvals granted by government authorities. Some of the information required was already available from the Australian Bureau of Statistics (A.B.S.), but not in sufficient detail for the purposes of this survey. All information was obtained from building permit applications.

The survey covers houses erected both by private owners, and all levels of State and Commonwealth Government.

2.2 SAMPLING

To provide small sampling error, and to avoid the need to apply Regional weightings, a sampling of all Local Government Authorities was undertaken.

Details were obtained on 3204 house approvals. This is 89.3% of the comparable A.B.S. figure of 3587. Reasons for this disparity are outlined in the section on error analysis (see 2.6).

The survey analysis is based on the A.B.S. Statistical Divisions which are illustrated in Appendices 1 and 2. These group the 139 Local Government Authorities into 5 metropolitan and 8 country divisions.

The comparison of survey approvals with A.B.S. figures is shown in Table 2.2

TABLE 2.2 SAMPLING COMPARISON

STATISTICAL DIVISION	ABS APPROVALS	SURVEY APPROVALS	PERCENTAGE COVER
Southwest	391	374	95.6
Lower Great Southern	68	67	98.5
Upper Great Southern	23	24	104.3
Midlands	62	68	109.7
South Eastern	92	89	96.7
Central	86	82	95.3
Pilbara	34	23	67.6
Kimberley	49	35	71.4
TOTAL COUNTRY	805	762	94.6
TOTAL METROPOLITAN	2782	2442	87.8
TOTAL W.A.	3587	3204	89.3

2.3 QUESTIONNAIRE

The Questionnaire and covering letter used in the survey are included in Appendix 3.

The Questionnaire covers the following details of each house:

- Floor Area
- Footings
- Floor Frame
- Floor Surface
- Outer Wall Cladding
- Wall Frame
- Inner Wall Cladding
- Roof Type
- Roof Frame
- Roof Cladding
- Ceiling Joists
- Ceiling Cladding
- Door and Window Frames
- Stairs and Railings
- Comments

2.4 DEFINITIONS

The following definitions have been used:

'House' - A building which has been designed so that its prime purpose is to be a single, self-contained dwelling unit, which is completely detached from other buildings, and which occupies a separate titled block of land.

This is the A.B.S. definition.

'Upper Storey' - In this survey the upper storey sections are treated separately from the rest of the house.

Duplexes, flats, units and extensions are specifically excluded.

2.5 STATISTICAL ANALYSIS

The use of a computer package (SPSS) has enabled the quick and detailed analysis of the survey data.

2.6 ERROR ANALYSIS

Potential areas of bias encountered in the Victorian survey were:

- bias in sample selection
- non response bias.

The first source may occur if the included house approvals are not representative of the population of all house approvals. However, this is not considered a problem with the W.A. survey due to the total sampling approach.

The second bias source refers to possible differences between the characteristics of house approvals included in the survey and characteristics not included due to information not being supplied. Because of the large sampling and the very small amount of excluded information, any bias produced is not considered significant.

In common with Dymowski, (1982), statistical and operational assumptions are required as they affect the results of this report:

(i) It is assumed that materials indicated to be used at the time of approval were actually used in construction. Several builders indicated during the survey period that changes occurring during construction related mainly to price at the time of purchase of materials. For example, this may have affected the survey result in relation to ceiling joists. Choices would be made between unseasoned hardwood and pine, depending on availability at time of purchase, but not necessarily following that specified at approval.

This was to some extent overcome by some local authorities, who supplied details of the materials actually used in construction.

(ii) As most local authorities in the State completed their own questionnaires, and some had more than one person completing questionnaires, there were approximately 140 different people completing forms. All of these had the instructions on the questionnaire front to ensure a uniform response from them. This uniformity is assumed.

(iii) It became apparent that some local authorities provided data based on commencements, rather than approvals as requested.

For the purposes of statistical analysis it is assumed that the number of commencements equals the number of permits issued. However, our advice is that some 10% of permits are not followed through to construction. This explains differences between ABS figures and survey figures of house approvals.

Three local authorities were unable to complete the questionnaire, but supplied copies of W.A. Building Operation Returns. These provided some of the details required, and the remainder were obtained directly from the builder concerned.

This method was also used by some local authorities when providing late information.

Obvious cases of data being wrongly entered were very few. They were not corrected, but are noted where considered important.

PART 3

SURVEY FINDINGS

This section contains the results, analysis and discussion, for each of the components of house construction. All results are expressed as percentages, unless otherwise stated. The percentages exclude 'No Response' answers; the results are based only on answers received. The level of response varies with each section, and is detailed in the table below.

TABLE 3.0 LEVEL OF RESPONSE

SECTION	TOTAL SURVEY	TOTAL RESPONSES	% RESPONSE
Floor Area	3204	3195	99.7
Footings	3204	3195	99.7
Floor Frame	3204	3194	99.7
Floor Surface	3204	3191	99.6
Outer Wall Cladding	3204	3195	99.7
Wall Frame	3204	3193	99.7
Inner Wall Cladding	3204	3186	99.4
Roof Type	3204	3132	97.7
Roof Frame	3204	3006	93.8
Roof Cladding	3204	3181	99.3
Ceiling Joists	3204	2977	92.9
Ceiling Cladding	3204	2933	91.5
Outer Door Frame	3204	2920	91.1
Inner Door Frame	3204	2881	89.9
Window Frame	3204	2905	90.6
Stairs	3204	3034	94.7

3.1 FLOOR AREAS

For the purpose of comparing house sizes, the floor areas were used, and divided into eight ranges.

TABLE 3.1.1 HOUSE SIZE (%)

	FLOOR AREA (m^2)							
STATISTICAL DIVISION	<100	100-149	150-199	200-249	250-299	300-349	350-399	>400
Central Metropolitan	-	4.5	27.3	15.9	25.0	13.6	4.5	9.1
East Metropolitan	3.4	29.2	32.4	17.5	9.1	4.2	2.2	2.0
North Metropolitan	2.3	31.7	31.0	22.2	8.4	2.4	1.4	0.7
Southwest Metropolitan	3.7	32.0	33.7	16.5	7.5	2.3	2.0	0.4
Southeast Metropolitan	6.5	42.8	28.0	13.7	4.8	1.7	1.3	1.1
Southwest	5.1	29.0	37.8	14.7	6.4	4.6	1.1	1.3
Lower Great Southern	13.4	34.3	20.9	16.4	11.9	1.5	1.5	-
Upper Great Southern	16.7	54.2	12.5	12.5	4.2	-	-	-
Midlands	19.7	30.3	18.2	18.2	9.1	3.0	-	1.5
South Eastern	11.2	44.9	23.6	9.0	9.0	2.2	-	-
Central	7.3	41.5	17.1	14.6	12.2	6.1	-	1.2
Pilbara	9.1	72.7	9.1	-	9.1	-	-	-
Kimberley	-	35.3	35.3	17.6	5.9	2.9	2.9	-
TOTAL COUNTRY	8.3	35.3	28.9	14.1	8.0	3.7	0.8	0.9
TOTAL METROPOLITAN	3.6	32.9	31.3	18.6	7.9	2.8	1.7	1.1
TOTAL W.A.	4.7	33.4	30.7	17.6	7.9	3.0	1.5	1.1

From Table 3.1.1 the average floor area was calculated using the mid points of the ranges. Thus, the average house size in the survey was 180.5 m^2.

TABLE 3.1.2 AVERAGE HOUSE SIZE

	FLOOR AREA (m^2)
TOTAL COUNTRY	173.1
TOTAL METROPOLITAN	182.2
TOTAL W.A.	180.5

3.2 FOOTINGS

The table below shows the dominance of concrete in footings in both the metropolitan and country areas.

TABLE 3.2.1 FOOTINGS (%)

	PERTH	COUNTRY	TOTAL W.A.
Concrete	99.8	92.5	98.1
Brick	-	0.4	0.1
Steel	-	2.5	0.6
Hardwood	0.05	2.5	0.6
Softwood	0.05	0.4	0.1
Timber Unspecified	-	0.5	0.1
Other	0.1	1.2	0.3

3.3 FLOOR FRAME

Table 3.3.1 shows the statewide dominance of concrete, with other materials only showing importance in Upper Great Southern and Midlands.

TABLE 3.3.1 FLOOR FRAME (%)

STATISTICAL DIVISION	CONCRETE	SEASONED HARDWOOD	UNSEASONED HARDWOOD	PINE	IMPORTED TIMBER	UNSPECIFIED TIMBER	OTHER
Southwest	93.8	0.3	4.8	-	-	0.3	0.8
Lower Great Southern	80.6	1.5	6.0	-	-	-	12.0
Upper Great Southern	66.7	4.2	-	-	-	12.5	16.7
Midlands	76.1	3.0	3.6	-	1.5	1.5	11.9
Southeastern	88.1	-	3.6	-	-	2.4	6.0
Central	95.1	2.4	1.2	-	-	-	1.2
Pilbara	95.7	4.3	-	-	-	-	-
Kimberley	80.0	2.9	11.4	-	-	2.9	2.9
TOTAL COUNTRY	89.2	1.2	4.2	-	0.1	1.1	4.2
TOTAL METROPOLITAN	99.3	0.1	0.05	0.05	-	0.05	0.45
TOTAL W.A.	96.9	0.4	1.0	-	-	0.3	1.2

The only materials which challenge concrete in any way are unseasoned hardwood, and steel (which is included in the "Other" category).

Only one house had pine floor framing and only two houses had all or part imported timber floor frame.

3.4 FLOOR SURFACE

As expected from the previous two sections, concrete is the major constructional material. Table 3.4.1 shows the analysis.

TABLE 3.4.1 FLOOR SURFACE MATERIALS (%)

STATISTICAL DIVISION	CONCRETE SLAB	HARDWOOD	SHEET TIMBER	OTHER*
Southwest	94.1	1.3	3.8	0.8
Lower Great Southern	77.6	4.5	11.9	6.0
Upper Great Southern	66.7	8.3	25.0	-
Midlands	78.8	-	16.7	4.5
Southeastern	88.1	2.4	8.3	1.2
Central	93.9	2.4	2.4	1.2
Pilbara	95.7	-	4.3	-
Kimberley	77.1	14.3	8.6	-
TOTAL COUNTRY	89.0	2.5	6.9	1.6
TOTAL METROPOLITAN	99.2	0.2	0.3	0.2
TOTAL W.A.	96.8	0.7	1.8	0.7

* Other includes combinations of materials.

Of note is the complete absence of pine flooring. Timber sheeting is of some importance in the Lower and Upper Great Southern and Midlands.

3.5 OUTER WALL CLADDING

Here we find brick the dominant construction material with 92.6% of the total. This is even higher in the metropolitan region. Asbestos cement is the only other material of significance.

TABLE 3.5.1 OUTER WALL CLADDING (%)

	METROPOLITAN	COUNTRY	TOTAL W.A.
Brick	98.7	73.0	92.6
Concrete	0.1	0.5	0.2
Hardwood	-	1.4	0.4
Softwood	-	1.2	0.3
Imported	-	0.1	-
Unspecified	-	0.3	0.1
Asbestos Cement	0.6	18.6	4.9
Other*	0.6	4.8	1.4

* Included in the 'Other' section is rammed earth wall construction.

3.6 WALL FRAMING

Brick is the predominant material, being used in 87.3% of all houses. In the metropolitan region the use rises to 98.6%.

In the country the use of alternatives to brick is wide spread. Major use of hardwod framing (both seasoned and unseasoned) and metal (included in the 'Other' category) is obvious, especially in areas of transportable or prefabricated housing. The almost total use of metal framing in the Pilbara is significant.

TABLE 3.6.1 WALL FRAMING (%)

STATISTICAL DIVISION	BRICK	SEASONED HARDWOOD	UNSEASONED HARDWOOD	PINE	IMPORTED TIMBER	UNSPECIFIED TIMBER	OTHER
Southwest	62.1	6.0	18.3	3.3	1.4	4.1	4.9
Lower Great Southern	23.9	4.5	38.8	11.9	-	3.0	14.9
Upper Great Southern	33.3	20.8	8.3	8.3	-	16.7	12.5
Midlands	44.8	10.4	7.5	9.0	6.0	3.0	19.4
Southeastern	43.8	6.7	15.7	1.1	1.1	13.5	18.0
Central	61.0	12.2	13.4	1.2	-	3.7	8.5
Pilbara	-	-	-	4.3	-	-	95.7
Kimberley	38.2	17.6	5.9	2.9	-	5.9	29.4
TOTAL COUNTRY	51.2	7.8	16.8	4.2	1.3	5.3	13.3
TOTAL METROPOLITAN	98.6	0.2	0.2	0.1	-	0.1	0.8
TOTAL W.A.	87.3	2.0	4.2	1.1	0.3	1.3	3.7

3.7 INNER WALL CLADDING

The use of cavity brick construction is again very obvious, being 98.5% of all metropolitan construction and 86.7% of all housing. The figure for the country for brickwork is 48.7%.

TABLE 3.7.1 INNER WALL CLADDING (%)

STATISTICAL DIVISION	BRICK	ASBESTOS CEMENT	PLASTER-BOARD	SOLID PINE	SHEET TIMBER	OTHER
Southwest	60.2	0.8	34.6	0.3	-	4.1
Lower Great Southern	19.4	4.5	65.7	-	-	10.5
Upper Great Southern	33.3	4.2	50.0	-	8.3	4.2
Midlands	44.8	6.0	44.8	-	-	4.5
Southeastern	43.8	2.2	52.8	-	-	1.1
Central	62.2	9.8	23.2	-	-	4.8
Pilbara	-	-	17.4	-	8.7	73.9
Kimberley	11.4	5.7	68.6	-	-	14.3
TOTAL COUNTRY	48.7	3.1	40.6	-	0.5	7.1
TOTAL METROPOLITAN	98.5	-	0.8	-	-	0.7
TOTAL W.A.	86.7	0.8	10.2	-	0.2	2.1

Plasterboard is the second most popular material group, obviously being used in both brick veneer and wholly timber framed construction. The 'Other' section contains all multiple material uses.

Of interest is the very small number of houses using solid pine or hardwood internally. Only six were recorded as using pine or hardwood alone, or in combination with other materials.

The percentage of brick veneer houses is equal to the difference between brick outer cladding and brick wall framing. This is 5.3% for all houses, and 21.8% for the country, and is almost non-existent in the city area.

3.8 ROOF TYPE

The pitched on-site roof is used in the majority of cases. The only exceptions are in more remote areas where trusses are used.

TABLE 3.8.1 ROOF TYPE (%)

STATISTICAL DIVISION	PITCHED	TRUSS	FLAT	OTHER
Southwest	94.4	4.0	1.1	0.5
Lower Great Southern	83.6	13.4	1.5	1.5
Upper Great Southern	75.0	25.0	-	-
Midlands	89.6	9.0	1.4	-
Southeastern	89.9	10.1	-	-
Central	78.0	22.0	-	-
Pilbara	8.7	91.3	-	-
Kimberley	14.3	85.7	-	-
TOTAL COUNTRY	83.9	15.0	0.8	0.3
TOTAL METROPOLITAN	98.7	0.7	0.3	0.3
TOTAL W.A.	95.1	4.2	0.4	0.3

3.9 ROOF FRAME

The following table sets out the results obtained.

TABLE 3.9.1 ROOF FRAMING (%)

STATISTICAL DIVISION	SEASONED HARDWOOD	UNSEASONED HARDWOOD	PINE	IMPORTED TIMBER	UNSPECIFIED TIMBER	METAL	COMBINATION
Southwest	15.4	75.0	1.7	1.1	4.5	1.4	0.9
Lower Great Southern	4.5	76.1	1.5	1.5	4.5	9.0	3.0
Upper Great Southern	8.7	43.5	13.0	-	26.1	4.3	4.3
Midlands	24.6	24.6	10.8	-	21.5	16.9	1.5
Southeastern	3.4	62.9	2.2	-	24.7	6.7	-
Central	1.2	86.6	1.2	-	1.2	9.8	-
Pilbara	87.0	-	-	-	4.3	4.3	4.3
Kimberley	8.6	14.3	-	-	14.3	60.0	2.9
TOTAL COUNTRY	13.9	64.5	2.7	0.7	9.2	7.9	1.1
TOTAL METROPOLITAN	0.6	89.1	0.8	0.1	4.5	0.3	4.6
TOTAL W.A.	3.9	83.0	1.3	0.3	5.7	2.2	3.6

The majority of roof framing is unseasoned hardwood, either jarrah or karri. No distinction was made between the two species in the survey. Builders spoken to showed no preference, and used what was available at the time of construction.

The use of seasoned hardwood seems high. Some misunderstanding of the definition of 'seasoned' (which was not stated in the questionnaire) is suspected.

A total of 38 houses had complete pine roof framing, whilst another eight used imported timber only.

The large 'unspecified timber' percentage is presumably due to the lack of detail on house plans. The timber is probably either jarrah or karri, hence most of these results could be included in the unseasoned figures.

Metal roof framing has its market mainly in the transportable/prefabricated type housing used in the remoter parts of the State.

The 'Other' category comprises those roof frames which are a combination of materials, the most common being unseasoned hardwood and pine, followed by seasoned and unseasoned hardwood. Most of these occurred in the metropolitan region and are used to define those houses with glued laminated beams as part of the roof framing. These beams are in common usage, but recording their occurrence was not specifically requested.

3.10 ROOF CLADDING

Table 3.10.1 shows the types of roof cladding used statewide.

TABLE 3.10.1 ROOF CLADDING (%)

STATISTICAL DIVISION	TILE	ASBESTOS CEMENT	METAL
Southwest	67.6	-	32.4
Lower Great Southern	44.8	3.0	52.2
Upper Great Southern	58.3	-	41.7
Midlands	23.4	3.1	73.4
Southeastern	60.7	-	39.3
Central	76.8	4.9	18.3
Pilbara	-	4.3	95.7
Kimberley	-	-	100.0
TOTAL COUNTRY	56.6	1.2	42.2
TOTAL METROPOLITAN	93.6	-	6.3
TOTAL W.A.	84.9	0.3	14.8

Tile roofing holds the largest market share in the metropolitan region and the State overall. In the country variations occur from 100% metal roofing in the Kimberley region to 18.3% metal roofing in the Central region.

Asbestos cement sheeting has only minor use.

3.11 CEILING JOISTS

In Table 3.11.1 the materials used in ceiling joists are shown.

TABLE 3.11.1 CEILING JOISTS (%)

STATISTICAL DIVISION	SEASONED HARDWOOD	UNSEASONED HARDWOOD	PINE	IMPORTED TIMBER	UNSPECIFIED TIMBER	METAL	N/A	OTHER
Southwest	13.1	70.0	6.4	0.6	4.7	1.5	3.2	0.6
Lower Great Southern	1.5	80.6	1.5	1.5	4.5	7.5	-	0.3
Upper Great Southern	20.8	37.5	12.5	-	16.7	8.3	4.2	-
Midlands	23.4	20.3	14.1	3.1	21.9	15.6	1.6	-
Southeastern	3.4	61.8	2.2	-	25.8	6.7	-	-
Central	2.5	86.3	1.3	-	5.0	5.0	-	-
Pilbara	8.7	-	-	-	4.3	82.6	-	-
Kimberley	14.3	14.3	-	-	2.9	51.4	17.1	-
TOTAL COUNTRY	10.7	61.4	5.4	0.7	9.1	9.5	2.6	0.6
TOTAL METROPOLITAN	0.8	59.5	33.1	0.1	4.1	0.2	1.6	0.3
TOTAL W.A.	3.3	60.0	26.3	0.3	5.3	2.5	1.9	0.4

From Table 3.11.1 it is obvious that unseasoned hardwood is the most popular ceiling joist material, followed by pine. Once again there are reporting problems with seasoned hardwood and unspecified timber, especially in the country regions.

The 'not applicable' section is for those houses which do not have ceiling joists, having cathedral or raked ceilings where the roof rafters provided the fixing for the ceiling, or no cladding was used.

The metropolitan region was further examined to determine any variations in the uses of hardwood and pine. The results are in the following table.

TABLE 3.11.2 CEILING JOISTS - METROPOLITAN AREA (%)

STATISTICAL DIVISION	UNSEASONED HARDWOOD	PINE	UNSPECIFIED	OTHER
Central Metropolitan	39.0	12.2	22.0	26.8
East Metropolitan	57.9	18.6	18.4	5.1
North Metropolitan	53.5	43.0	-	3.5
Southwest Metropolitan	56.2	43.0	-	0.8
Southeast Metropolitan	76.8	21.7	-	1.5
TOTAL METROPOLITAN	59.5	33.1	4.1	3.3

3.12 CEILING CLADDING

The most popular ceiling cladding is plaster board sheeting. No other material holds an important share of the market.

TABLE 3.12.1 CEILING CLADDING (%)

STATISTICAL DIVISION	PLASTERBOARD	HARDWOOD	PINE	SHEET TIMBER	ASBESTOS CEMENT	OTHER	EXPOSED BEAMS
Southwest Lower Great	90.8	-	0.9	0.9	0.9	6.2	0.6
Southern Upper Great	93.9	-	-	1.5	-	4.5	-
Southern	91.7	-	-	4.2	-	4.2	-
Midlands	90.2	-	4.9	-	-	4.8	-
Southeastern	98.9	-	1.1	-	-	-	-
Central	90.2	-	-	-	6.1	3.6	1.2
Pilbara	91.3	-	-	4.3	-	4.3	-
Kimberley	80.0	-	-	-	2.9	17.1	-
TOTAL COUNTRY	91.5	-	1.0	0.8	1.2	5.1	0.4
TOTAL METROPOLITAN	90.6	0.9	0.2	-	-	8.1	0.2
TOTAL W.A.	90.8	0.7	0.4	0.2	0.3	7.3	0.3

The 'Other' section contains various combinations of materials, the most common being exposed beams with plasterboard ceilings, accounting for 120 houses or 4.1% of the total. Another combination is an area of exposed beams with asbestos cement ceilings, with standard plasterboard ceilings elsewhere. This occurred in 24 houses or 0.8% of the total.

3.13 OUTER DOOR FRAMES

Results are shown in Table 3.13.1.

TABLE 3.13.1 OUTER DOOR FRAMES (%)

	METROPOLITAN	COUNTRY	TOTAL W.A.
Metal	8.7	25.4	12.7
Timber	23.7	67.5	34.1
Both Metal and Timber	67.6	7.0	53.2

It seems that the timber framed front door is part of W.A. housing, with 87% of all homes having one. This usually combines with an external sliding door of some sort at the rear (or side) of the house. This did cause some reporting problems as some builders refer to all aluminium fittings as "windows". This would only influence the combined total.

3.14 INNER DOOR FRAMES

With inner door frames, the position is reversed with metal holding 81.3% of market and timber down to 17.9%.

TABLE 3.14.1 INNER DOOR FRAMES (%)

MATERIAL	METROPOLITAN	COUNTRY	TOTAL W.A.
Metal	90.3	52.7	81.3
Timber	9.0	46.0	17.9
Both	0.7	1.3	0.8

3.15 WINDOW FRAMES

Aluminium window frames were used in 97.1% of the houses surveyed. Timber frames are a very small part of the total (2.3%).

TABLE 3.15.1 WINDOW FRAMES (%)

MATERIAL	METROPOLITAN	COUNTRY	TOTAL W.A.
Metal	98.1	93.9	97.1
Timber	1.3	5.6	2.3
Both	0.7	0.4	0.6

3.16 UPPER STOREY DETAILS

The upper storey details have not been included with the lower (as was done by Dymowski, (1982) but are looked at separately. Upper storey construction does not reflect the overall construction on ground floors. In many cases the upper storey is likely to have a lighter construction than the rest of the house on which it is built. Thus there is less brickwork and concrete, and more framing and sheeting.

A total of 87 upper storey details were recorded. This represents 2.7% of all houses approved. Reporting problems may have reduced the actual number detailed.

3.16.1 STAIRS

Hardwood stairs (46.0%) form the largest section ahead of concrete (18.0%), unspecified timber (13.7%), and combination (15.1%).

3.16.2 **UPPER FLOOR FRAME**

Concrete holds the largest share with 57.6% of all houses, followed by unseasoned hardwood with 11.8%.

3.16.3 **UPPER FLOOR SURFACE**

Again concrete has the largest share with 57.5%. Timber sheeting has the other major share with 33.3%.

3.16.4 **UPPER OUTER CLADDING**

Brickwork accounted for 71.3% of these materials, and asbestos cement for 17.2%.

3.16.5 **UPPER WALL FRAMING**

Brickwork again held majority with 67.8%, and hardwood and pine held 9.2% each.

3.16.6 **UPPER INNER CLADDING**

Brickwork continued to be most popular with 66.3%, followed by plasterboard with 19.8%.

3.16.7 **UPPER CEILING JOISTS**

Unseasoned hardwood (45.6%) and pine (19.1%) were the two most popular materials, with unspecified timber (16.2%).

3.16.8 **UPPER CEILING CLADDING**

Plasterboard ceilings were most popular (80.8%).

3.16.9 **UPPER DOOR AND WINDOW FRAMES**

These reflected the lower storey results. Steel door frames accounted for most internal doors (57.4%), and aluminium windows continued their monopoly (90.1%).

3.17 COMPARISON WITH THE AUSTRALIAN BUREAU OF STATISTICS FIGURES

A comparison has been made with figures published by the Australian Bureau of Statistics (A.B.S.) (1982).

For the purposes of this comparison, the survey data was altered where necessary to suit the A.B.S. categories.

As the A.B.S. data specifies only a single outer wall material, the brick veneer percentage was calculated as the difference between brick outer wall cladding and brick wall framing. Timber cladding was calculated as the sum of pine, hardwood, imported and unspecified timbers.

The A.B.S. publish details on house approvals monthly, so the whole survey period may be compared directly.

Likely errors have been discussed in Section 2.

TABLE 3.17.1 OUTER WALL CLADDING COMPARISON

	BRICK	BRICK VENEER	ASBESTOS CEMENT	TIMBER	OTHER
A.B.S. Perth	98.6	0.1	0.5	0.7	0.1
Survey Metropolitan	98.7	0.1	0.6	-	0.5
A.B.S. Country	52.4	22.9	18.2	1.9	4.6
Survey Country	51.2	21.8	18.6	3.0	5.4
A.B.S. Total W.A.	88.2	5.2	4.5	1.0	1.1
Survey Total W.A.	87.3	5.3	4.9	0.8	1.7

TABLE 3.17.2 HOUSE SIZE COMPARISON

	Floor Area (m^2)
A.B.S. Perth	183.7
Survey Metropolitan	182.2
A.B.S. Country	168.9
Survey Country	173.1
A.B.S. Total W.A.	180.4
Survey Total W.A.	180.5

The high correlation between the two was expected as both sets of data came from the same source i.e. the Local Government Authorities.

CONCLUSIONS

The survey has obtained information for all new houses in Western Australia, for which permits were issued during the months of September, October, and November 1983 by local government authorities.

The information identifies:

- the major materials used in construction;

- the location within the house of the major materials;

- the proportional use of the major materials within each location of the house.

The information is intended as base data from which trends may be established by comparison with future surveys.

ACKNOWLEDGEMENTS

The following people are to be thanked for their assistance in making the completion of this report possible.

- The officers of the A.B.S. for their assistance in the preparation of the Questionnaire, and for permission to use various tables and results.

- The building surveyors, their inspectors, and staff of all local government authorities, for providing the survey information, and for assisting prior to the survey period in the selection of the method of information collection.

- All staff of the Forests Department of Western Australia who made the completion of this survey possible.

REFERENCES

AUSTRALIAN BUREAU OF STATISTICS, (1982). *Local Government, Western Australia, 1981-82. Catalogue No. 1303.5.* Perth, W.A.

DYMOWSKI, A.J. (1982). *Fifth Survey of Materials Used in House Building.* Forests Commission of Victoria, Division of Economics and Marketing Melbourne, Victoria.

APPENDIX 1

Listing of all local government areas and the statistical division in which they are situated.

INDEX LIST OF LOCAL GOVERNMENT AREAS

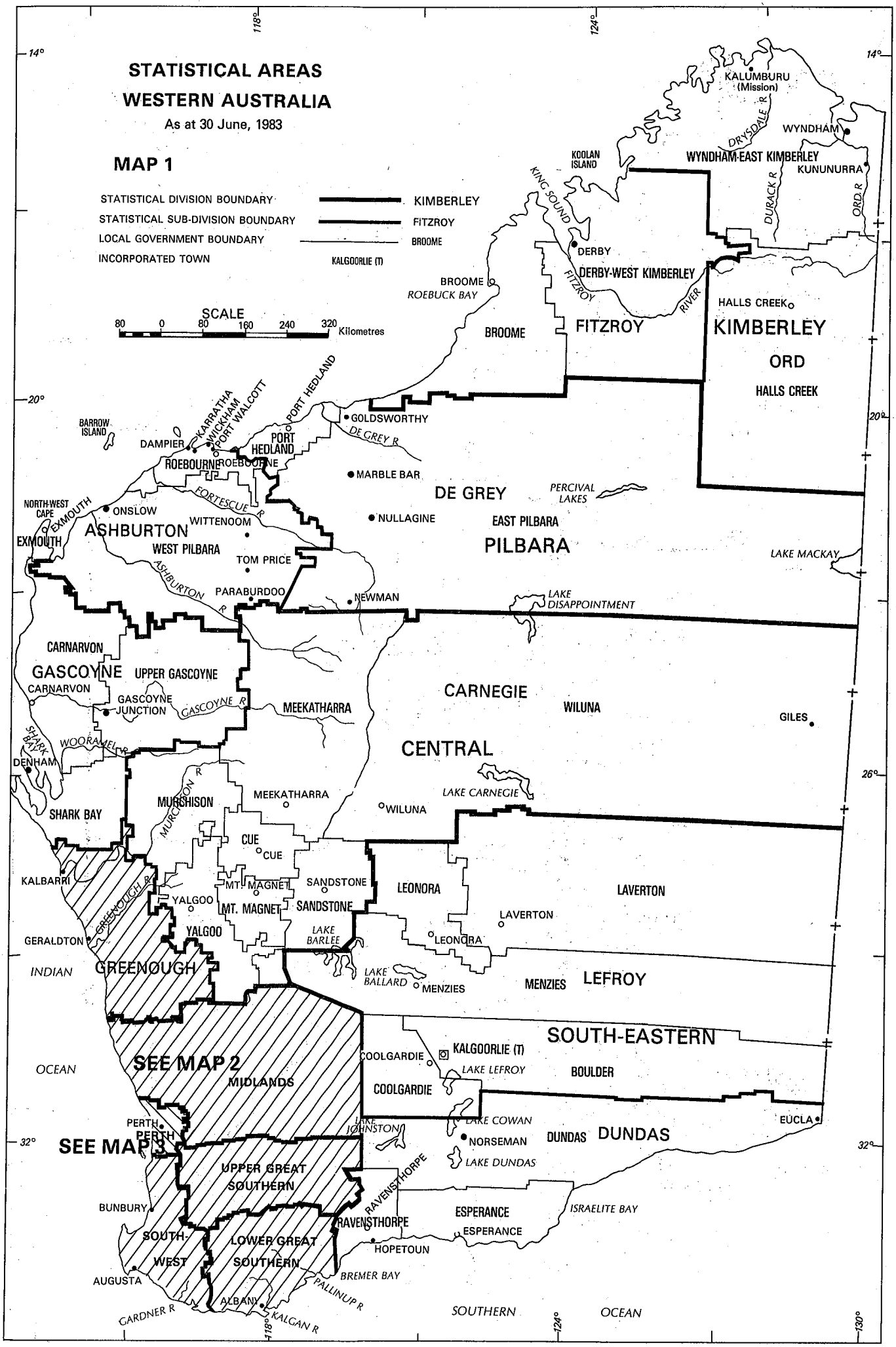
At 30June 1983

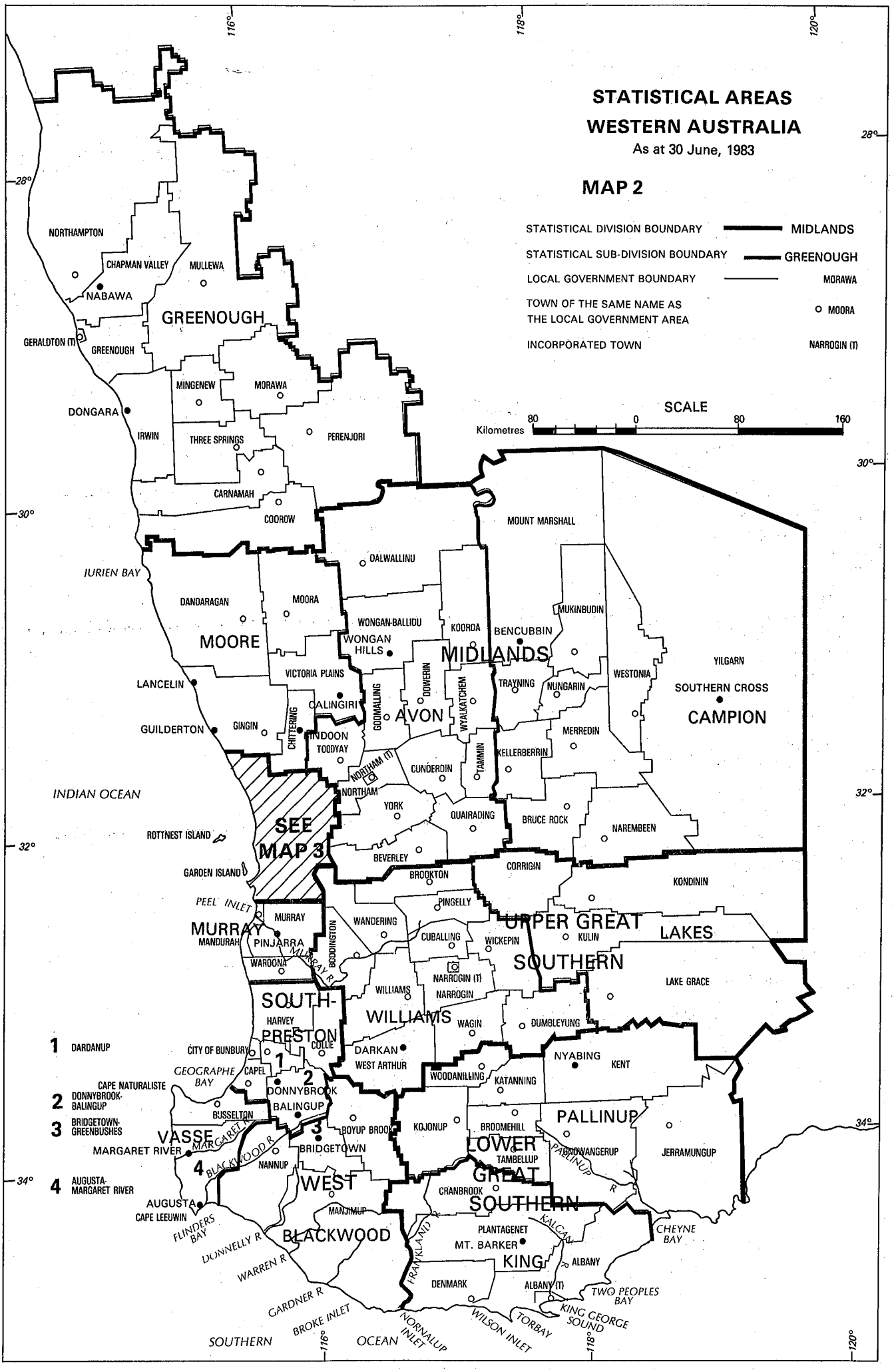
Local government area (a)	Statistical division in which situated
ALBANY (T)	Lower Great Southern
Albany	Lower Great Southern
ARMADALE (T)	Perth
Augusta-Margaret River	South-West
BASSENDEAN (T)	Perth
Bayswater	Perth
BELMONT (C)	Perth
Beverley	Midlands
Boddington	Upper Great Southern
Boulder	South-Eastern
Boyup Brook	South-West
Bridgetown-Greenbushes	South-West
Brookton	Upper Great Southern
Broome	Kimberley
Broomehill	Lower Great Southern
Bruce Rock	Midlands
BUNBURY (C)	South-West
Busselton	South-West
CANNING (C)	Perth
Capel	South-West
Carnamah	Central
Carnarvon	Central
Chapman Valley	Central
Chittering	Midlands
CLAREMONT (T)	Perth
COCKBURN (C)	Perth
Collie	South-West
Coolgardie	South-Eastern
Coorow	Central
Corrigin	Upper Great Southern
COTTESLOE (T)	Perth
Cranbrook	Lower Great Southern
Cuballing	Upper Great Southern
Cue	Central
Cunderdin	Midlands
Dalwallinu	Midlands
Dandaragan	Midlands
Dardanup	South-West
Denmark	Lower Great Southern
Derby/West Kimberley	Kimberley
Donnybrook-Balingup	South-West
Dowerin	Midlands
Dumbleyung	Upper Great Southern
Dundas	South-Eastern
EAST FREMANTLE (T)	Perth
East Pilbara	Pilbara
Esperance	South-Eastern
Exmouth	Central
FREMANTLE (C)	Perth
GERALDTON (T)	Central
Gingin	Midlands
Gnowangerup	Lower Great Southern
Goomalling	Midlands
GOSNELLS (C)	Perth
Greenough	Central
Halls Creek	Kimberley
Harvey	South-West
Irwin	Central
Jerramungup	Lower Great Southern
Kalamunda	Perth
KALGOORLIE (T)	South-Eastern
Katanning	Lower Great Southern
Kellerberrin	Midlands
Kent	Lower Great Southern
Kojonup	Lower Great Southern
Kondinin	Upper Great Southern
Koorda	Midlands
Kulin	Upper Great Southern
KWINANA (T)	Perth
Lake Grace	Upper Great Southern
Laverton	South-Eastern
Leonora	South-Eastern
Mandurah	South-West
Manjimup	South-West
Meekatharra	Central
MELVILLE (C)	Perth
Menzies	South-Eastern
Merredin	Midlands
Mingenew	Central
Moora	Midlands
Morawa	Central
MOSMAN PARK (T)	Perth
Mount Magnet	Central
Mount Marshall	Midlands
Mukinbudin	Midlands
Mullewa	Central
Mundaring	Perth
Murchison	Central
Murray	South-West
Nannup	South-West
Narembeen	Midlands
NARROGIN (T)	Upper Great Southern
Narrogin	Upper Great Southern
NEDLANDS (C)	Perth
NORTHAM (T)	Midlands
Northam	Midlands
Northampton	Central
Nungarin	Midlands
Peppermint Grove	Perth
Perenjori	Central
PERTH (C)	Perth
Pingelley	Upper Great Southern
Plantagenet	Lower Great Southern
Port Hedland	Pilbara
Quairading	Midlands
Ravensthorpe	South-Eastern
Rockingham	Perth
Roebourne	Pilbara
Sandstone	Central
Serpentine-Jarrahdale	Perth
Shark Bay	Central
SOUTH PERTH (C)	Perth
STIRLING (C)	Perth
SUBIACO (C)	Perth
Swan	Perth
Tambellup	Lower Great Southern
Tammin	Midlands
Three Springs	Central
Toodyay	Midlands
Trayning	Midlands
Upper Gascoyne	Central
Victoria Plains	Midlands
Wagin	Upper Great Southern
Wandering	Upper Great Southern
Wanneroo	Perth
Waroona	South-West
West Arthur	Upper Great Southern
West Pilbara	Pilbara
Westonia	Midlands
Wickepin	Upper Great Southern
Williams	Upper Great Southern
Wiluna	Central
Wongan-Ballidu	Midlands
Woodanilling	Lower Great Southern
Wyalkatchem	Midlands
Wyndham-East Kimberley	Kimberley
Yalgoo	Central
Yilgarn	Midlands
York	Midlands

(a) Shire, unless marked (C) indicating City, or (T) indicating Town.

APPENDIX 2

Maps of local government areas showing statistical divisions.

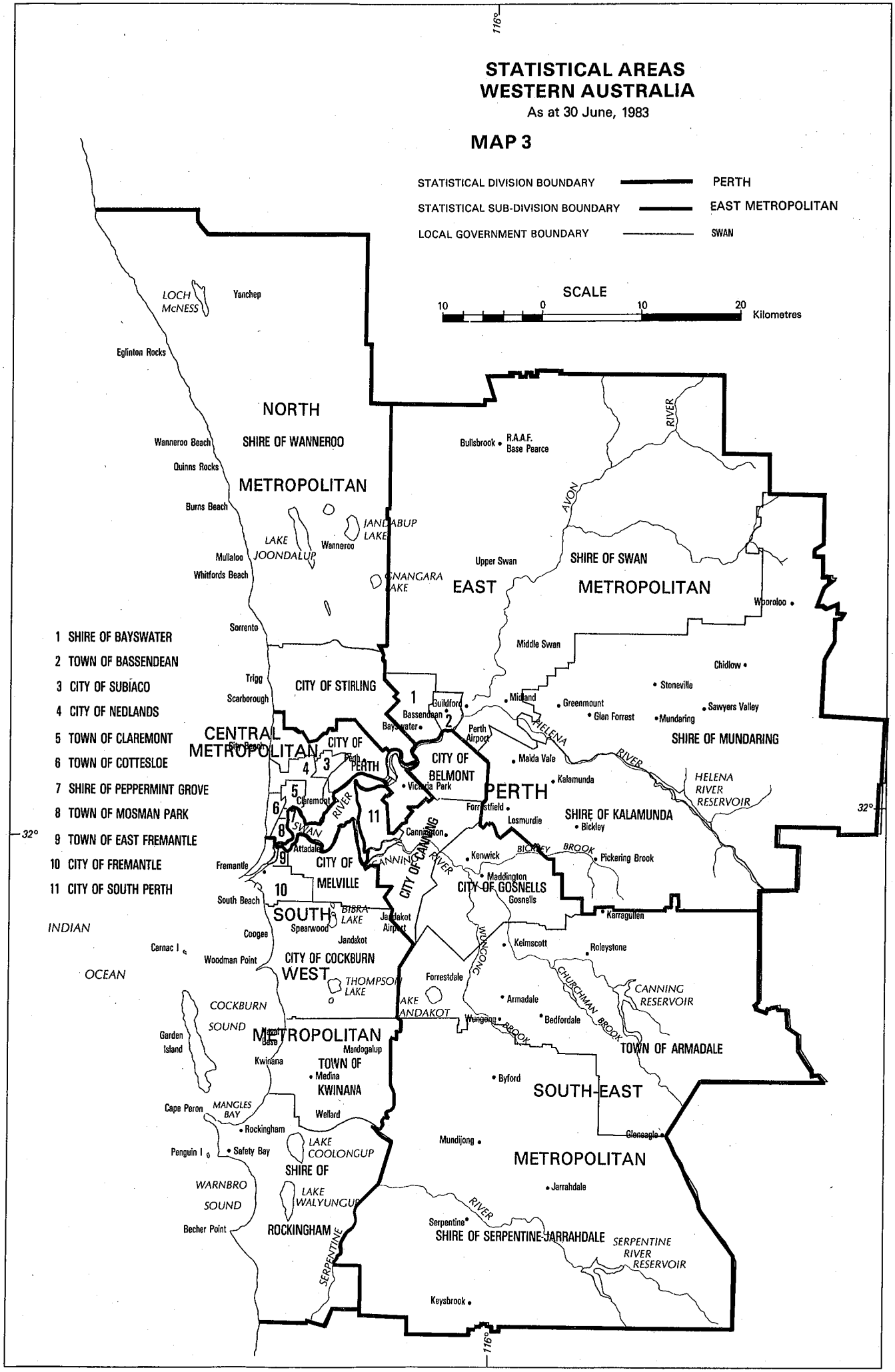

STATISTICAL AREAS
WESTERN AUSTRALIA
As at 30 June, 1983
MAP 1
STATISTICAL DIVISION BOUNDARY
STATISTICAL SUB-DIVISION BOUNDARY
LOCAL GOVERNMENT BOUNDARY
INCORPORATED TOWN
KIMBERLEY
FITZROY
BROOME
KALGOORLIE (T)
SCALE
80 0 80 160 240 320 Kilometres
118°
124°
130°
14°
20°
26°
32°
KALUMBURU (Mission)
WYNDHAM
WYNDHAM-EAST KIMBERLEY
KUNUNURRA
KOOLAN ISLAND
KING SOUND
DRYSDALE R
DURACK R
ORD R
DERBY
DERBY-WEST KIMBERLEY
FITZROY RIVER
HALLS CREEK
KIMBERLEY
ORD
HALLS CREEK
BROOME
ROEBUCK BAY
FITZROY
BARROW ISLAND
DAMPIER
KARRATHA
WICKHAM
PORT WALCOTT
PORT HEDLAND
GOLDSWORTHY
DE GREY R
ROEBOURNE
MARBLE BAR
DE GREY
PERCIVAL LAKES
NORTH-WEST CAPE
EXMOUTH
ONSLOW
FORTESCUE R
NULLAGINE
EAST PILBARA
PILBARA
ASHBURTON
WITTENOOM
WEST PILBARA
TOM PRICE
LAKE MACKAY
ASHBURTON R
PARABURDOO
NEWMAN
LAKE DISAPPOINTMENT
CARNARVON
GASCOYNE
UPPER GASCOYNE
CARNARVON
GASCOYNE JUNCTION
GASCOYNE R
MEEKATHARRA
CARNEGIE
WILUNA
GILES
SHARK BAY
WOORAMEL R
DENHAM
CENTRAL
MURCHISON R
MEEKATHARRA
LAKE CARNEGIE
MURCHISON
WILUNA
SHARK BAY
CUE
CUE
KALBARRI
GREENOUGH R
MT. MAGNET
SANDSTONE
LEONORA
LAVERTON
YALGOO
MT. MAGNET
SANDSTONE
LAVERTON
GERALDTON
YALGOO
LAKE BARLEE
LEONORA
INDIAN
GREENOUGH
LAKE BALLARD
MENZIES
MENZIES
LEFROY
SOUTH-EASTERN
SEE MAP 2
OCEAN
MIDLANDS
COOLGARDIE
KALGOORLIE (T)
LAKE LEFROY
BOULDER
COOLGARDIE
PERTH
PERTH
LAKE JOHNSTON
LAKE COWAN
EUCLA
SEE MAP 3
NORSEMAN
DUNDAS
DUNDAS
LAKE DUNDAS
UPPER GREAT SOUTHERN
RAVENSTHORPE
BUNBURY
ESPERANCE
ISRAELITE BAY
RAVENSTHORPE
ESPERANCE
SOUTH-WEST
LOWER GREAT SOUTHERN
HOPETOUN
AUGUSTA
BREMER BAY
PALLINUP R
ALBANY
GARDNER R
KALGAN R
SOUTHERN
OCEAN


STATISTICAL AREAS
WESTERN AUSTRALIA
As at 30 June, 1983
MAP 2
STATISTICAL DIVISION BOUNDARY
STATISTICAL SUB-DIVISION BOUNDARY
LOCAL GOVERNMENT BOUNDARY
TOWN OF THE SAME NAME AS THE LOCAL GOVERNMENT AREA
INCORPORATED TOWN
MIDLANDS
GREENOUGH
MORAWA
MOORA
NARROGIN (T)
SCALE
Kilometres
80 0 80 160
116°
118°
120°
28°
30°
32°
34°
NORTHAMPTON
CHAPMAN VALLEY
MULLEWA
NABAWA
GREENOUGH
GERALDTON (T)
MINGENEW
MORAWA
DONGARA
IRWIN
THREE SPRINGS
PERENJORI
CARNAMAH
COOROW
MOUNT MARSHALL
OALWALLINU
IURIEN BAY
DANDARAGAN
MOORA
MUKINBUDIN
WONGAN-BALLIDU
KOORDA
BENCUBBIN
MOORE
WONGAN HILLS
MIDLANDS
YILGARN
VICTORIA PLAINS
TRAYNING
NUNGARIN
WESTONIA
SOUTHERN CROSS
LANCELIN
CALINGIRI
DOWERIN
GOOMALLING
WYALKATCHEM
CAMPION
GUILDERTON
GINGIN
CHITTERING
INDOON
TOODYAY
AVON
MERREDIN
KELLERBERRIN
NORTHAM (T)
NORTHAM
CUNDERDIN
TAMMIN
INDIAN OCEAN
YORK
QUAIRADING
BRUCE ROCK
NAREMBEEN
ROTTNEST ISLAND
SEE MAP 3
BEVERLEY
GAROEN ISLAND
BROOKTON
CORRIGIN
KONDININ
PEEL INLET
MURRAY
PINGELLY
WANDERING
UPPER GREAT LAKES
MURRAY
MANDURAH
PINJARRA
CUBALLING
WICKEPIN
KULIN
BODDINGTON
WAROONA
SOUTHERN
NARROGIN (T)
LAKE GRACE
WILLIAMS
NARROGIN
SOUTH-
WILLIAMS
HARVEY
WAGIN
DUMBLEYUNG
PRESTON
1 DARDANUP
CITY OF BUNBURY
COLLIE
DARKAN
NYABING
KENT
GEOGRAPHE BAY
CAPE NATURALISTE
CAPEL
WEST ARTHUR
WOODANILLING
KATANNING
2 DONNYBROOK-BALINGUP
DONNYBROOK
BALINGUP
BUSSELTON
3 BRIDGETOWN-GREENBUSHES
VASSE
MARGARET RIVER
BOYUP BROOK
KOJONUP
BROOMEHILL
PALLINUP
LOWER
BRIDGETOWN
TAMBELLUP
JERRAMUNGUP
4 AUGUSTA-MARGARET RIVER
NANNUP
GREAT
WEST
CRANBROOK
SOUTHERN
AUGUSTA
CAPE LEEUWIN
MANJIMUP
FLINDERS BAY
BLACKWOOD
PLANTAGENET
MT. BARKER
KING
ALBANY
ALBANY (T)
DENMARK
CHEYNE BAY
TWO PEOPLES BAY
KING GEORGE SOUND
TORBAY
WILSON INLET
NORNALUP INLET
BROKE INLET
GARDNER R
WARREN R
DONNELLY R
FRANKLAND
KALGAN R
MARGARET R
BLACKWOOD R
PALLINUP R
SOUTHERN OCEAN

STATISTICAL AREAS
WESTERN AUSTRALIA

As at 30 June, 1983

MAP 3



APPENDIX 3

Copy of Questionnaire and covering letter sent to Shires.

Dear Sir

The Western Australian Government recently established a task force to co-ordinate the utilisation and marketing of the state's timber resources.

Reliable market information is essential for objective conclusions to be reached by this task force. Because housing is the most important market for local timbers, the Forests Department is conducting a survey of materials used in house construction.

With the assistance of local authorities throughout Western Australia, the Department hopes to produce detailed and reliable information for use by the task force.

The Forests Commission of Victoria, with the co-operation of the local government authorities, has carried out similar surveys over the past four years. The resulting information has proved to be of value to the housing industry and timber producers. In addition, the local government authorities have found the results to be of benefit and have continued their support in that state.

Using the Victorian surveys as a model, and after discussions with members of the W.A. Chapter of the Institute of Building Surveyors, and staff of the Australian Bureau of Statistics, a suitable format was developed for Western Australian conditions.

This survey is to cover all house approvals for the period 1st September to 30th November 1983 inclusive.

It would be appreciated if you would complete the enclosed questionnaire and return it in the reply paid envelope by 9th December 1983.

I trust information contained within the statewide report will be of interest to you, and when compiled, a copy will be forwarded.

Should you have any queries, please contact Jeff Glass at Forests Department, Como on 367 6333.

Yours faithfully

ACTING CONSERVATOR OF FORESTS

22 August 1983

enc

FORESTS DEPARTMENT
50 HAYMAN ROAD, COMO, WESTERN AUSTRALIA
P.O. BOX 104, COMO 6152 TELEPHONE (09) 367 6333

SURVEY OF MATERIALS USED IN HOUSE CONSTRUCTION, W.A.
1st SEPTEMBER TO 30th NOVEMBER, 1983

The following definitions and instructions are to assist with the completion of the questionnaire.

DEFINITIONS

A house is defined as a building which has been designed so that its prime purpose is to be a single self-contained dwelling unit, which is completely detached from other buildings and which occupies a separate titled block of land.

Dwellings such as flats, home units, duplexes, town houses, villa units etc., are excluded from the survey.

INSTRUCTIONS

For this survey include information for all new house approvals in the period 1st September to 30th November, inclusive.

The questionnaire lists the various parts of house construction. For each part there are a number of categories of building material.

SINGLE STOREY HOUSES

Use one row of the questionnaire for each single storey house.

As each house is approved, enter the permit number in the first column.

As further details become known for each part of the house construction, mark the appropriate square with a cross. (x)

If for any part of the house more than one category applies mark each appropriate square.

Where there is insufficient space to describe the house adequately, use the comments section or the following line.

For some sections details of particular timbers are listed. If these are unknown mark "Timber Unspecified".

When the category "Other" is used give details in the comments section.

MULTI STOREY HOUSES

For multi story houses use one row for each storey.

Include total floor area with the lower storey only.

Give roofing details with upper storey only.

RETURNING QUESTIONNAIRE

Return the questionnaire by 9th December 1983. Some house descriptions may be incomplete. For these houses, supply the name of the builder so that the remaining information may be obtained.

If you have any problems filling in the questionnaire or queries on the survey, please contact Jeff Glass at Forests Department, Como, on 367 6333.

F.D. /87

SHIRE _____

MATERIALS USED IN HOUSE CONSTRUCTION, W.A.

PERIOD 1 SEPTEMBER TO 30 NOVEMBER 1983

PERMIT NUMBER

TOTAL FLOOR AREA, m²	FOOTINGS	FLOOR FRAME	FLOOR SURFACE	OUTER WALL CLADDING	WALL FRAME	INNER WALL CLADDING	ROOF TYPE	ROOF FRAME	ROOF CLADDING	CEILING JOISTS	CEILING CLADDING	WINDOW AND DOOR FRAME	INTERNAL STAIRS AND RAILINGS
LESS THAN 100	CONCRETE SLAB	CONCRETE SLAB	TIMBER SHEET (PLY, ETC.)	SOLID BRICK	SOLID BRICK	FACE BRICK PLASTERED	PITCHED	HARDWOOD—SEASONED	METAL	NOT APPLICABLE	EXPOSED BEAMS	METAL	CONCRETE
100 TO 149	HARDWOOD—SEASONED	HARDWOOD	OTHER	CONCRETE	HARDWOOD—SEASONED	ASBESTOS CEMENT	TRUSS	HARDWOOD—UNSEASONED	TILE	PLASTERBOARD	OUTER DOOR FRAME—METAL	TIMBER	METAL
150 TO 199	HARDWOOD—UNSEASONED	PINE	SOLID BRICK	HARDWOOD	PINE	PLASTERBOARD	FLAT	PINE	ASBESTOS CEMENT	SOLID HARDWOOD	INNER DOOR FRAME—METAL	WINDOW FRAME—METAL	HARDWOOD
200 TO 249	PINE	IMPORTED TIMBER	CONCRETE	SOFTWOOD	IMPORTED TIMBER	SOLID HARDWOOD	OTHER	IMPORTED TIMBER	METAL	SOLID PINE	OUTER DOOR FRAME—TIMBER	WINDOW FRAME—TIMBER	PINE
250 TO 299	IMPORTED TIMBER	TIMBER—UNSPECIFIED	HARDWOOD	IMPORTED TIMBER	TIMBER—UNSPECIFIED	SOLID PINE	HARDWOOD—SEASONED	TIMBER—UNSPECIFIED	OTHER	IMPORTED TIMBER	INNER DOOR FRAME—TIMBER	CONCRETE	IMPORTED TIMBER
300 TO 349	TIMBER—UNSPECIFIED	OTHER	PINE	ASBESTOS CEMENT	OTHER	IMPORTED TIMBER	HARDWOOD—UNSEASONED	METAL	HARDWOOD—SEASONED	TIMBER—UNSPECIFIED	WINDOW FRAME—METAL	METAL	TIMBER—UNSPECIFIED
350 TO 399	OTHER	TIMBER SHEET (PLY, ETC.)	OTHER	OTHER	FACE BRICK PLASTERED	OTHER	PINE	TILE	HARDWOOD—UNSEASONED	OTHER	WINDOW FRAME—TIMBER	HARDWOOD	OTHER
MORE THAN 400	CONCRETE SLAB	SOLID BRICK	TIMBER SHEET (PLY, ETC.)	FACE BRICK PLASTERED	ASBESTOS CEMENT	TIMBER SHEET (PLY, ETC.)	IMPORTED TIMBER	ASBESTOS CEMENT	PINE	IMPORTED TIMBER	CONCRETE	PINE	NOT APPLICABLE
CONCRETE	HARDWOOD	CONCRETE	IMPORTED TIMBER	PLASTERBOARD	SOLID HARDWOOD	IMPORTED TIMBER	TIMBER—UNSPECIFIED	METAL	IMPORTED TIMBER	METAL	METAL	IMPORTED TIMBER	
BRICK	PINE	HARDWOOD	TIMBER—UNSPECIFIED	SOLID HARDWOOD	SOLID PINE	TIMBER—UNSPECIFIED	METAL	OTHER	TIMBER—UNSPECIFIED	OTHER	HARDWOOD	OTHER	
STEEL	IMPORTED TIMBER	SOFTWOOD	ASBESTOS CEMENT	SOLID PINE	IMPORTED TIMBER	OTHER	OTHER		OTHER		PINE	TIMBER—UNSPECIFIED	
HARDWOOD	TIMBER—UNSPECIFIED	IMPORTED TIMBER	OTHER	IMPORTED TIMBER	OTHER						IMPORTED TIMBER		
SOFTWOOD	OTHER	TIMBER—UNSPECIFIED		TIMBER—UNSPECIFIED							OTHER		
OTHER—UNSPECIFIED		ASBESTOS CEMENT		OTHER									
		OTHER											

COMMENTS

F.D. 787

SHIRE _____

MATERIALS USED IN HOUSE CONSTRUCTION, W.A.

PERIOD 1 SEPTEMBER TO 30 NOVEMBER 1983

PERMIT NUMBER

TOTAL FLOOR AREA, m²	FOOTINGS	FLOOR FRAME	FLOOR SURFACE	OUTER WALL CLADDING	WALL FRAME	INNER WALL CLADDING	ROOF TYPE	ROOF FRAME	ROOF CLADDING	CEILING JOISTS	CEILING CLADDING	WINDOW AND DOOR FRAME	INTERNAL STAIRS AND RAILINGS
LESS THAN 100	CONCRETE	CONCRETE SLAB	HARDWOOD	SOLID BRICK	SOLID BRICK	SOLID BRICK	PITCHED	HARDWOOD–SEASONED	TILE	METAL	EXPOSED BEAMS	OUTER DOOR FRAME–METAL	CONCRETE
100 TO 150	BRICK	HARDWOOD	CONCRETE	CONCRETE	HARDWOOD–SEASONED	CONCRETE	TRUSS	HARDWOOD–UNSEASONED	ASBESTOS CEMENT	OTHER	OUTER DOOR FRAME–TIMBER	INNER DOOR FRAME–METAL	METAL
150 TO 199	STEEL	SOFTWOOD	SOFTWOOD	HARDWOOD	HARDWOOD–UNSEASONED	HARDWOOD	FLAT	PINE	METAL	HARDWOOD–SEASONED	INNER DOOR FRAME–TIMBER	WINDOW FRAME–METAL	HARDWOOD
200 TO 249	HARDWOOD	TIMBER–UNSPECIFIED	IMPORTED TIMBER	SOFTWOOD	PINE	SOFTWOOD	OTHER	IMPORTED TIMBER	OTHER	HARDWOOD–UNSEASONED	WINDOW FRAME–METAL	WINDOW FRAME–TIMBER	PINE
250 TO 299	SOFTWOOD	OTHER	TIMBER–UNSPECIFIED	IMPORTED TIMBER	IMPORTED TIMBER	IMPORTED TIMBER		TIMBER–UNSPECIFIED		PINE	WINDOW FRAME–TIMBER		IMPORTED TIMBER
300 TO 349	TIMBER–UNSPECIFIED		CONCRETE SLAB	TIMBER–UNSPECIFIED	TIMBER–UNSPECIFIED	TIMBER–UNSPECIFIED		IMPORTED TIMBER		IMPORTED TIMBER			TIMBER–UNSPECIFIED
350 TO 399	OTHER		HARDWOOD	ASBESTOS CEMENT	FACE BRICK/PLASTERED	SOLID PINE		METAL		TIMBER–UNSPECIFIED			OTHER
MORE THAN 400			PINE	OTHER	ASBESTOS CEMENT	TIMBER SHEET (PLY, ETC.)		OTHER		OTHER			NOT APPLICABLE
			TIMBER SHEET (PLY, ETC.)		PLASTERBOARD	IMPORTED TIMBER		HARDWOOD–SEASONED		NOT APPLICABLE			
			OTHER		SOLID HARDWOOD	OTHER		HARDWOOD–UNSEASONED		PLASTERBOARD			
					SOLID PINE			PINE		SOLID HARDWOOD			
					TIMBER SHEET (PLY, ETC.)			IMPORTED TIMBER		SOLID PINE			
					IMPORTED TIMBER			TIMBER–UNSPECIFIED		TIMBER SHEET (PLY, ETC.)			
					OTHER			METAL		IMPORTED TIMBER			
								OTHER		ASBESTOS CEMENT			
										OTHER			

COMMENTS

This example describes a single storey house of 160m^2 area. It has a concrete slab footing with cavity brick walls. Internal walls are either face brick or plastered. The pitched tiled roof is framed from unseasoned hardwood. The ceilings are gyprock fixed to pine ceiling joists. The front door frame is timber, all other outer and inner door frames are steel. All window frames are aluminium.

This is a description of a two storey house of total floor area 340m^2. Both footings and ground floor frame are steel, the lower floor surface being particleboard sheeting. Both lower and upper storeys have a combination of pine board and hardiplank outer wall cladding on unseasoned hardwood wall frames. Inner wall cladding on the lower storey is pine boards and ply sheeting. The lower storey ceiling joists which also form the upper storey floor frame are unseasoned hardwood. Lower storey ceiling is plaster board. The upper floor surface is pine boards, the upper storey inner wall cladding is plaster board. The roof is flat and made from exposed beams of oregon and unseasoned hardwood rafters. The roof is clad in corrugated iron. The upper storey ceiling joists are the roof rafters with a ply sheet ceiling. All door frames are timber, all window frames aluminium. The stairs are hardwood.

EXAMPLE ONLY