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THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

Eagleton Rock Syndicate Pty Ltd

A summary of the economic impact of Eagleton Quarry

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The Hunter Research Foundation Centre is a multi-disciplinary research organisation which provides socio-economic research, analysis and innovation across key sectors.



Hunter Research Foundation Centre

The University of Newcastle (UON), University Drive Callaghan NSW 2308 Australia

Email: hafc@newcastle.edu.au | Website: www.newcastle.edu.au/hafc

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A summary of the economic impact of Eagleton Quarry

The Client (Eagleton Rock Syndicate Pty Ltd) is proposing the construction of an Eagleton Quarry project at Eagleton, Port Stephens. The Eagleton Quarry Project is for the extraction of a hard rock reserve that is a mixture of various igneous and sedimentary rock formations. Eagleton Rock Syndicate Pty Ltd has identified rock formations suited to local and regional construction markets and therefore the project will contribute to satisfying an identified demand. The Eagleton Quarry proposal incorporates a 30 year quarry operations area of approximately 30ha which includes a processing, sales and administrative area. The estimated construction (capital) and operating expenditure over the quarry's 24 year operating life, based on predicted production rates, is \$100.2 million¹.

Focusing on the initial investment into the proposed Eagleton Quarry, the HRF Centre is able to estimate the impacts of these expenditures in terms of the number of jobs created and the total flow-on consumption and investment expenditures. These estimates are based on the HRF's proprietary input-output (I-O) model for the Hunter Region. The I-O model is discussed in detail in the Appendix.

Using this I-O model, we estimate that the value of the cumulative economic impact of client's \$100.2 million investment over the planned period of operation 2018-2041 is **\$174.6 million²**, of which:

- \$100.2 million is invested directly by the Client (Eagleton Rock Syndicate Pty Ltd),
- the flow-on impact of this \$100.2 million investment is an additional **\$74.4 million** in economic activity across the Hunter Region (in 2016 dollars).
- This includes 4.3 million of flow-on benefits stemming from capital expenditure and \$70.1 million flow-on benefits from operating expenditure within the planned project.

¹ The operating life of 24 years is based on estimated sales (and is the basis of this analysis). If sales are lower than expected, the quarry may operate up to 30 years with a maximum extraction value of 600,000 tonnes per annum.

² Forecasted production volumes are supplied by the client and are based on extraction rates and market value using Quarry Mining Systems Market Analysis and Appraisal, Eagleton Quarry.

Discounting the flow-on benefits (\$74.4 million) from the planned expenditure to calculate their net present value (NPV), using a 5% real discount rate, the cumulative impact of the client's proposed investment over the 24 year period has an NPV \$43.9 million in flow-on benefit to the region.

In terms of the employment impacts from the proposed investment, we estimate that, on average, **41** jobs per year will be generated over the 24 years of the project, from the direct investment expenditures associated with Eagleton Quarry, and associated flow-on expenditures. This totals to **454** additional jobs (full-time equivalent positions for a single year) over the 24 years of the project.

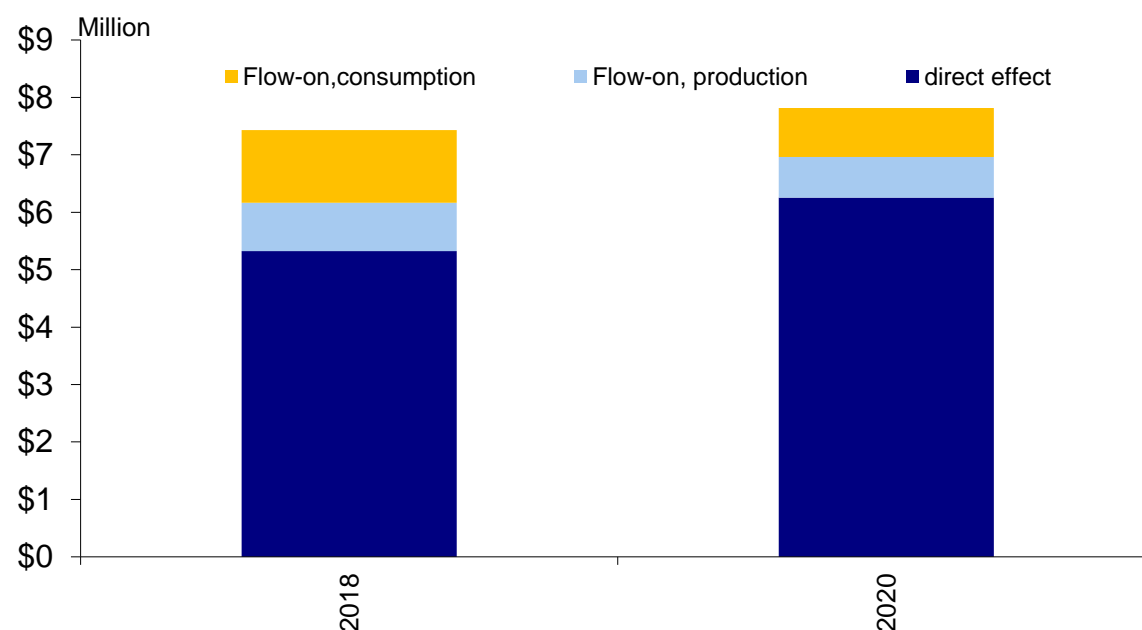
Table 1 presents the direct, and flow-on impacts (production and consumption) associated with the projects planned capital and operating expenditure. The impacts on economic output and employment are graphed in Figures 1 and 2, respectively, for the planned capital and operational expenditure. The graphs disaggregate the flow-on impacts into 'production' and 'consumption' impacts. The impacts of the quarry's planned operating expenditure continues from 2028 until 2041 with the same direct, consumption and flow-on impacts as shown in 2027 and 2028.

Table 1: Economic impact of proposed Eagleton Quarry

Impact on the Hunter (\$)	CAPEX	OPEX
Direct effect	\$11,576,400	\$88,619,134
Production flow-on	\$1,555,149	\$47,171,165
Consumption flow-on	\$2,748,850	\$22,884,214
Total benefit	\$15,880,399	\$158,674,513
Impact on Hunter employment^a	CAPEX	OPEX
Direct effect	31	239
Production flow-on	5	92
Consumption flow-on	12	76
Total employment increase	47	407

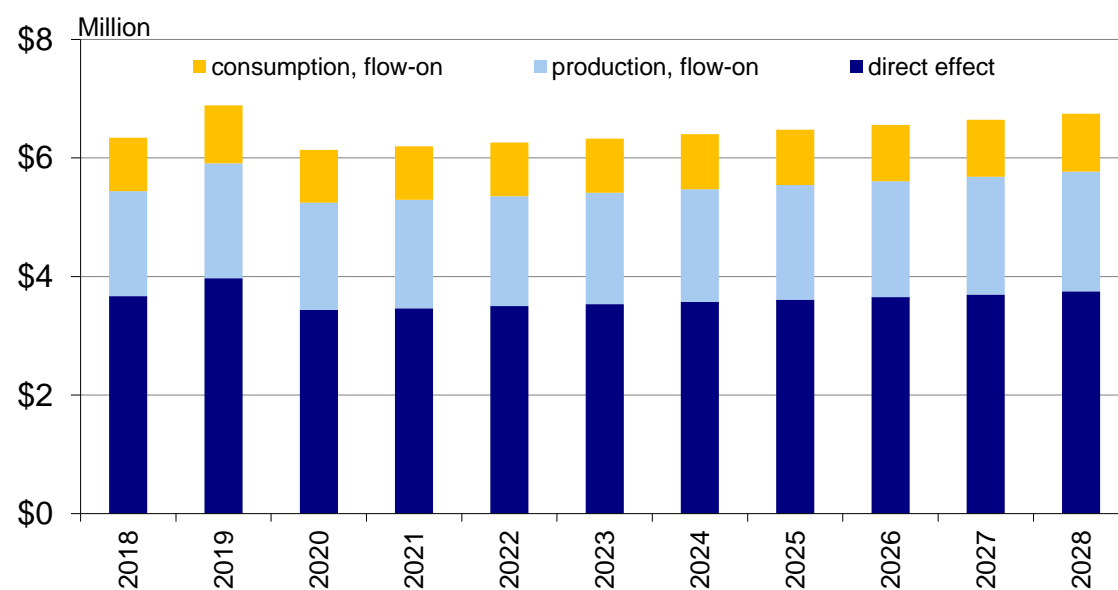
^a Employment is measured in units of one full-time equivalent (FTE) positions for a single year.

Figure 1: Impact on the Hunter economy from proposed Eagleton Quarry CAPEX



Source: HRF Centre, Eagleton Rock Syndicate Pty Ltd.

Figure 2: Impact on the Hunter economy from proposed Eagleton Quarry, OPEX



Source: HRF Centre, Eagleton Rock Syndicate Pty Ltd.



Appendix

A.1 Input-output models

An I-O model provides a descriptive snapshot of a particular economy at a point in time. I-O modelling assumes that each industry in an economy is related to every other industry. The relationship is strong between some industries (e.g. coal and transport are closely related) and weak between others (e.g. coal and communications tends to have a weaker relationship).

Assessments using I-O models estimate the ‘economic impact’ of a change in economic activity caused by either an increase or decline in spending associated with a specific industry.

The construction of a new port facility is an example of an injection into an economy because its construction expenditure of, say, hundreds of millions of dollars, will generate demand for labour and resources, which will be combined to form the new port facility. A withdrawal of activity from an economy creates a negative impact. A manufacturer closing operations is an example of the withdrawal of an activity that has economic consequences for a community. I-O modelling will estimate the increase or decrease in the value of goods and services and the level of employment that is associated with either an injection or withdrawal of activity. The results of the analysis are shown in terms of the value of the goods and services which are generated/lost (which will be more than the initial increase or decline in spending) and the number of jobs which are created/lost within the defined economy.

Using I-O models

I-O analysis essentially identifies and evaluates linkages between sectors in the economy. The analysis uses the expenditure by the University as a starting point, and then tracks backward through the various sectors in the economy to identify the contribution each sector makes to the University’s operations.

As the connections are traced backwards, the analysis is made in terms of the:

- (a) Initial (direct) impacts of the expenditure, and the
- (b) Flow-on (induced) impacts.

In conceptual terms, initial impacts can be thought of as the cause, and flow-ons as the effects. The expenditure passing backwards diminishes with each succeeding round, as money is lost to both purchases outside of the defined economy (leakages) and government revenue (taxes). Eventually these losses erode the flow-on effect to zero and an aggregate impact can be derived.

I-O analysis can estimate the value of all the goods and services, and the level of employment, required to produce a certain amount of output in a specific industry. This allows the impacts of the operation of a particular industry to be measured in each specific sector of the economy. The sectors used in the HRF Centre I-O model are defined in Appendix A.1.

The value of the additional output is expressed in 2016 dollars. Employment is measured in units of one full-time equivalent (FTE) positions for a single year.

Multipliers

The strength of the relationship between all industries is represented by multipliers. The multiplier represents the aggregate impact of a change in expenditure. That is, the impacts that are additional to the 'initial' impact (flow-on impacts) are captured by the value of the multiplier. Multipliers are defined by the level of dependency between industry sectors and their respective exposure to leakages.

Due to leakages from the regional economy, the size of the multipliers used in this report are substantially lower than those applied in national or state analyses. They are however, more accurate with respect to the impact upon the regional economy.

In the I-O literature, multiplier impacts are sometimes defined differently and/or a particular multiplier effect may be referred to by different names. The HRF Centre has adopted the following conventions to describe and quantify multiplier impacts, which formalise the preceding explanation of flow-on effects.

- *Production-induced multiplier impacts:* The increase in the production of goods and services and employment which occurs in response to the respective expenditure. This multiplier takes into account the effect of purchases by a firm from the sector in which it is classified in the I-O model, as well as the effects in all other sectors of the model, arising from transactions between sectors as successive waves of increases in production occur

- *Consumption-induced multiplier impacts:* The output and employment effects arising from the increase in household incomes (wages, salaries, dividends and profits) in all sectors of the economy as a result of the respective expenditure. The main influence captured here is the stimulus to the retail and service sectors when householders purchase consumer goods and services with their increased incomes. This effect is sometimes referred to as the “pay-package” effect
- *Total flow-on impacts:* The sum of the production- and consumption-induced impacts
- *Total impacts:* The sum of the initial and total flow-on impacts. That is, the sum of the cause and effect components.

Limitations of I-O analysis

Given all assumptions implicit in the I-O model, the multiplier effects represent the maximum impacts on the regional economy that would result from the current and potential increases in expenditure. Factors which would act to reduce the extent of these impacts include:

- Time lags in response: it is assumed that the total output, income and employment responses occur in the same year in which they are initiated. The University’s policy decisions, changes in other areas of the economy and other institutional changes may influence the timing and the degree of the multiplier impacts
- The static nature of I-O models: multiplier analysis is based upon an economic snapshot. Changes in trade patterns, technological change, product substitution, price changes, all of which influence the structure of the economy, would influence the magnitude of the multiplier impacts. However, these variations generally have the greatest effect on sectoral multipliers, whereas total multipliers showing a reasonable degree of stability through time.

Other limitations of I-O analysis relate to:

- The assumption of unemployed resources: the analysis assumes that unemployed resources are available within the regional economy to meet any increase in demand, and that the same proportion of inputs will be used to meet the increase. Given that this analysis is focused upon the impact, and prospective impacts upon the Hunter economy (potentially in specific areas of the Region), it is not unreasonable that under-utilised

resources will be drawn from outside the Region, where internal constraints may otherwise limit flow-on benefits. Positive net intra-regional migration is exemplary of this situation

- The aggregate nature of I-O models: the HRF Centre I-O model contains 29 industry sectors. Defining the economy in these terms necessarily embodies substantial aggregation. One consequence of this aggregation is that it is not possible to estimate economic impacts on specific firms or sub-sectors within a particular industry sector (see Appendix A.1 for the industry definitions used in the HRF Centre I-O model)
- The non-inclusion of externalities: externalities exist where the consumption or production of a good or service impacts on the welfare of others and where the value of this impact is not reflected by the price mechanism. For example, this methodology does not account for the substantial role that the University plays in the development of academic, technical and professional skills, which provide the foundation for much of the Region's human capital and subsequent economic capacity. This limitation is partially accounted for in the other parts of the cost-benefit analysis.

The HRF Centre I-O model and application to this project

The I-O model used in this report has been specifically developed for the Hunter Region economy. The model was developed by the HRF Centre and comprises 29 sectors. The data which was used for the model was compiled from a survey of over 300 organisations in the Hunter Region in 2001.

A.2 Sectors in the HRF Centre Input-Output model

1. AGRICULTURE

Agriculture: plant nurseries, cut flower and flower seed growing, vegetable growing. Grape, apple & pear, stone fruit and kiwi fruit growing. Grain growing, grain-sheep and grain-beef cattle farming, sheep-beef cattle farming, sheep and beef cattle farming, dairy cattle farming, poultry farming (eggs and meat), pig, horse, and deer farming. Sugar cane and cotton growing.

Services to Agriculture: cotton ginning, shearing, and aerial agricultural services.

Hunting and Trapping

Forestry and Logging: forestry, logging, services to forestry.

Commercial Fishing: rock lobster and prawn fishing, finfish trawling, squid jigging, line fishing. Aquaculture.

2. MINING

Coal Mining: black coal and brown coal.

Oil and Gas Extraction.

Metal Ore Mining: iron ore, bauxite, copper ore, gold ore, mineral sand, nickel ore, silver-lead-zinc ore.

Other Mining: gravel and sand quarrying, construction material.

Services to Mining: exploration (petroleum and minerals) and other services to mining.

3. MEAT & MILK PRODUCTS, FOOD PRODUCTS, AND BEVERAGES & TOBACCO PRODUCTS

Meat and Milk Products: meat and poultry processing, bacon, ham, and smallgoods. Milk and cream processing, ice cream and dairy products.

Food Products: fruit and vegetable processing. Oil and fat. Flour mill products cereal food and baking mixes, bread, cakes and pastry and biscuits. Sugar, confectionary, seafood, prepared animal and bird food.

Beverages: soft drink, cordial and syrup, beer and malt, wine, spirits.

Tobacco: cigarettes, cigars, and snuff.

4. TEXTILES, CLOTHING AND FOOTWEAR

Textiles: wool scouring, synthetic fibre textiles, cotton textiles, wool textiles, textile finishing. Made-up textile products, textile floor coverings, rope, cordage, and twine.

Clothing: hosiery, cardigans and pullovers. Men's and boy's wear, women's and girl's wear, sleepwear, underwear, infant clothing.

Footwear.

Leather: Leather tanning and fur dressing. Leather and leather substitute products.

5.	WOOD AND WOOD PRODUCTS	Log sawmilling, wood chipping, timber re-sawing and dressing. Plywoods and veneers, fabricated wood, wooden structural components.
6.	PAPER & PRINTING	<p><i>Paper:</i> pulp, paper and paperboard, solid paperboard containers, corrugated paperboard containers, paper bags and sacks.</p> <p><i>Printing:</i> paper stationary, printing (including screen printing) and services to printing. Newspaper printing or publishing, other periodical publishing, book and other publishing. Recording media manufacturing and publishing.</p>
7.	PETROLEUM AND COAL PRODUCTS	Petroleum refining, petroleum and coal product manufacturing.
8.	CHEMICALS	Fertilisers, industrial gases, synthetic resins, organic and inorganic industrial chemicals. Explosives, paint, medicinal and pharmaceutical products, pesticides, soap and other detergents, cosmetic and toiletry precursor products, inks, dyes, pigments.
9.	NON-METALLIC MINERAL PRODUCTS	Glass and glass products. Clay bricks and ceramic products, ceramic tiles and pipes. Cement and lime, plaster products, concrete slurry, concrete pipe and box culverts.
10.	BASIC IRON AND STEEL	Basic iron and steel, iron and steel casting and forging, steel pipes and tubes.
11.	OTHER BASIC METALS	Alumina production, aluminium smelting, copper, silver, lead, and zinc smelting and refining. Basic non-ferrous metals. Aluminium and non-ferrous metal rolling, drawing, extruding; non-ferrous metal casting.
12.	FABRICATED METAL PRODUCTS	<p>Structural steel fabricating, architectural aluminium products, structural metal products.</p> <p>Hand tools and general hardware, wire products and springs, nuts, bolts, screws, and rivets, metal coating and finishing, non-ferrous pipe fitting.</p>
13.	TRANSPORT EQUIPMENT	<p>Motor vehicles, motor vehicle bodies, automotive electrical components and instruments.</p> <p>Shipbuilding, boatbuilding, aircraft manufacturing, and railway equipment manufacturing.</p>

- 14. MACHINERY, RUBBER & PLASTIC PRODUCTS, AND MISCELLANEOUS MANUFACTURING**
- Machinery:* photographic and optical goods, medical and surgical equipment, professional and scientific equipment. Computers and business machines; telecommunication, broadcasting and transceiving equipment. Household appliances, electric cable and wire, batteries, electric lights and signs. Agricultural machinery, mining and construction machinery, food processing machinery, machine tools and parts, lifting and material handling equipment, pumps and compressors, commercial space heating and cooling equipment.
- Rubber & Plastic Products:* rubber tyres and rubber products. Plastic blow-moulded products, plastic extruded products, plastic bag and film manufacturing, plastic rigid fibre reinforced products, plastic foam products, plastic injection moulded products.
- Miscellaneous Manufacturing:* prefabricated metal buildings, wooden furniture and upholstered seats, sheet metal furniture, mattresses (except rubber), jewellery and silverware, toys and sporting goods.
- 15. ELECTRICITY, GAS AND WATER**
- Electricity and gas supply.
- Water supply and sewerage and drainage services
- 16. CONSTRUCTION**
- General Construction:* house, residential and non-residential building construction; road, bridge and other non-building construction.
- Construction Trade Services:* site preparation, concreting, bricklaying, roofing, structural steel erection, plumbing, electrical installation, air conditioning, and fire & security system services. Plastering and plasterboard fitting, carpentry, tiling, painting and decorating, glazing, landscaping.
- 17. WHOLESALE TRADE**
- Basic Materials:* wool, cereal grain, farm produce and supplies, petroleum products, metals and minerals, chemicals, timber and building supplies.
- Machinery and Motor Vehicles:* farm and construction machinery, professional equipment, computers, business machines, electrical and electronic equipment, cars, commercial vehicles, and new motor vehicle parts, motor vehicle dismantling, used motor vehicle parts.
- Personal and Household Goods:* meat, poultry and smallgoods, dairy produce, fish, fruit and vegetables, confectionary and soft drinks, liquor, tobacco products, groceries.
- Textiles, Clothing, and Footwear:* textiles, clothing, footwear, household appliances, furniture, floor coverings, household goods, photographic equipment, jewellery and watches, toys and sporting goods, books and magazines, paper products, pharmaceuticals and toiletries.

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| 18. | RETAIL TRADE | <p><i>Food:</i> supermarket and grocery stores, fresh meat, fish, poultry, fruit and vegetables, liquor, bread and cakes, take-away food, milk vending.</p> <p><i>Personal and Household Goods:</i> department stores, clothing, footwear, fabrics, soft goods, furniture, floor coverings, domestic hardware, houseware, appliances, recorded music, sports and camping equipment, toys and games, newspapers, books, stationery, photographic equipment, marine equipment, pharmaceuticals, cosmetics and toiletries, antiques and used goods, garden equipment, flowers, watches and jewellery.</p> <p><i>Motor Vehicles:</i> motor cars, motor cycles, trailers and caravans, automotive fuel and electrical services, tyres.</p> |
| 19. | REPAIRS | <p>Smash repairing, automotive repairs and services, panel beaters and painters, household equipment repair services, industrial and business equipment repairers.</p> |
| 20. | ACCOMMODATION
CAFES AND
RESTAURANTS | <p>Accommodation, pubs, taverns, and bars, cafes, restaurants, and clubs (hospitality).</p> |
| 21. | TRANSPORT AND
STORAGE | <p><i>Transport:</i> road freight transport, long and short distance bus transport (including tramway), taxi and other road passenger transport, rail transport, international sea transport, coastal and inland water transport, scheduled international and domestic air transport, non-scheduled air and space transport, pipeline transport. Parking services and other services to road transport. Stevedoring, water transport terminals, port operators, other services to water transport. Services to air transport. Other services to transport; including travel agency services, road freight forwarding, freight forwarding (except road), customs agency services.</p> <p><i>Storage:</i> grain storage, cold storage, warehousing.</p> |
| 22. | COMMUNICATION
SERVICES | <p>Postal services, courier services (light), telecommunication services.</p> |
| 23. | FINANCE AND
INSURANCE | <p><i>Finance:</i> central bank, banks, building societies, credit unions, money market dealers, other financiers, financial asset investors, financial asset broking services and other services to finance and investment.</p> <p><i>Insurance:</i> life insurance, superannuation funds, health insurance, general insurance, services to insurance.</p> |

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| 24. | PROPERTY AND
BUSINESS SERVICES | <p><i>Property services:</i> property operators and developers, real estate agents, non-financial asset investors, machinery and equipment hiring and leasing.</p> <p><i>Business services:</i> scientific research, architectural, surveying, consulting engineering, data processing, information storage and retrieval, computer maintenance and consultancy, legal and accounting services, advertising, commercial art and display, market research, and business administrative services.</p> <p>Employment placement, contract staff and secretarial services, security and investigative services, pest control, cleaning, contract packing services.</p> |
| 25. | GOVERNMENT
ADMINISTRATION
AND DEFENCE | <p><i>Government Administration:</i> central, state and local government, justice, foreign government representation.</p> <p><i>Defence.</i></p> |
| 26. | EDUCATION | <p>Preschools, primary, secondary, and combined primary and secondary schools, special schools, higher education, technical and further education.</p> |
| 27. | HEALTH AND
COMMUNITY
SERVICES | <p><i>Health Services:</i> hospitals (except psychiatric hospitals), psychiatric hospitals, nursing homes, general practice medical services, specialist medical services, dental services, pathology services, optometry and optical dispensing, ambulance services, community health centres, physiotherapy services, chiropractic services.</p> <p>Veterinary services.</p> <p><i>Community Services:</i> child care services, accommodation for the aged, residential and non-residential care services.</p> |
| 28. | CULTURAL AND
RECREATIONAL
SERVICES | <p><i>Cultural Services:</i> film and video production and distribution, motion picture exhibition, radio services, television services, libraries, museums, zoological and botanic gardens, recreational parks and gardens, music and theatre production, creative arts, sound recording studios, performing arts venues, services to the arts.</p> <p><i>Recreational Services:</i> horse and dog racing, sports grounds and facilities, sports and services to sports, lotteries, casinos, gambling services.</p> |
| 29. | PERSONAL AND
OTHER SERVICES | <p><i>Personal Services:</i> video hire outlets, personal and household goods hiring, Laundry, dry-cleaning, hairdressers and beauty salons, photography services, funeral directors and cemeteries, gardening services, private household staff (maids, caretakers etc.).</p> <p><i>Other Services:</i> welfare, charitable, religious institutions. Professional, scientific, and labour organisations, political parties. Police, fire brigade, waste disposal services, corrective centres.</p> |

