



# Queensland Government research and development expenditure 2017–18

# Report overview 2017–18

The Queensland Government research and development expenditure report provides information on:

- Queensland Government research and development (R&D) investments
- partnerships and collaborations between government and other organisations
- how R&D investments are being used to benefit Queensland.

Data from this collection and previous reports is available on the Queensland Government open data website.



## What is research and development?

The Queensland Government has adopted the internationally recognised Organisation for Economic Cooperation and Development (OECD) definition of R&D for the purposes of this report, i.e. *creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.*<sup>1</sup>

Some examples of R&D expenditure that are included in this report are:

- research that is conducted in-house<sup>2</sup> by government on government premises
- research that is conducted externally (non-Queensland Government facilities, for example, universities), but funded by government
- collaborative research programs (with a level of funding and/or resourcing provided by government)
- commissioned research
- research infrastructure and operational costs of research institutes
- research grants, fellowships and social sciences research that identifies ‘causal links’.

R&D *excludes* market research, operations research, routine computer programming, extension or commercialisation of R&D, routine monitoring, routine data collection, quality control, testing and standardisation, or scientific and technical services.

Essentially, R&D has novelty and resolves scientific/technological uncertainty.

<sup>1</sup> Frascati Manual, 2015

<sup>2</sup> Performed by Queensland Government staff regardless of who funds the R&D



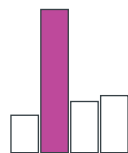


## Key facts for 2017–18



**\$353 m**

was spent on R&D  
in 2017–18,  
an increase from  
**\$351 m**  
in 2016–17



**49%**

of the R&D expenditure  
was funded directly by  
Queensland Government



**97%**

of the total expenditure  
in 2017–18 related to  
operational costs including  
labour costs of R&D  
personnel, non-capital  
purchases of R&D materials,  
supplies and equipment



**\$100.13 m**

was the highest spend on  
R&D by a single agency  
**Queensland Health**,  
followed closely by the  
**Department of Agriculture  
and Fisheries** (DAF) with  
**\$96.98 m**



**32.5%**

of DAF's total budget  
was spent on R&D,  
the highest percentage of  
all agencies



# Why does the Queensland Government invest in R&D?

## Investment in R&D informs decision making for government.

R&D can identify emerging issues and give government time to prepare appropriate resources. It also contributes to:

- planning for the future
- decision making about nurturing future industries
- creating competitive advantage
- protecting our natural environment.

As one example, the research conducted on driver behaviour in different scenarios can steer investment in types of road infrastructure including signage and policing techniques.

R&D also contributes to break-throughs in medical science and agriculture improvements.

The QIMR Berghofer Medical Research Institute co-led the world's largest genetic study of breast cancer.

The study identified 72 novel markers that are capable of predicting a woman's risk of developing breast cancer.

The study also collaborated internationally to develop a personalised treatment approach for patients with aggressive disease.

Those genetics researchers continued to recruit participants into the Australian arm of the world's largest study of clinical depression. [Find out more](#)



A new breed of chickpeas called 'PBA Drummond' was officially launched with commercial partner SeedNet in 2018.

This was a joint research effort involving the Grains Research and Development Corporation, Queensland Department of Agriculture and Fisheries, NSW Department of Primary Industries and Pulse Breeding Australia partners.

This has resulted in an improved chickpea with significantly higher grain yield than all current varieties in Central Queensland. [Find out more](#)





# Why does the Queensland Government report its annual R&D spend?

## The Queensland Government has reported its R&D spend since 2004.

Reporting and reviewing this R&D investment shows trends in funding and collaborations, as well as how its investment aligns with government policy priorities.

The results also contribute to building a picture about the health of Queensland's science, technology and innovation activities.

Of course, measuring innovation is far broader than just taking R&D monetary investment into account.

Measuring innovation can also include other indicators such as:

- human resource investment in R&D
- technical collaborations between industry, government and researchers
- the number of patents registered
- the number of startups that succeed
- contemporary regulation around R&D investment and taxation.



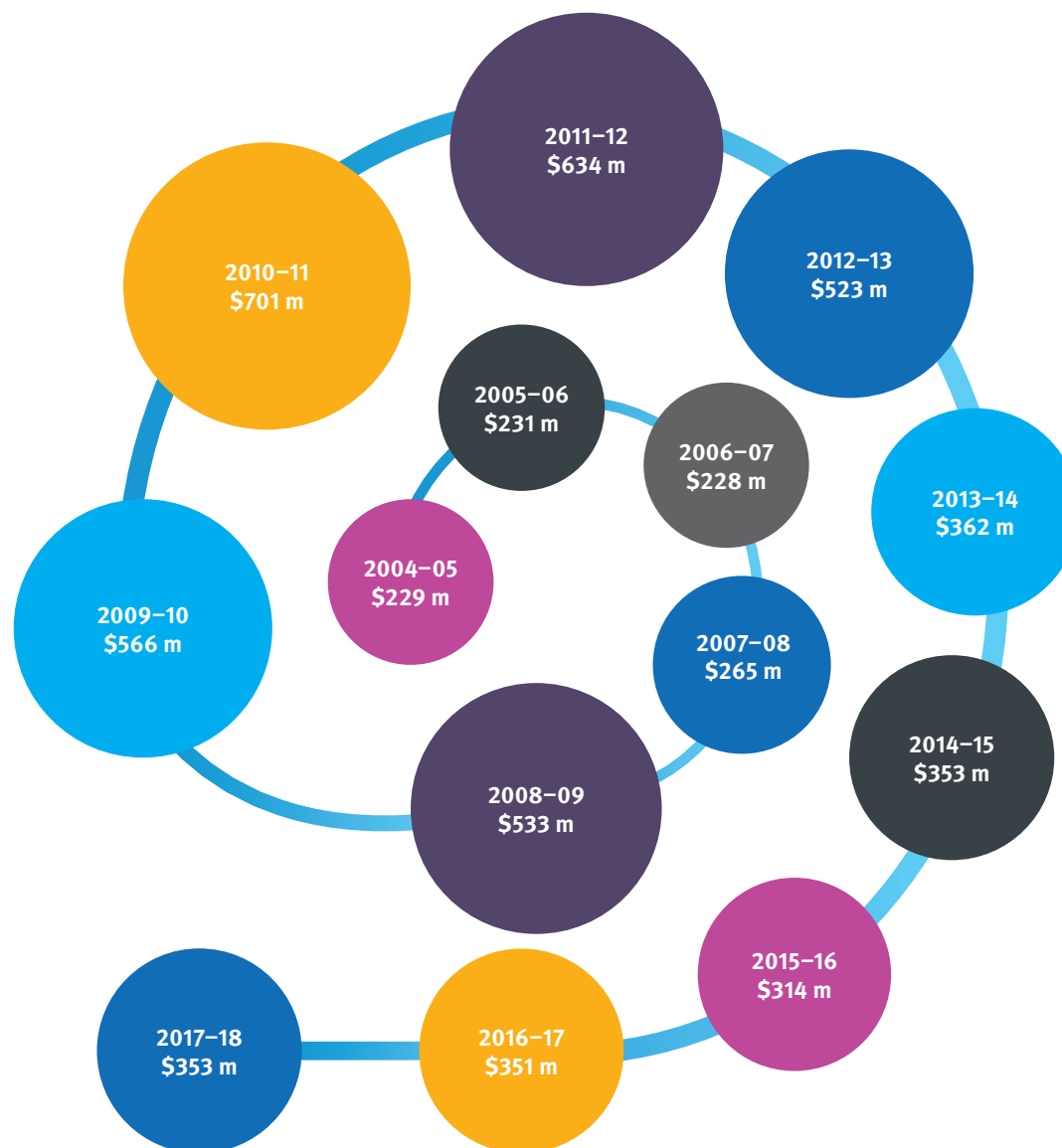
# What was spent?

**The values in this figure include both capital (infrastructure) and current (operational) expenditure.**

After a period of investment stability from 2004–08, this doubled in 2008–09 and maintained consistency for a five-year period to 2012–13. This higher value resulted from significant investment in research infrastructure (capital expenditure) under the Smart State strategies, including the construction of many facilities, for example:

- the Translational Research Institute at Woolloongabba
- the QIMR Berghofer Medical Research Institute at Herston
- the Health and Food Sciences Precinct at Coopers Plains
- the Ecosciences Precinct at Boggo Road, Dutton Park.

After this, emphasis on infrastructure investment returned to approximately \$350 million for the five-year period to 2017–18.





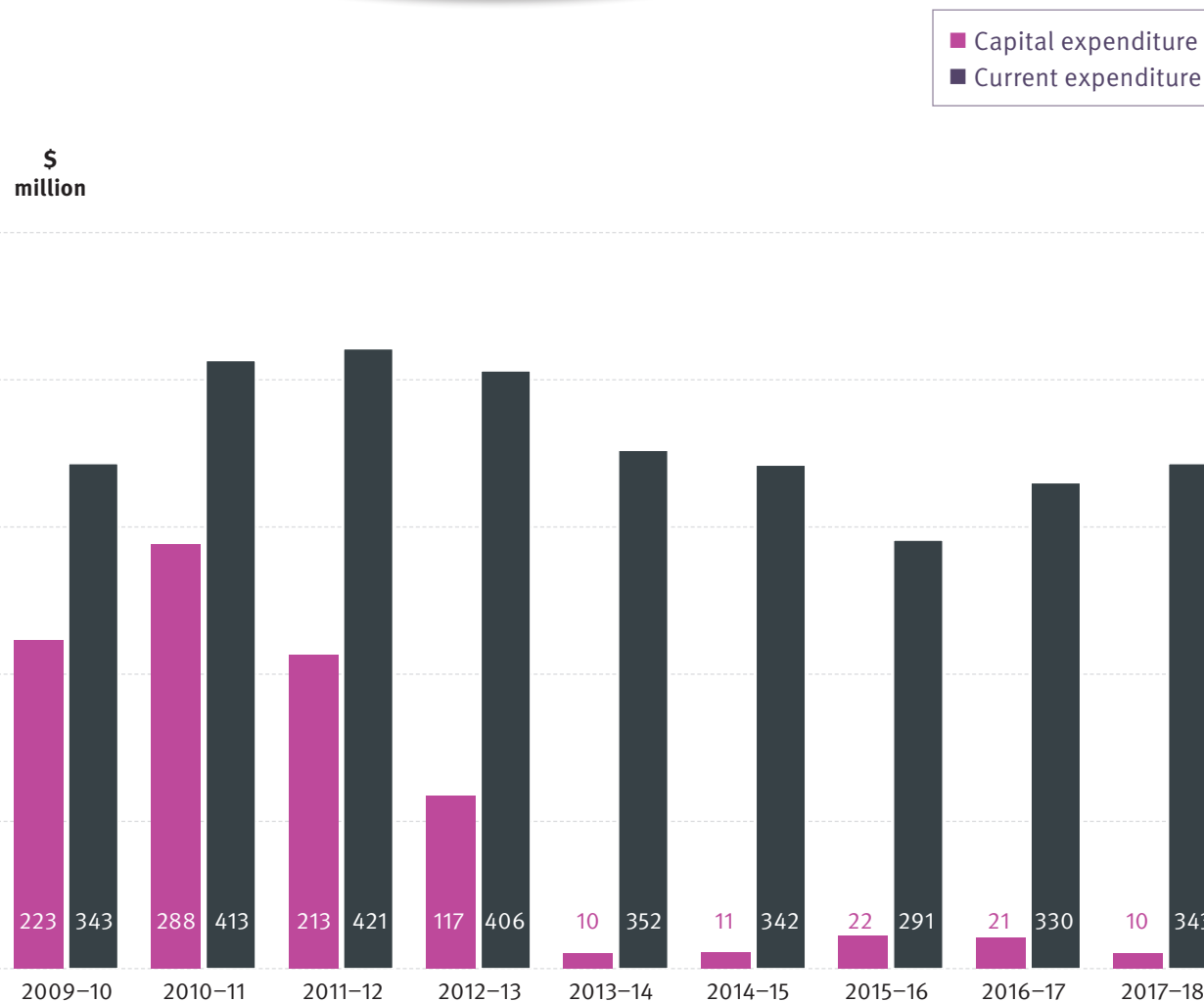
# Capital vs current expenditure

**Separate capital and current expenditure records are only available from 2009–10. Prior to this, only total expenditure amounts were recorded.**

Across the nine periods recorded, capital expenditure peaked at \$288 million in 2010–11, the second year of the significant investment in major research precincts.

Of the \$9.7 million capital expended in 2017–18, funds were mostly allocated to:

- research, evaluation and monitoring to facilitate investment on transport and main roads infrastructure (\$4.9 million)
- construction of the Australian Institute of Tropical Health and Medicine (AITHM) (\$2 million)
- purchase and installation of medical equipment relating to imaging (\$1.4 million).



# How much did each agency spend in 2017–18?

**The total Queensland Government R&D spend is \$352.8 million across 19 agencies (this includes Queensland Government funds and leveraged funds).**

The distribution ranges from \$60,000 spent by the Inspector-General Emergency Management to \$100.13 million by Queensland Health.

R&D expenditure of four agencies accounts for 77% of the total expenditure, including Queensland Health, Department of Agriculture and Fisheries, QIMR Berghofer Medical Research Institute, and the Department of Innovation, Tourism and Industry Development.

Traditionally Queensland Health and the Department of Agriculture and Fisheries are the highest spenders on R&D.

Queensland Health accounts for 28% of overall expenditure and is five times higher than the average spend across all 19 agencies.

NB: *There was a change of portfolios midway during the reporting period. Agencies are listed using the current names.*

\$ million

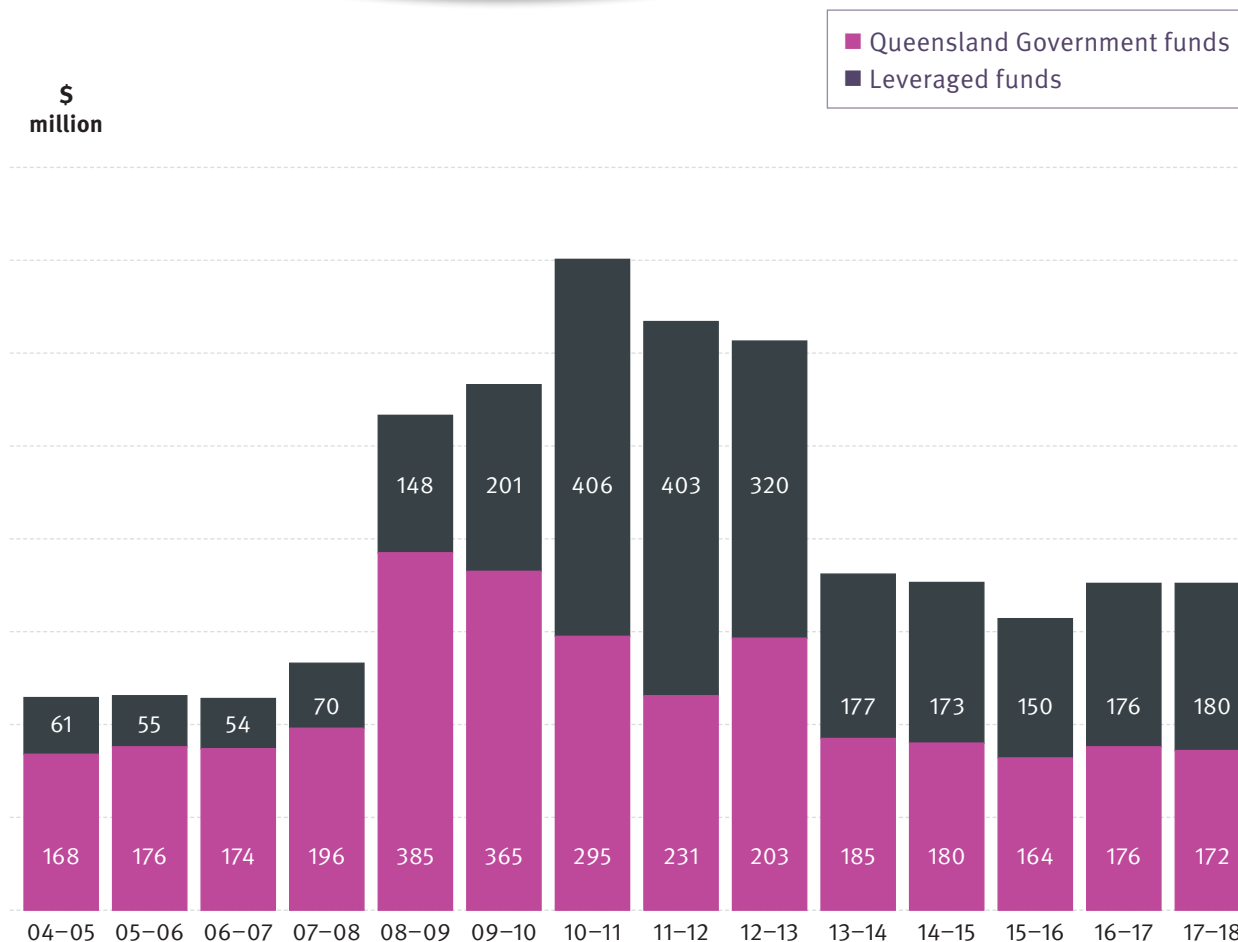
100.13	Queensland Health
96.98	Department of Agriculture and Fisheries
45.85	QIMR Berghofer Medical Research Institute
30.35	Department of Innovation, Tourism and Industry Development
14.26	Motor Accident Insurance Commission
13.64	Department of Transport and Main Roads
13.58	Department of Natural Resources, Mines and Energy
11.85	Department of Environment and Science
10.00	Queensland Treasury
9.91	Department of Education
1.43	Queensland Corrective Services
1.25	Queensland Museum
1.14	Department of Housing and Public Works
0.83	Queensland Fire and Emergency Services
0.76	Queensland Police Service
0.44	Department of Child Safety, Youth and Women
0.20	Department of the Premier and Cabinet
0.12	Department of Justice and Attorney-General
0.06	Inspector-General Emergency Management



## How was the funding sourced in 2004–18?

**Queensland Government funds** are those invested directly from state budget allocation. **Leveraged funds** are from non-Queensland Government organisations (which may include Australian Government, universities, private companies, overseas locations, etc.).

Since reporting commenced in 2004–05, leveraged funds have been slightly lower overall than the Queensland Government investment. Leverage in the last two years has been 1:1.



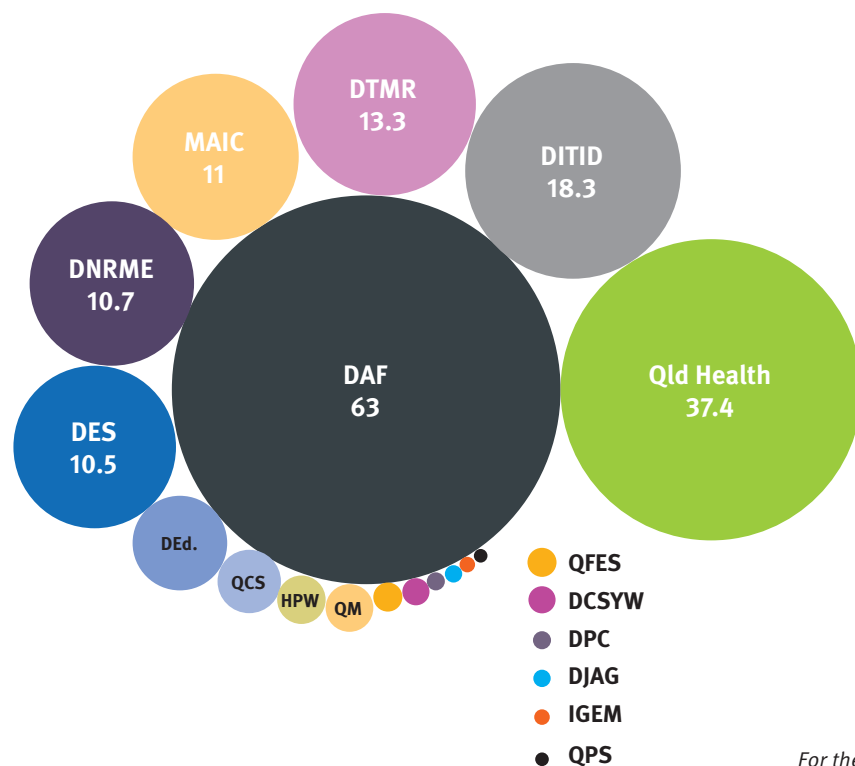
# How was the funding sourced by agencies in 2017–18?

**This year, leveraged funds are highly concentrated with just five of the 19 agencies representing 92% of the total.**

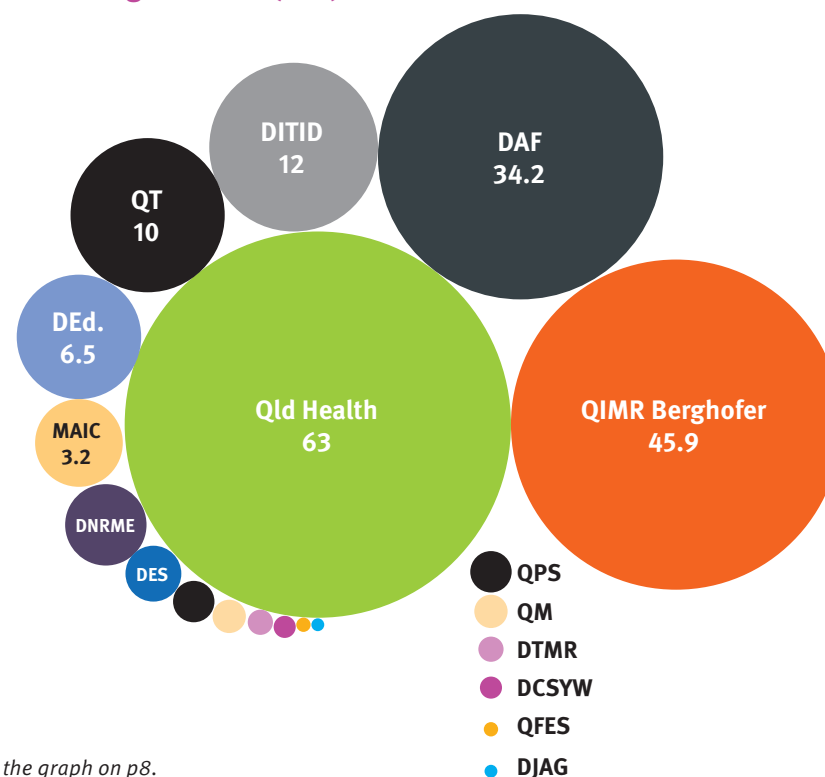
The Department of Agriculture and Fisheries was the highest spender of Queensland Government funds (\$63 million) and was third highest to attract leveraged funds (\$34.2 million) equating to a rate of around 1:0.55.

Queensland Health spent \$37.4 million on R&D and leveraged almost double its investment at \$62.8 million—equating to a rate of 1:1.68. This is almost seven times larger than the average across all 19 agencies.

Queensland Government funds (\$ m)



Leveraged funds (\$ m)



For the full name of agencies refer to the graph on p8.



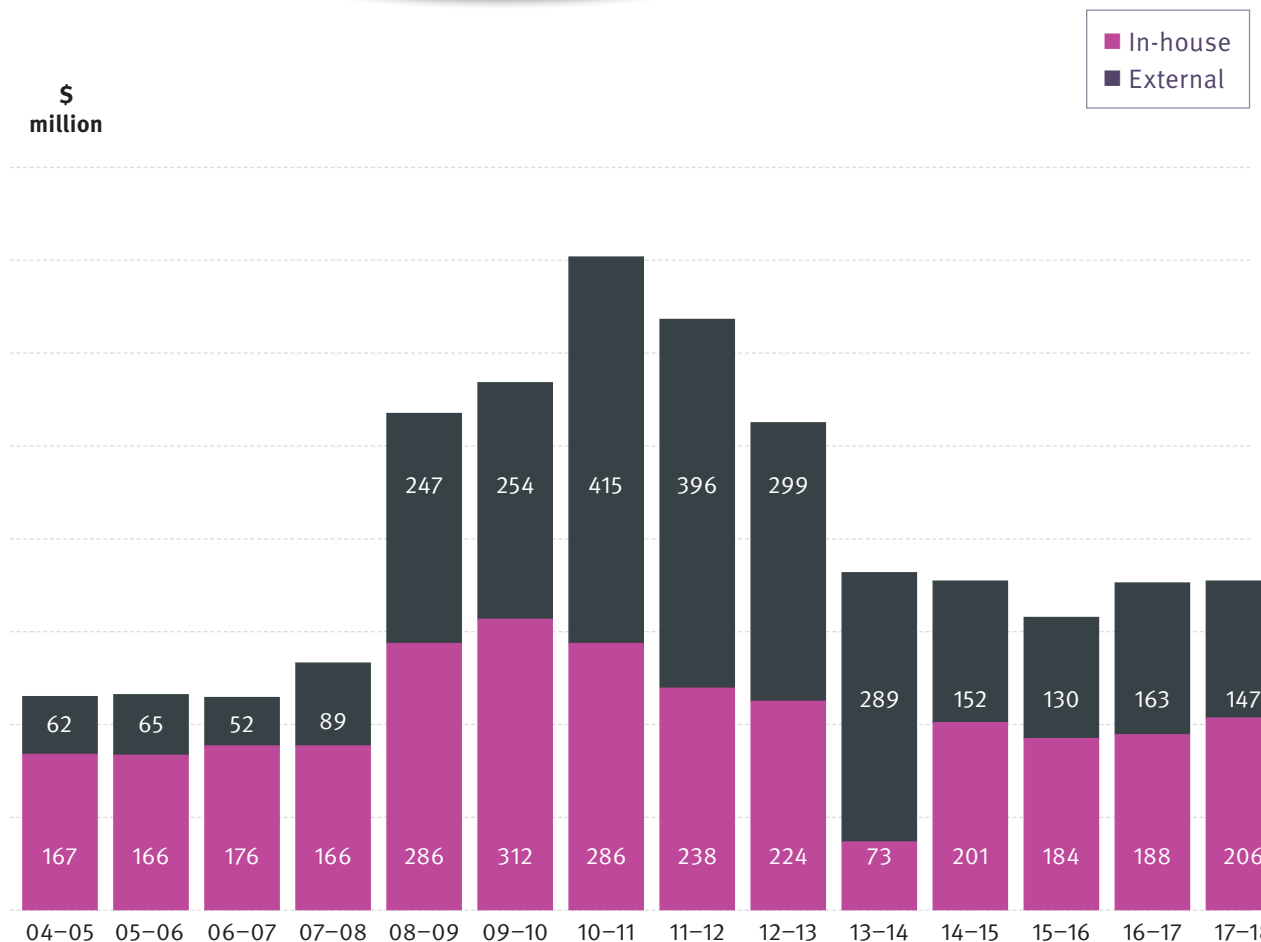
# Where was the research carried out in 2004–18?

**This graph shows where research was executed.**

In-house refers to R&D being conducted at Queensland Government sites, for example, the Ecosciences Precinct. R&D occurring at non-government sites, such as universities or other non-Queensland Government locations, has been categorised as external.

The graph gives a longitudinal representation of the high level of R&D activity traditionally occurring at government locations during the first four years of records (2004–08). The trend then reversed to higher activity and expenditure in external, non-Queensland Government locations, during projects between 2008–13.

Residual higher external funding was also present in 2013–14, after which R&D activity included construction of several major infrastructure facilities that reverted to a higher incidence of in-house R&D expenditure.



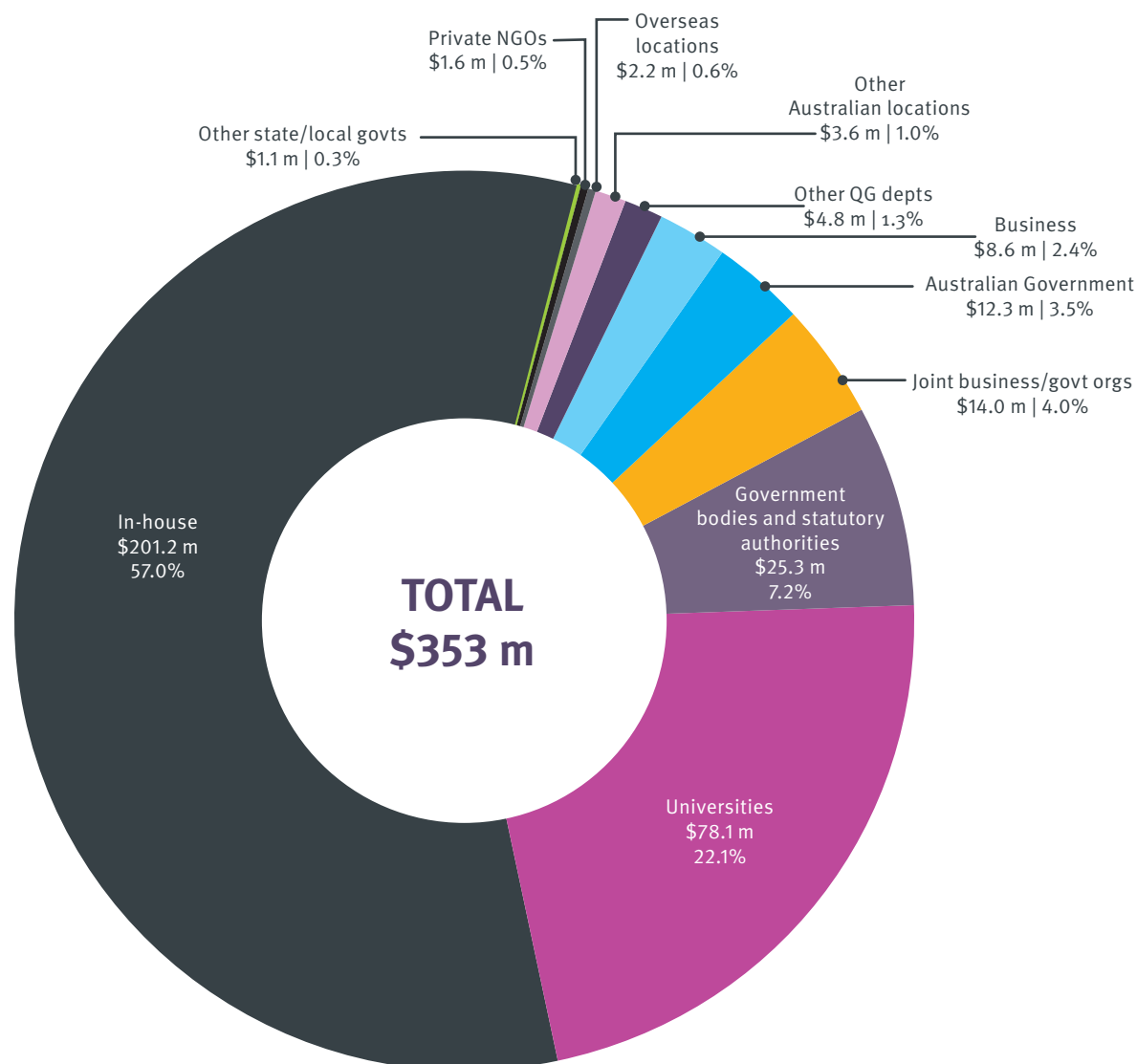
# Where was the research carried out in 2017–18?

**This pie chart breaks down the external component of the R&D spend to provide more details for this year.**

Nearly 60% of funding (\$206.1 million) was spent on R&D occurring in-house—at Queensland Government locations.

The remainder occurred in a variety of external locations including universities (22.1%), followed by other government bodies and statutory authorities (7.2%), joint business/government organisations (4.0%) and Australian Government (3.5%).

Minor work was carried out at private, non-profit organisations and with other state or local governments.





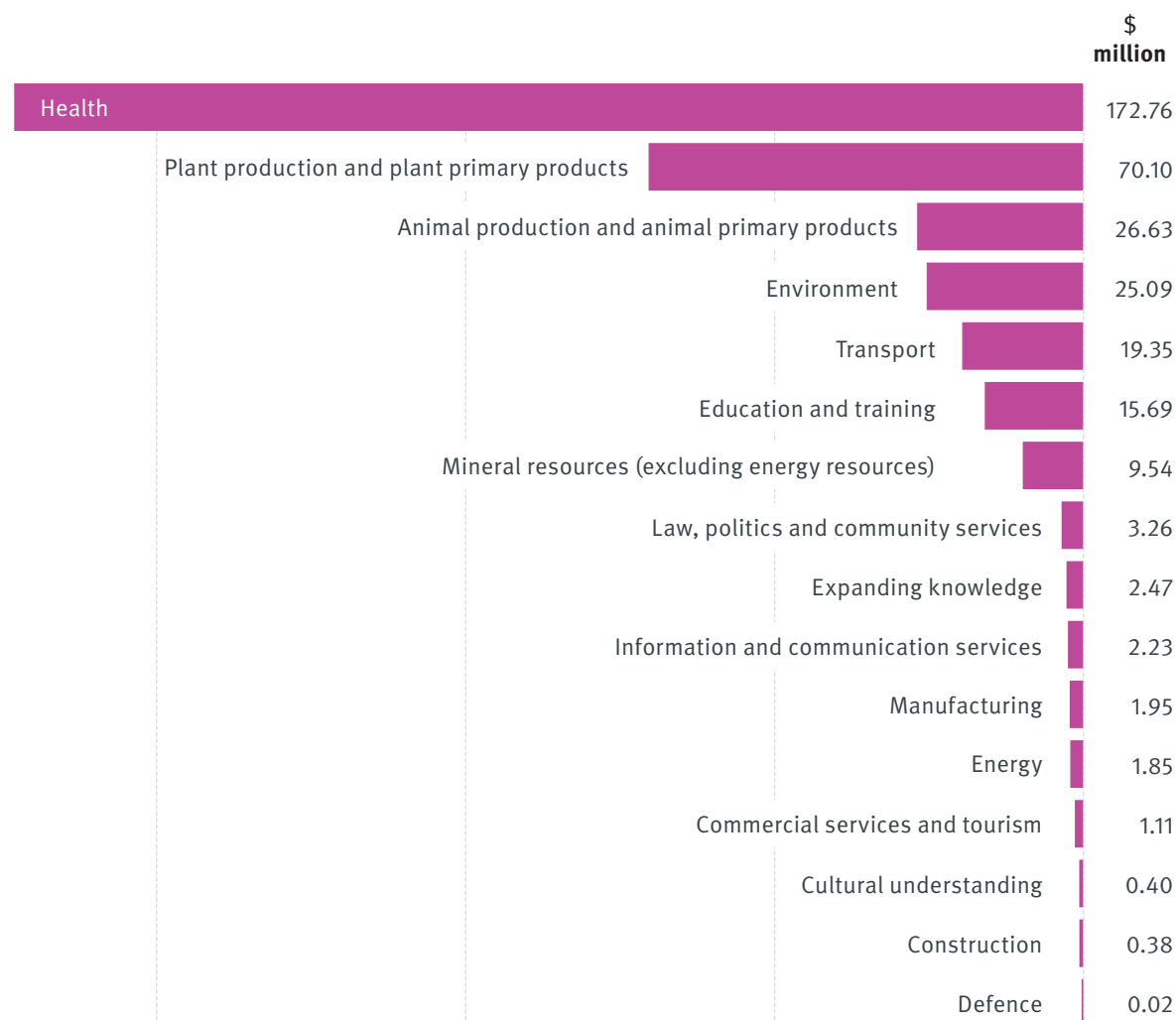
# What socio-economic objectives were covered?

## Agencies are able to classify R&D investment according to the Australian Bureau of Statistics' socio-economic objectives.

The objectives relate to the impact of the research and are standardised fields. Not surprisingly, the distribution of the expenditure by socio-economic objectives reflects the overall R&D expenditure distribution, in that 83% of the total distribution across the 16 objectives is represented by four objectives:

- health
- plant production and plant primary products
- animal production and animal primary products
- environment.

This is reflected by the investment portfolios of Queensland Health, the Department of Agriculture and Fisheries, and the QIMR Berghofer Medical Research Institute, and is in line with overall expenditure distribution that showed 77% of spending was executed by four of the 19 agencies.



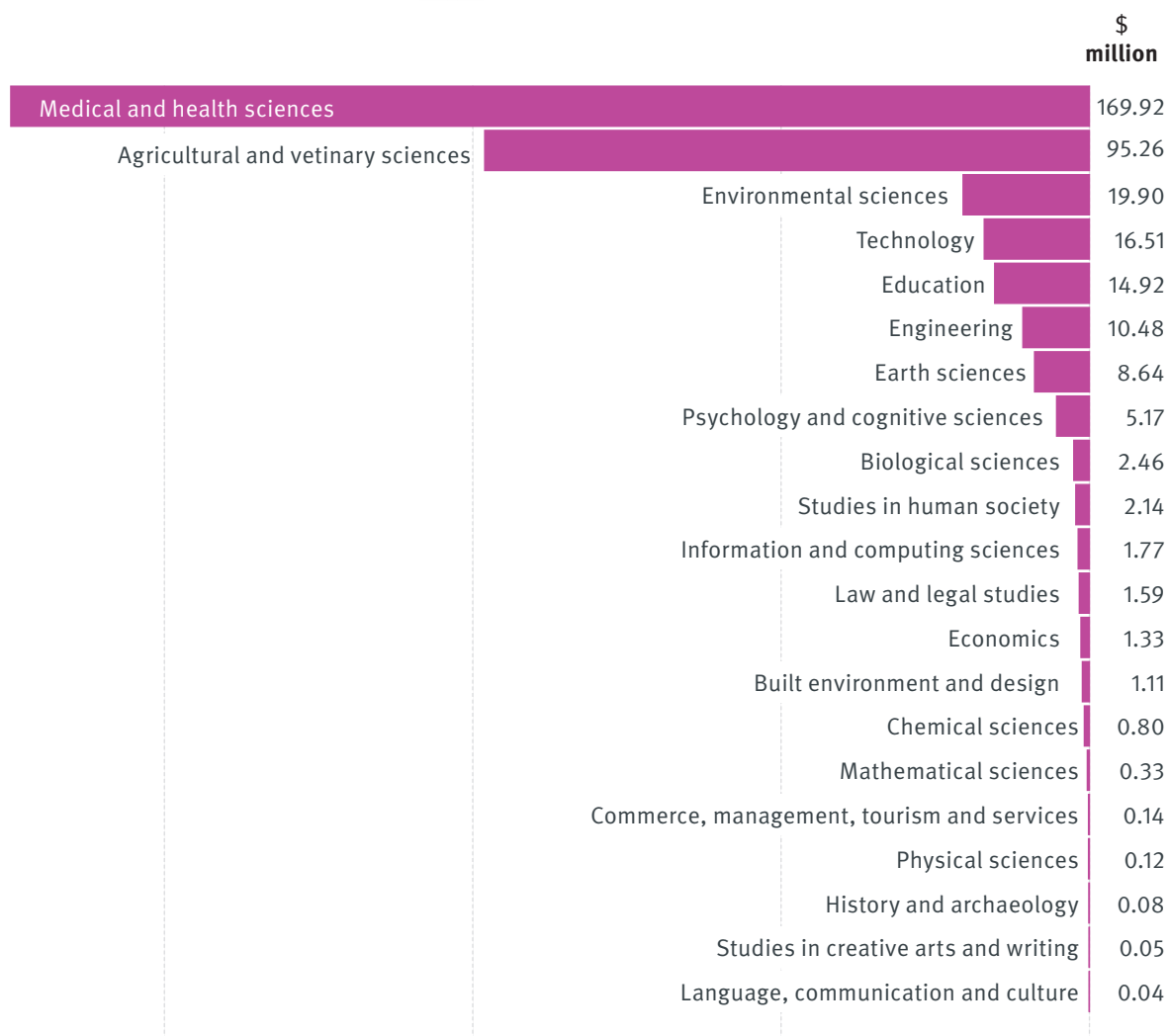
# What fields of research were covered?

**This list of research fields is defined by the Australian Bureau of Statistics and is in place to allow R&D activity to be categorised according to the methodology used—not the activity, nor the purpose.**

The analysis of R&D expenditure by field of research attributes \$169.9 million to medical and health sciences, and \$95.26 to agricultural and veterinary sciences.

This mirrors the two highest spending agencies in R&D, namely Queensland Health and the Department of Agriculture and Fisheries.

Medical and health sciences represents almost half (48%) of the expenditure, and is ten times larger than the average across the 21 fields. Of the total expenditure, 81% is highly concentrated into just three of the 21 fields of research.



# How is R&D delivering for Queenslanders?

## Cellular immunotherapies for multiple sclerosis and cancers

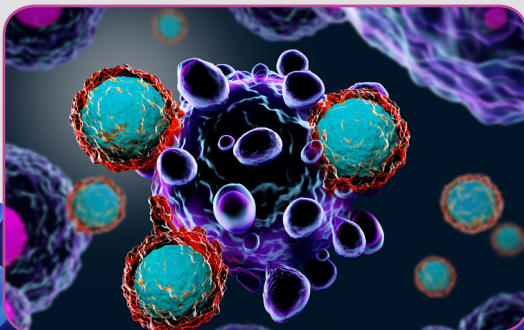
The Queensland Government helped QIMR Berghofer Medical Research Institute secure a deal with US biopharmaceutical company Atara Biotherapeutics with a \$1.4 million funding injection.

The funding will see an upgrade and expansion to Q-Gen Cell Therapeutics—a world-class, regulatory approved cell therapy manufacturing facility. This facility is used to develop cellular immunotherapies for conditions including multiple sclerosis and some cancers.

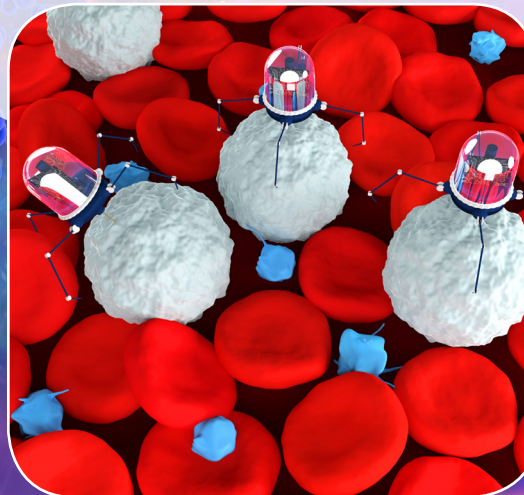
Immunotherapy works by training the immune system to recognise and destroy cancer and other harmful cells.

The Queensland Government's funding and the agreements between QIMR Berghofer and Atara will bring much-needed new T-cell immunotherapies to Queensland patients.

[Find out more](#)



**QIMR Berghofer Medical Research Institute together with collaborators, successfully designed tiny nanorobots, made of DNA and protein, to directly target tumours to stop them from growing. [Find out more](#)**



## Integration of genomics into everyday healthcare

The integration of genomics into everyday healthcare has the potential to be transformative with faster diagnosis, new treatments and more cost-effective service delivery.

The Queensland Government invested \$25 million in the Queensland Genomics Health Alliance over a five-year period (2016–20) to pioneer the translation and integration of genomics into everyday healthcare in Queensland.

In 2017, the first funding round allocated \$4.8 million for nine projects. Five of the nine projects focussed on building infrastructure, and four were clinical demonstration projects to help build the evidence base for clinical genomics in melanoma, infectious diseases, maturity onset diabetes of the young, and lung cancer.

Two more funding rounds are planned under the Queensland Genomics Health Alliance initiative.

[Find out more](#)





# How is R&D delivering for Queenslanders?

## Taxonomy of Australian trapdoor spiders

The *Idiopidae* are a family of trapdoor spiders found throughout the southern hemisphere.

Only 22 of the now 114 endemic species within the tribe *Aganippini* were previously described, while many remained undocumented.

Trapdoor spiders are of great conservation significance and vulnerable to extinction.

The project presented a complete taxonomic revision of the Australian *Aganippine idiopidae*, with a \$349,000 grant from the Australian Government to the Queensland and Western Australian museums.

The project will determine conservation priorities and help to document and understand the evolution of the spiders across Australia. So far it has resulted in 18 peer-reviewed research papers and received significant academic and media attention. [Find out more](#)



The Cooperative Research Centre for Living with Autism (Autism CRC) is working towards improving the quality of life of people with Autism Spectrum Disorder.

The centre has received financial support from the Australian Government and 55 participant organisations. [Find out more](#)

The Department of Housing and Public Works in conjunction with QUT, One-Stop-Shop Liquid Learning, Search365 and the Open Data Institute Queensland, is developing a proof of concept to transform standard record keeping to build an open, trustworthy data ecosystem in real time.

The system will have open and transparent access to government data offering insight and foresight to Queensland Government to make better decisions. [Find out more](#)



## Exceptional teaching in disadvantaged schools

An investment of \$150,000 from the Queensland Government has joined \$191,000 from the Australian Research Council to deliver a unique teacher education program aimed at preparing quality teachers for schools in low socio-economic communities.

The program has led to a national change in the quality of teaching in schools—initially in Queensland—and now rolling out nationally through a network of eight universities.

It provides specialised training to high-performing teaching graduates to encourage them to choose to work in low socio-economic status schools. [Find out more](#)



# How is R&D delivering for Queenslanders?

## Ipswich Connected Vehicle Pilot

The Queensland Department of Transport and Main Roads is delivering the Ipswich Connected Vehicle Pilot—currently Australia's largest on-road testing trial of cooperative vehicles and infrastructure. This pilot will help prepare for the arrival of new vehicle technologies with safety, mobility and environmental benefits on Queensland roads.

The pilot will involve up to 500 private and fleet vehicles retro-fitted with Cooperative Intelligent Transport Systems (C-ITS) devices that enable them to 'talk' to other connected vehicles, infrastructure, road operations systems and cloud-based data-sharing systems.

Planning for this large-scale project is well underway with approximately nine months of on-road trials to take place in, and around, Ipswich. The pilot is expected to commence in late 2019. [For out more](#)



## The Asian Market project

The Asian Market project will increase the value and profitability of Australian horticulture exports by improving its reputation for freshness and consistently high-quality product.

Australian exports of fresh horticulture to Asia is currently worth \$1.58 billion.

The project will begin with two significant horticulture chains, seven horticulture post-harvest R&D specialists from three Australian

organisations, the China Academy of Sciences and horticulture agribusiness researchers from two Australian universities. This will include support from service providers and export chains.

The \$10.5 million project is being funded the the Hort Frontiers strategic partnership initiative using matched co-investment payments of \$6.4 million to Hort Innovation which returns matched funds to the Department of Agriculture and Fisheries.

[Find out more](#)





# Thank you

The Office of the Queensland Chief Scientist has been working with Queensland Government departments and organisations since 2004 to identify R&D that is carried out or funded by the Queensland Government. The data is used to assess our investment in R&D and explore the partnerships and the research priorities that exist across government. Past reports are available on our [website](#).

We would like to thank the staff, internally and externally to government, for their assistance and continued collaboration in collecting R&D data.

Collection and finalisation of data is an extensive process that requires representatives from each department to collect and finalise a whole-of-department dataset. Once sent to the Office of the Queensland Chief Scientist for inclusion, a process to confirm and finalise the dataset begins. Data from this collection and previous expenditure collections is available on the [Queensland Government open data website](#).

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