Forensic and Scientific Services
an overview
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Foreword

Forensic and Scientific Services (FSS) is Australia’s most comprehensive forensic and public and environmental health facility—performing specialist analysis and giving independent advice to maintain and improve the health and safety of our community.

We are proud to serve the people of Queensland, providing services not only to Queensland Health, but also to other Queensland Government agencies and the private sector. Principal government clients include the Queensland Police Service (QPS) and the Coroners Court of Queensland.

We also provide a limited range of services directly to members of the public, for example to families bereaved by deaths reported to the Coroners Court of Queensland.

The wellbeing of Queenslanders is at the heart of our work. This is complemented by our engagement with national and international bodies such as the World Health Organization.

As national leaders in our field, we use the latest technology to investigate and respond to public health threats, epidemics, civil emergencies, as well as to support criminal and coronial investigations.

We employ a unique range of highly-qualified and experienced professionals, including medical specialists, scientists, technicians, nurses, counsellors, mortuary assistants, librarians and support staff.

At FSS we are proud of our expert teams— their dedication to excellence, commitment to our customers and the delivery of innovative services for Queenslanders.
Our people
We employ around 400 people who work across a range of disciplines. The majority of our staff are located at our Coopers Plains campus in Brisbane.

Our people and teams are highly qualified, experienced and responsive. We are dedicated to delivering excellence through hard work, innovation and consistent delivery of high-quality services to the Queensland community.

Our teams include administrative and operational staff, microbiologists, chemists, counsellors and social workers, dental practitioners, laboratory scientists, information professionals, medical imaging professionals, medical practitioners, medical technicians, psychologists, radiation physicists, radio-chemists, radiologists, registered nurses, science technicians, forensic pathologists and laboratory assistants.

We provide scientific testing and expert analysis and advice on forensic, public and environmental health testing including DNA analysis, forensic chemistry, toxicology, pathology (autopsies), forensic medical services, public health microbiology and virology, environmental chemistry and radiation science.

FSS plays a critical role in the government’s response to epidemics, civil emergencies and public health threats.

**Professional development**

We provide ongoing professional development for our staff through a competency-based training and assessment framework. Our capability development program includes role-specific learning pathways.

Our Scientific Skills Development Unit has developed evidence-based competency statements to recognise and formalise staff competencies gained on-site.

We use training modules to assess ongoing competency and facilitate the maintenance and development of professional and clinical skills.

In-house training, education programs, seminars and conferences are available to all staff. Working groups and special interest groups are selectively available as the need arises.

Our operational and administrative officers have access to education and training incentive funds to undertake vocational training. The study and research assistance scheme also provides staff with the opportunity to access further education.

We also offer placements for tertiary students, providing them with an opportunity to develop skills and gain knowledge about FSS and the services we deliver.

FSS is accredited with the Royal College of Pathologists of Australasia for training in anatomical and forensic pathology.
Our facilities
Our Coopers Plains campus fosters collaboration between researchers working in biosecurity and food technology, as well as public health and forensic investigations.

FSS is a state-wide service, delivered primarily from our campus at Coopers Plains, Brisbane.

Our campus incorporates the Health and Food Science Precinct which hosts scientists from:

- Commonwealth Scientific and Industrial Research Organisation
- Department of Agriculture and Fisheries
- Queensland Alliance for Agriculture and Food Innovation.

Also on site are the Queensland Bone Bank, Metro South Public Health Unit and specialised teams employed by the QPS.

Our laboratories are accredited by the National Association of Testing Authorities against international standards. The Department of Agriculture and Water Resources have also approved our laboratories for the use and storage of material subject to biosecurity control.

The Radiation and Nuclear Science unit is one of only three recognised laboratories in Australia that form part of the Analytical Laboratories for the Measurement of Environmental Radioactivity group under the International Atomic Energy Agency. FSS also is a state reference laboratory for a number of diseases and organisms that are of public health significance.

Our Leptospirosis reference laboratory is accredited by the World Health Organization and the Office of International des Epizooties. We collaborate extensively with universities and government departments and perform research, surveillance and diagnosis in the human and veterinary fields across Australia and the Western Pacific Region.
Our customers
FSS plays a critical role in the government’s response to epidemics, civil emergencies and public health threats.

We have a broad range of customers including:

- Minister for Health and Minister for Ambulance Services (Qld)
- Chief Health Officer, Queensland Health
- Public and environmental health units and medical specialists
- Pathology Queensland
- Donor tissue banks
- Queensland Police Service
- Queensland Fire and Emergency Services
- State Coroner and Coroner Courts of Queensland
- Office of the Director of Public Prosecutions
- Legal Aid
- Department of Justice and Attorney-General
- Department of Agriculture and Fisheries
- Australian Department of Agriculture and Water Resources
- Department of Natural Resources, Mines and Energy
- Department of Science, Information Technology and Innovation
- Local government and industry
- Queensland community
- Private sector including universities
- International and national agencies and networks such as the World Health Organization and the Royal College of Pathologists of Australasia.
Our services
Forensic and public health property points and client liaison

The Forensic Property Point provides support and liaison services to internal and external clients, ensuring that contact is appropriately directed to the correct team.

We assist our forensic laboratories with prioritising cases for the Queensland Police Services and the Queensland Courts.

Our Scientific Services Liaison Unit (SSLU) is integral to the management and prioritisation of cases within Forensic and Scientific Services. SSLU is the first point of contact for incoming calls and their expertise within the organisation ensures the caller is directed to the correct area without delay. Staff coordinate transfer of samples within Forensic and Scientific Services, coordinate court appearances and travel requirements of staff, ensure that all statements and certificates are recorded and available for the courts, and ensure the correct information is entered into the laboratory information management systems and the Forensic Register. Additionally, they liaise with the courts to ensure appropriate time frames for analysis are in place.

Our Public Health Property Point receipt, check, sort, register and distribute samples including notifiable disease samples, pathology specimens, local council and private client environmental samples, and any sample related to the work being undertaken by the public and environmental health laboratory service.

The Forensic Property Point receipt, check, sort, register and distribute all samples submitted by the QPS for forensic testing. Our service ensures that procedures to maintain the chain of custody are applied correctly.

All property point facilities ensure safe access and storage, and the security of evidence and samples.
Clinical forensic medicine

Our clinical forensic medicine services collect and interpret medical evidence for the Coroners Court of Queensland, 24 hours a day, 7 days a week.

We provide:

- evidence collection, examination, documentation and interpretation of injuries of victims and alleged perpetrators in the investigation of crimes against the person such as physical and sexual assault of adults
- examination and treatment of police detainees including prisoner health, evidentiary examinations and evidence collection
- same-day reporting to the Coroner on healthcare-related deaths and other deaths in the Coroner’s jurisdiction
- assessment and medico-legal opinions involving traffic medicine including injury interpretation, drug and alcohol effects, medical causes contributing to crash causation and fitness to drive

- assessment and expert opinions regarding the clinical effects and toxicology of alcohol and drugs whether legal or otherwise
- expert opinions regarding medical issues for the legal system including criminal prosecutions, coronial investigations, medical board investigations and civil litigation.

Our expert medical staff are utilised by the QPS, the Office of the Director of Public Prosecutions and the Coroners Court of Queensland.
Coronial services

We provide coronial services, including forensic pathology and forensic toxicology. Our dedicated professionals work closely with the State Coroner, other coroners, coronial staff and police officers, including homicide detectives, police scientists, scenes of crime officers and investigators.

Forensic pathology

Forensic pathology includes a broad range of services including:
• conducting autopsies and examinations ordered by the coroners
• providing specialist forensic services such as histology, neuropathology and post-mortem CT scanning
• facilitating the issue of Cause of Death Certificates in non-suspicious natural deaths where appropriate
• providing expert opinions about causes and circumstances of death
• interpreting autopsy test results, including alcohol, drugs and poisons
• providing court evidence in inquests and trials and advice to prosecuting and defence counsel
• advising and supporting families bereaved by deaths reported to coroners
• providing training of medical specialists in forensic pathology accredited by the Royal College of Pathologists of Australasia.

We also provide services such as disaster victim identification, anthropology and forensic dentistry. We provide advice on mortuary practices, posthumous sperm donation, proposed amendments to medico-legal legislation and inspect anatomy schools.

Forensic toxicology

Forensic toxicology involves the analysis, detection, identification, measurement and interpretation of alcohol, drugs, poisons and other substances in human samples including blood, urine, saliva and other fluids and tissues.

Our two main services include:
• testing of samples from autopsies ordered by the coroners
• testing of samples from living subjects for the QPS, such as alcohol and drugs in drivers and specialist testing for drugs in assault victims.

This information is used to report on substances that may or may not have contributed to an accident or death, impaired behaviour, such as in drivers or involvement in criminal activity.

Our services include:
• providing rapid overnight coronial drug testing services
• preparing certified reference materials for the QPS breath analysis unit
• conducting workplace drug testing of police officers involved in critical incidents
• providing expert opinion and advice on issues relating to forensic toxicology
• road policing command examples.
Police services

We provide forensic DNA analysis and forensic chemistry services for the Queensland Police Service, the Coroners Court of Queensland and some private clients.

The services we provide to the QPS include:
• assisting with missing persons and victims of disasters
• providing impartial expert evidence in all levels of the judicial system
• providing training and advice to the QPS, the Office of the Director for Public Prosecutions and the Coroners Court of Queensland.

Forensic DNA analysis
Our forensic DNA analysis services include:
• examining and testing biological items delivered from alleged crime scenes to generate a DNA profile
• reporting interpretations of DNA profiles, including the use of the National Criminal Investigation DNA Database on behalf of the QPS
• preparing of court documents and the provision of expert evidence in court.

Forensic chemistry
Our forensic chemistry services include:
• examining, testing and reporting on seized items related to pills, powders, liquids, food and utensils suspected to be associated with dangerous drugs
• providing information to law enforcement agencies on emerging drug trends and new drug types
• providing on-call assistance to the QPS to dismantle and collect evidence from hazardous crime scenes which involve a clandestine drug laboratory
• analytical testing, reporting and expert evidence on items related to the manufacturing of suspected dangerous drugs or illicit drug material
• testing and reporting on cases; comparison of items such as fibres, textiles, oils, and identification of unknown items such as explosives and chemical warfare agents.
Public and environmental health

Our laboratories work to identify chemicals, radiation, bacteria and viruses in environmental and biological samples to ensure the safety of Queensland’s food, drinking water, soil, air and waterways.

Inorganic chemistry laboratory

We provide expert analysis of metals, elements and inorganic pollutants in environmental samples such as water, soil and sediments, food, blood, urine and other biological tissues.

Analytical testing offered by the laboratory:
- physical properties of water (including hardness and corrosiveness)
- nitrogen and phosphorus analysis
- metal contaminants in environmental samples
- determination of trace elements in biological fluids and food samples
- carbon analysis in water, soil and sediment samples.

We provide expert and unbiased advice to relevant authorities and stakeholders on:
- water quality and assessment
- fluoride level compliance
- waste discharge monitoring
- food compliance and complaint investigations
- country of origin testing
- air-monitoring (occupational and environmental)
- chemical exposure testing
- responses to public health events and terrorist threats relating to environmental contamination.
Organic chemistry laboratory

We provide expert chemical, molecular and scientific advice and analysis services to all levels of government, industry and the private sector.

State-of-the-art instrumentation allows us to provide an extensive range of testing, research and investigation for environmental and food samples.

Our advice and services are focused on the levels of organic pollutants, contaminants and toxins in public health samples and in the environment. We test water, soil, food, air, vegetation and other samples as requested.

We test water for:
- disinfection by-products
- endocrine disrupting compounds
- hydrocarbons
- perfluorinated compounds
- pesticides and herbicides
- pharmaceuticals and personal care products
- perfluorinated compounds
- pesticides and herbicides
- sewage epidemiology of dangerous or illicit drugs
- algae identification and enumeration
- DNA-based detection of toxic blue-green algae
- freshwater and marine cyanobacterial toxins.

We test food for:
- food compliance and complaint investigations
- nutrition panel composition
- DNA identification of plant, animal, fungal and bacterial species in fresh and processed foods
- pesticides and other residues
- toxic alkaloids in honey, herbal teas and plant material
- toxins in seafood (including ciguatera toxin, paralytic, diarrhetic and amnesic shellfish poison, nodularin)
- pesticides in seafood.

We test air for:
- environmental investigations
- sick buildings
- occupational exposure.

We test vegetation for:
- herbicide poisoning
- spray drift poisoning.

Our specialist testing includes:
- agricultural dipping/spraying solution testing
- chemical exposure testing (blood/urine for pesticides, herbicides, polyfluoroalkyl substances)
- Chinese and herbal medicine analysis
- country-of-origin testing (isotope-ratio mass spectrometry)
- collaborative research into emerging chemical analysis
- development of new services to respond to our client’s needs
- mass spectrometry screening and quantitation for unknown chemicals
- rapid response to public health events including collaboration with Queensland Fire and Emergency Services during chemical emergencies.
We provide public and environmental health advice and assessment, monitoring and surveillance services to all levels of government and private sector clients.

**Radiation and nuclear sciences**

Our advice and assessment is focused on the measurement, impact, use and safety of radiation sources, including naturally-occurring radioactive material, medical and industrial radiation devices and radioactive waste.

We provide specialist radiation advisory, consultancy and measurement services, and have an active research focus delivering novel solutions in areas including radioecology, climate change and geomedicine.

Our services include:

- radiochemistry and radio-analytical laboratory measurement capabilities of:
  - water, soils, sediments and solid materials
  - air and biota and food using low level liquid scintillation spectrometry
  - alpha and gamma spectrometry, radon monitoring and other advanced radiometric measurement techniques
- professional scientific consultancy such as conducting on-site radiation investigations and audits, radiation surveys and sampling; site and situation assessments, transportation of radioactive substances, waste consolidation and disposal,
- environmental health physics programs including surveillance and monitoring, provision of professional advice, and compliance and clearance certifications,
- instrument compliance testing and calibration checks for environmental survey meters and protection-level radiation survey meters,
- radioanalytical and post-incident remediation services as part of the Queensland Government and Queensland Health emergency response capability,
- customised radiation safety training programs.

Our staff hold licences to use and transport radiation sources under the *Queensland Radiation Safety Act 1999*, and are accredited for certifying radiation devices and facilities.

We are a ISO9001 systems certified public and environmental health and research group.

We are members of, and actively participate in state (Queensland Health), national (Australian Radiation Protection and Nuclear Safety Agency), and international (Atomic Energy Agency’s Analytical Laboratories for the Measurement of Environmental Radioactivity) emergency response networks.
We provide expert scientific knowledge and laboratory investigation for notifiable bacterial pathogens and bacterially/toxin-mediated outbreaks.

Public health microbiology
Our microbiology reference laboratories provide a tertiary referral service for notifiable bacterial pathogens at local, national and international levels.

We use surveillance and epidemiological data to provide high quality reference and diagnostic services to a wide range of public health and clinical clients.

We are a one-stop shop for bacterial outbreak investigations, analysing all samples including:

- food – undertaking microbiological surveillance of foods available in the marketplace; investigating and surveying of foodborne illnesses, analysing and identifying moulds and detecting foodborne pathogens and their toxins, national reporting of foodborne disease outbreaks
- water – investigating water quality and bacterial outbreaks from consuming, ingesting or inhaling contaminated water (e.g. drinking, dialysis, swimming, waste and recycled water)
- molecular epidemiology – genotyping major bacterial pathogens and typing bacteria for identifying and characterising disease outbreaks, transmission sources and emerging diseases
- reference microbiology – investigation, surveillance and typing of bacterial notifiable pathogens and bacterial outbreaks at local, national and international levels
- leptospirosis – providing expert analysis, advice, diagnostic support and reference services for Leptospirosis investigations and outbreaks.

We investigate outbreaks of viral diseases including measles, gastroenteritis, dengue and Zika which affect Queenslanders.

Public health virology
Our laboratory provides state-wide specialist diagnostic services and surveillance for viruses and mosquito- and tick-borne pathogens of medical importance.

We investigate outbreaks of disease caused by infection with viruses such as measles, norovirus, gastroenteritis, dengue and Zika, which are of public health significance to Queensland. We perform surveillance of viruses and mosquitoes for local, state and federal authorities who can undertake targeted public health responses.

We have the capacity to respond to any public health crisis involving emerging or re-emerging viruses and rickettsiae, whether they be endemic or exotic to Queensland.

Our teams:
- investigate virus outbreaks of public health significance such as those caused by noroviruses
- detect, conduct surveillance and report on medically important arbovirus such as dengue, West Nile, yellow fever, Zika and chikungunya viruses
- perform influenza virus-typing and culture
- conduct research on viral diseases of public health importance
- perform genotyping to identify and track virus outbreaks
- investigate mosquitoes and other arthropods to determine their capacity to become infected with, and transmit viruses
- identify medically important mosquito species using morphological and molecular methods.
Research, development and collaboration are fundamental to the ongoing growth, relevance and innovation of the services we provide.

Forensic and Scientific Services is the only laboratory in Australia to provide both forensic and public health services in one location.

We conduct analytical, forensic and applied research in collaboration with other government agencies, universities, industry groups and specialist research organisations across the world and offer a unique selection of research assets. These include an extensive collection of reference and clinical samples, specialised equipment, large datasets and a highly-trained and educated workforce.

Our research priorities help improve the safety and security of Queenslanders and encompass areas such as biology, chemistry, radiology, and forensic medicine and science.

These research priorities include:

- illicit drugs
- forensic and environmental toxicology
- forensic pathology
- mortuary practice
- post-mortem CT scanning
- chemical criminalistics
- biology and DNA analysis
- advanced diagnostics
- allergens in food
- air, water and food quality
- radiation investigations
- phylogenetics and evolution
- phenotypic, molecular and genomic technologies
- disease reservoirs and source tracking
- novel surveillance and control strategies for arboviruses.
Research and development

Research and development is integral to Forensic and Scientific Services. It is focused on the health of Queenslanders and is based on real-world problems which influence our local population and environment.

Each of the scientific disciplines identifies research projects that may improve our capacity and capability.

Our police and coronial services teams are at the forefront of forensic science research and emerging trends. The Public and Environmental Health teams research diseases, vectors and environmental contaminants which are of public health importance.

The research office coordinates the governance of all research activities and provides advice and support for stakeholders interested in fostering a research partnership. We assist staff to obtain relevant regulatory approvals and deliver research outcomes for the organisation that are safe, ethical, and scientifically robust and in accordance with our research governance framework.

Our success was recently acknowledged as the first laboratory in Australia to isolate and characterise the emerging and infectious Zika virus in a clinical patient. Our research activities were targeted to meet real and urgent client needs.

Ethics committees

The FSS Human Ethics Committee was established in 1995 and has responsibility for and expertise in review of research applications involving the use of coronial materials including data.

The Forensic and Scientific Services Human Ethics Committee is responsible for reviewing:

- the use of human samples submitted to Forensic and Scientific Services for testing
- the use of data about human subjects held at Forensic and Scientific Services
- access to coronial autopsies, including retrieval of tissue, for purposes other than coronial investigation
- non-research practices at Forensic and Scientific Services that raise ethical issues.

The committee is constituted and functions in accordance with the National Health and Medical Research Council’s National Statement on Ethical Conduct in Human Research (2007) – updated 2018.

The FSS Animal Ethics Committee is responsible for FSS compliance to the Australian code for the care and use of animals for scientific purposes (2013).
Partnerships
We collaborate with industry, government and academic partners to ensure diagnostic capabilities meet future operational requirements and contribute to advancements in forensic and health science.

We offer our partners access to state-of-the-art infrastructure, resources, diverse multi-disciplinary teams and individual expertise. Our collaborative approach to delivering forensic and public health solutions and improvements to community safety and wellbeing is strongly encouraged and supported through our research activities.

Collaborative opportunities include:
• forming a long-term strategic alliance
• sharing resources and expertise
• sponsoring or collaborating on a research project
• mentoring, advising or coaching students through our student placement program.

Our laboratories have a strong history of collaborative research and developing partnerships. Past collaborations have included preparing joint grant applications, establishing centres of excellence, participating in staff exchanges and providing access to our state-of-the-art equipment.

Our facilities, equipment and technology
The unique co-location of public health and forensic sciences at our Coopers Plains facility ensures that our people have access to a wide range of analytical equipment and techniques including:
• high containment laboratories at levels 2, 3 and 4
• whole genome and next generation sequencing
• liquid chromatography tandem mass spectrometer
• CT scanning and imaging.

We are always looking for opportunities to collaborate on research and development initiatives. If you interested in collaborating or partnering with us, please email us at FSS_Research@health.qld.gov.au or phone us on 1800 000 377.
Contact us

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Acronyms

FSS  Forensic and Scientific Services
HSQ  Health Support Queensland
JAG  Queensland Department of Justice and Attorney-General
QFES  Queensland Fire and Emergency Services
QH  Queensland Health
QPS  Queensland Police Service
About Health Support Queensland

FSS is part of Health Support Queensland (HSQ). HSQ delivers the best health support services for a safer and healthier Queensland, as part of Queensland Health.

HSQ delivers a wide range of diagnostic, scientific, clinical support and payroll services to enable the delivery of frontline healthcare, providing critical services to Hospital and Health Services, government agencies, commercial clients and the community.