



**Norman
Disney &
Young**
A TETRA TECH COMPANY

Laboratories

Capability Statement

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**NDY by
numbers**

 established
1959

 **600+**
people

 **9**
key markets

12 
offices

 **5**
countries

Introduction

“Delivering high level consulting design excellence in research teaching, laboratories, cleanrooms, scientific research and containment facilities.”



Hear from our thought leaders on the future of laboratory design
<http://youtu.be/t8bdS5tEoN0>

Established in 1959, Norman Disney & Young (NDY) has a long and proud history of offering an extensive range of engineering services and delivering award-winning world-class, complex laboratory and controlled environment projects.

Iconic project examples include the South Australian Health & Medical Research Institute (SAHMRI) in Adelaide, The Telethon Kids institute in Perth, WEBS, UNSW, NZ Glasshouse, AFP Canberra, the Murdoch Children's Research Institute as part of the New Royal Children's Hospital project, and La Trobe Institute for Molecular Science.

As a leader in this highly specialised field, NDY recognise the value of deploying a team of experienced specialists.

Our team is well equipped to comprehend the nature of research or process themes and their functional requirements. We work collaboratively to provide constructive input in the shaping of project expectations.

We have assembled such a team under the leadership of Brad George, Director of Laboratories. Our team will contribute innovative laboratory engineering services concepts and solutions that address the project objectives, and help to ensure the concepts are relevant and empathetic with the architectural design concepts.

Our goal at the outset is to understand and embrace clients' business objectives to deliver high quality customer service. We look forward to discussing and assisting you to develop and realise your aspirations for your next project.

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Our **values**

Excellence

Do it once, do it well

Leadership

**Lead in our profession, industry
and the community**

Integrity

Treat others as we wish to be treated

Collaboration

Listen, share and contribute

Accountability & Ownership

**Understand the impact of our actions
and own the outcomes**

Innovation

Inspired creativity to challenge the norm

Our purpose
is making
spaces work

Our **vision**

To enhance the lives of others,
by engineering outstanding projects,
mindful that every project matters.

To sustain deep and trusting
relationships with our clients,
through solving their problems and
serving them with utmost reliability,

and

To engage our people with
meaningful, rewarding and
inspiring opportunities.

Our ethical statement

NDY has a proud tradition of upholding the highest ethical standards in the manner by which we conduct ourselves as a company. Read our ethical statement at www.ndy.com/about-us/our-ethical-statement



South Australian Health and Medical Research Institute, SA

What **we** do

As consulting engineers, our purpose is **Making Spaces Work**. We listen to the unique requirements of each client, and tailor our services accordingly to every project.

Our collaborative approach to excellence and innovation are core values at NDY. We consistently deliver best practice sustainable building design solutions to achieve our clients' objectives.

Clients come to NDY because they want quality. We take ownership and provide clear recommendations while consulting with the utmost integrity.

Most of all, clients come to us because we listen. We look forward to better understanding your business and collaborating with you to achieve successful outcomes.

Our markets

- Civic (including Correctional)
- Education
- Health
- Industrial
- Mission Critical
- Offices
- Residential & Hotels
- Retail
- Transport

Our services

- Acoustics
- Asset Performance
- Audio Visual
- BIM (Building Information Modelling)
- Commissioning Management
- Communications
- Controls & System Integration
- Electrical
- Fire Engineering
- Fire Protection
- Hydraulics
- ICT Consultancy
- Interiors
- Mechanical
- NDYLIGHT (Specialist Lighting Design)
- Property Consultancy
- Security (including Cyber Security)
- Sustainability
- Vertical Transportation

Our approach

Laboratories present a unique challenge in relation to their need for operational flexibility to accommodate changing research themes and spatial requirements. The key to satisfying this requirement is designing a facility that not only meets the briefed requirements of the initial stakeholders but, within reason, has the capability to accommodate the changing needs of users and the growing use of automated laboratory equipment.

Our approach to successfully delivering complex laboratory projects that effectively address these challenging design criteria embodies the following.

Deployment of Experienced Specialist Team

- › Multi-disciplinary designers with solid laboratory & controlled environment experience that work collaboratively with the client to achieve the desired outcome.
- › Sector specific understanding of operational functionality and key business drivers behind each client's project needs.
- › Expertise and passion for the sector drive innovative solutions which evolve from constructive challenging of the brief with suggestions for more cost effective alternatives.
- › A design focus on the safety and comfort of the laboratory occupants.
- › Delivering sustainable solutions that reduce energy usage and minimise negative impact on the surrounding environment.
- › Successful delivery of the project by our team dedicated to achieving client satisfaction.

Effective Briefing Process

- › Strong leadership during our structured time-effective workshop style briefing process.
- › Focus on understanding the project requirements and on ensuring that stakeholders are active and motivated participants during the design development journey.
- › Pragmatic approach to flexibility & adaptability provisions, to accommodate the evolution of changing user needs. i.e. design modularity, shell-space, soft space, and extent of support services.
- › Engineering systems designed to be extended while maintaining business continuity whilst avoiding the commitment of capital funds to redundant plant for possible future use.
- › Effective translation of the brief into design content based on precise industry knowledge and the appropriate level of infrastructure required to support those functions.
- › Strategic planning of ICT system solutions that provide for optimised integration of technology and communications. Decisions in relation to engineering ICT innovations and technology to reduce operational costs.





Royal Childrens Hospital, Melbourne, VIC

Our approach continued

Concept Design

- › Focus on developing and validating preliminary design concepts that embody stakeholders' requirements.
- › Achieving early client agreement in relation to design concepts avoids costly variations later in the design phase. Design options that might involve slightly higher capital costs often result in reduced operational costs. Unless such considerations are fully addressed at concept phase, the appetite to backtrack and accommodate such inclusions in later phases declines dramatically.

Design for Compliance & Commissioning

- › Our in-depth understanding of the relevant Codes and Standards ensures our focus throughout is on achieving end-of-project compliance.
- › Strong awareness of the importance of designing systems that address the needs and future requirements of commissioning. Successful commissioning is essential to validating laboratory system performance and in achieving accreditation.

Design Integration

- › Focused early interaction with architectural and structural disciplines to inform the construction methodologies and detailing of pressurised spaces.
- › Collaborative focus with a best-for-project attitude is a must to complete highly complex and service intensive projects.

Documentation

- › Focus on the key early stage system schematics to ensure designs are well understood and communicated prior to entering detailed documentation phases.

Construction

- › Commissioning verification – complex interactive building services systems that are required for safe and compliant operation of the facility.
- › Handover – detailed interaction with facility managers and operational staff to ensure system operational parameters and key maintenance information is transferred and understood.

Our laboratories capabilities

The key to successful laboratory delivery is to deliver the client's briefed requirements. This is closely followed by a design focus on end-compliance and accreditation requirements.

From an engineering services perspective, this involves ensuring key design elements are incorporated by the architect, and that the builder understands and embraces the level of quality and close tolerances required to support a successful outcome.

Fundamental to this shared objective is close collaboration within the broader team and the need for excellent communication.

The NDY service characteristics that consistently enable us to deliver innovative projects include:

- › **Specialist Expertise:** through a team of multi-disciplinary engineering specialists
- › **Leadership:** provided by highly qualified and accredited team leaders
- › **Quality:** our commitment to excellence, innovation & quality control
- › **Collaborative Engagement:** with both clients and other team members.



Laboratories **capability matrix**

	Construction Completion	Building Works Value \$	Total floor Area m2	Dry Lab Area	Wet Lab Area	Interaction Areas	Administration/ workspace	Seminar/ Conference Rooms	Lecture Theatre	Teaching Labs	Microbiology	Chemistry/Analytical Chemistry	Clean Rooms	Plant Research	Specialised Animal Holding	Insectaries	AS 2243.3 PC\ OGTR\ QC
Western Edge Biosciences Stage 1 (WEBS) University of Melbourne	2019	\$76 million	11,000 sq m (new) 1,700 sq m (refurb)	•	•		•	•		•							•
Bio Research Laboratory University of Newcastle	2020	\$ 25 million	3,750 sq m		•		•				•				•		•
Biosciences Stage 1 University of New South Wales	2017	\$120 million	21,000 sq m	•	•	•	•	•	•	•	•	•	•		•	•	•
G26 New PC3 Annexe Griffith University	2015	\$7.5 million	450 sq m		•						•				•	•	•
Block 2 and Block 6 Upgrade QHFSS, Queensland Health	2019	\$4 million	1000 sq m		•	•	•				•	•	•	•			•
Forensic Data Centre Facility Australian Federal Police	2016	\$100 million	14,900 sq m	•	•	•	•	•			•	•	•				
Biosciences Stage 1 University of New South Wales	2017	\$120 million	21,000 sq m	•	•	•	•	•	•	•	•	•	•		•	•	•
Bioresource Facility and Research Laboratories Telethon Kids Institute	2017	\$60 million	10,000 sq m		•	•	•	•	•		•	•	•		•		•
Charles Perkins Centre, Centre for Obesity, Diabetes and Cardio-Vascular Disease University of Sydney	2018	\$250 million	50,000 sq m	•	•	•	•	•	•	•	•	•	•		•		•
SAHMRI Cyclotron Facility SAHMRI	2018	\$6 million	900 sq m	•	•								•				•
Institute of Biomedical Engineering Imperial College London	2007	\$28 million	6000 sq m	•	•	•		•		•	•	•	•	•			
Department of Bio Nanotechnology Imperial College London	2007	\$4 million	1500 sq m	•	•	•				•							
Department of Bio Engineering Imperial College London	2008	\$12 million	3000 sq m	•	•	•		•	•	•	•	•					
Materials Science Engineering University of NSW, Sydney	2015	\$150 million	20,000 sq m	•	•	•		•	•	•	•	•	•				•
South Australian Health & Medical Research Institute SA Health	2013	\$200 million	25,000 sq m	•	•	•		•	•		•	•	•		•	•	•
Murdoch Children's Research Institute Department of Health, Victoria	2011	Part of \$1 billion RCH project	20,000 sq m		•	•		•	•		•	•			•		•
Institute for Molecular Science La Trobe University	2013	\$80 million	11,000 sq m	•	•	•	•	•	•	•	•	•	•				•
Defence Science & Technology Organisation HPPD & Security Upgrade	2011	\$41 million	2400 sq m		•		•	•			•	•					•



Our laboratories specialties

ICT & Technology

The role of ICT and technology is now pivotal in underpinning global research collaboration, clinical translational research and interactive learning. In relation to communicating concepts, sharing data, and establishing global networks, the sophistication and power of ICT has rendered geographical distance largely insignificant.

The ongoing development of technology plus the vast capability of currently available ICT systems, is boundless and therefore rarely a limiting factor in finding an optimum solution.

NDY has the key in-house service capabilities needed to craft the most appropriate system solutions, including:

- › Contemporary specialist ICT expertise and innovative applications experience ranging from strategic systems planning through to detailed network design and systems integration management.
- › An industry level appreciation of laboratory practices, laboratory equipment, WH&S issues & compliance regimes.
- › An ability to interactively explore and thereafter to clearly articulate stakeholders' project needs once they have been developed collaboratively.

The development of innovative ICT system solutions as a game changer for research support or as an interactive learning tool is largely dependent on the successful tailoring of every project solution to satisfy stakeholders' specific current needs and to address where possible their likely future challenges.

Our early involvement in projects such as the **New Royal Children's Hospital**, the **New Children's Hospital in Perth** and **Bendigo Hospital** has proven that involving stakeholders in the design of the functionality of new technology, and fine-tuning the systems implementation, ensures the users have been active participants in the design development journey.

NDY is an ICT partner of choice because:

- › We facilitate change and innovation by demonstrating new solutions and how they can facilitate a business case by saving time and cost.
- › We provide the processes, project resources and the experience based on lessons learnt from our work with a range of specialist projects.
- › We provide depth of experience with next generation technologies to deliver the appropriate amount of innovation within the cost / risk profile of the project;
- › We have the capacity and flexibility to deliver to an appropriate mix of hardware, software and people resources.



Design Guidelines

Australian HFG Guidelines

NDY are familiar with the recently updated guidelines for Mental Health inpatient units, released by AHFG/Health Infrastructure NSW.

HPU 131 Mental Health – Overarching Guideline (Version 1, 14 March 2018) is a new guideline that describes the generic planning and design requirements to be considered when planning mental health inpatient units. It has been developed to act as a Part 1 to each of the following six mental health guidelines:

- › HPU 132 Child and Adolescent Mental Health Unit;
- › HPU 133 Psychiatric Emergency Care Centre (PECC);
- › HPU 134 Adult Acute Mental Health Inpatient Unit;
- › HPU 135 Older People's Acute Mental Health Inpatient Unit;
- › HPU 136 Non Acute Mental Health Unit (including rehabilitation, extended care and forensics) and;
- › HPU 137 Mental Health Intensive Care Unit.

The intent of HPU 131 is to reduce repetition so that the other HPUs can focus on service specific requirements (e.g. the special needs of adolescents). The focus of the document is acute inpatient units but it can be used to inform non-acute environments.

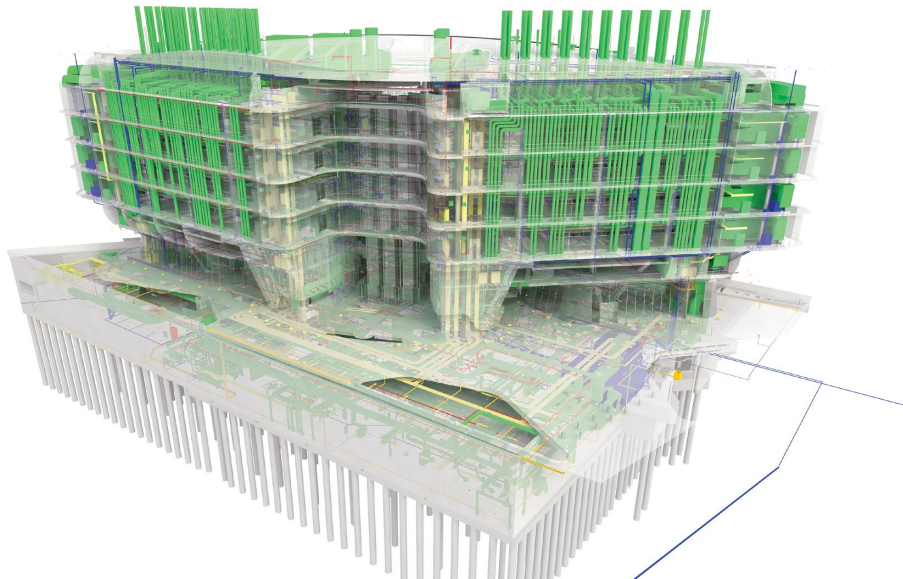
Design Tools

NDY Capability in BIM

Norman Disney & Young have developed their BIM consulting and modelling solutions, recognising that BIM is integral to the process of design, construction and management.

NDY have been working in 3D for engineering services since 2001 when we worked in conjunction with AutoDesk to create the libraries that form the basis of AutoCAD MEP today. NDY have led the industry in the application of BIM as a methodology to deliver large scale complex projects in Australia and have successfully delivered a number of BIM projects.

NDY adopted Revit as a standard tool for every project as soon as it was released as a metric version in 2009. We have regular training sessions for our Revit operators and constantly update our processes to take advantage of upcoming technologies. Additionally, we have a dedicated full time development team creating automated design tools and verification processes, intelligent families of objects and researching design integration into Revit.



Federated Model Construction

A key element to the BIM approach is the routine generation of federated models for use by the design and construction teams. The federated model becomes the focal point of design meetings and co-ordination activities. Where relevant to our scope, NDY can construct the federated models to assist the design team by:

- Providing different means of viewing the model; whole model, by service, level by level, sections, etc.;

- Differentiation of building elements and engineering services;

- Comparison of different aspects of the model (e.g. Electrical services vs structure);

- Providing fixed views to suit the design team; and

- Providing animation paths throughout the model.

NDY have also developed tools to facilitate the following critical functions:

- Comparison with previous versions to determine change;

- Interface into project programs for construction sequencing; and

- Creation of clash detection reports.

dRofus Implementation

We note that dRofus is used by Health Infrastructure NSW in the delivery of healthcare projects and will be implemented for many future projects in different sectors. We are experienced in using dRofus on several healthcare and other public infrastructure projects including Perth Children's Hospital, Telethon Kids Institute and Casey Hospital Expansion in Victoria, as well as on projects in other market sectors such as prisons and education facilities, and we are at the forefront of collaboration and development with dRofus/Autodesk in further integrating dRofus into the digital engineering project process.

We use dRofus to leverage off the project data such as schedules and room data requirements to assist in our documentation and digital engineering design processes.

Design Tools

3D Tools Development

Our development team has created a full suite of Revit libraries to suit Building Services.

The library comprises over 5,000 equipment items covering mechanical, electrical, fire, public health, communications and security systems. These are optimised to utilise the potential of Revit as a design tool, to interface into BIM federated modelling tools such as Navisworks, and external databases.

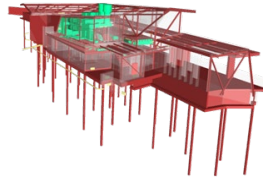
A core objective of the development was to create parametric equipment objects, taking into consideration design workflow, system connectivity, error handling, maintenance access, incorporation of NDY and industry standards, 2D and 3D representation, material mapping and standardised equipment parameters for integration into BIM databases.

Our internally developed systems can scan any Revit model for object information and load it into an external database for data augmentation and export to external systems.

Technology is the catalyst driving an unprecedented level of change in the very fabric of our industry

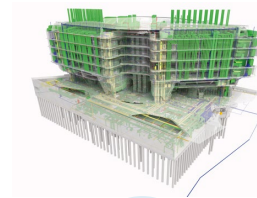
An illustration of the NDY BIM/Revit timeline is shown to the right.

Southbank Boardwalk
BIM in AutoCAD MEP LOD300



2010

SAHMRI
Full BIM Project LOD300



2011

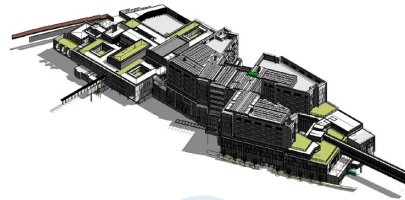
NCH
Full BIM Project LOD400



2012

Bendigo Hospital

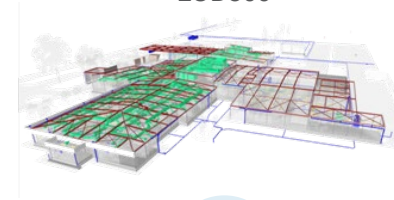
Revit BIM Project
LOD300



2014

Warren Hospital

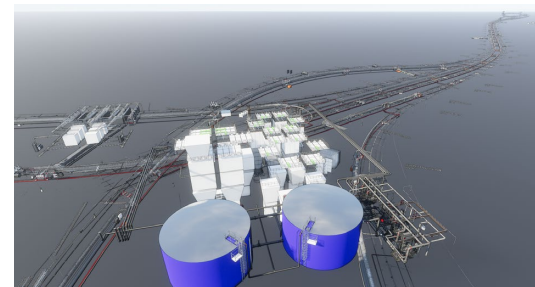
Current Revit BIM Project
LOD300



2015

WestConnex

Full BIM Project LOD400 & Design Automation



2017

Building Information Modelling (BIM)

The level of design, documentation and coordination needed to ensure the optimum accommodation of sophisticated laboratory building systems has given greater significance to the early detection and resolution of system design clashes.

As a pioneer in the adoption of 3D design and documentation of building services, all of our design documents are presented in 3D. Our ability to deliver projects in this manner enables us to provide an unrivalled level of coordination from the earliest project stages.

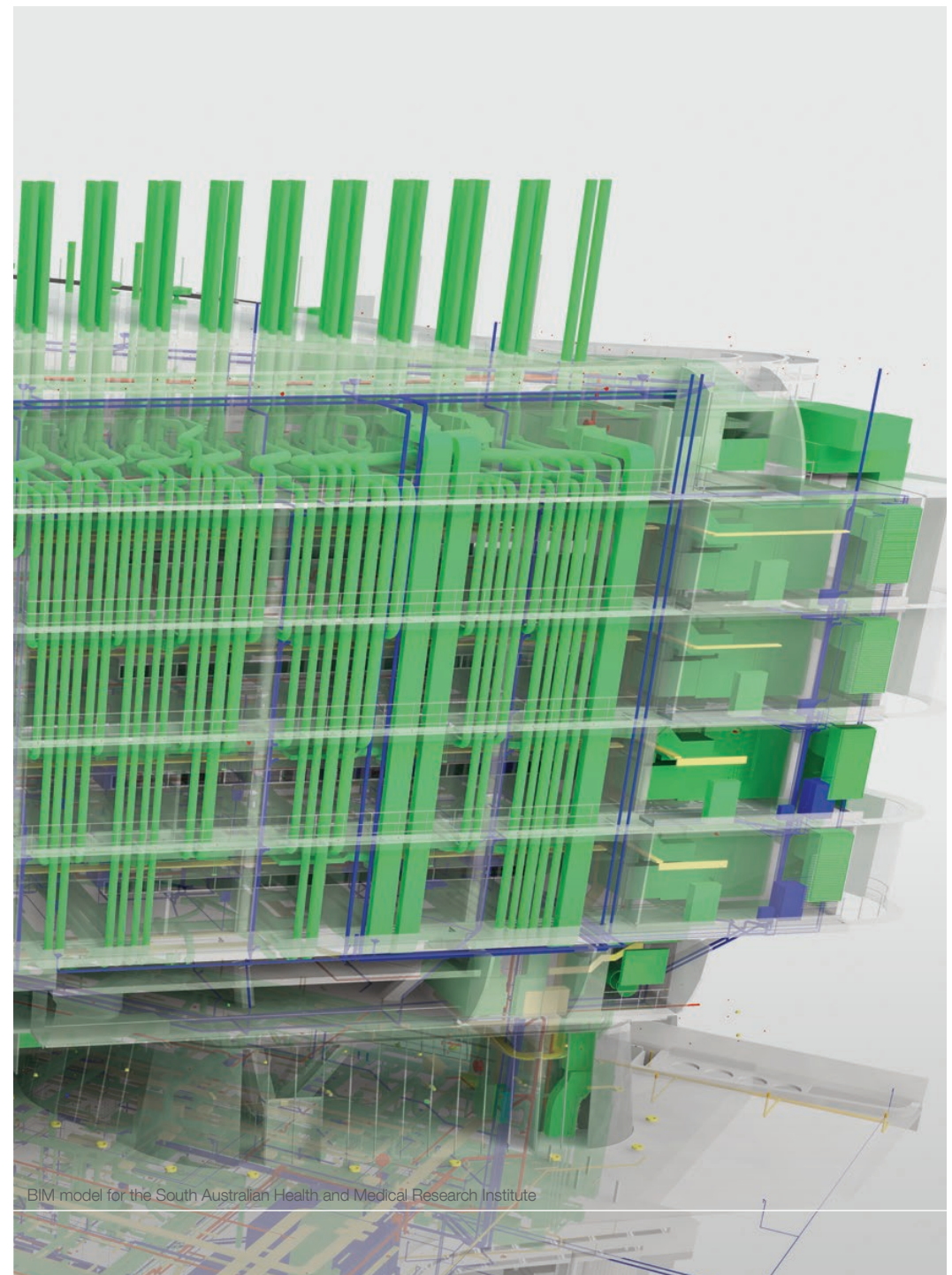
On the **Bendigo Hospital Project**, we employed 3D Revit to fully document the building. During early design phases, we applied an in-house developed feature which enabled us to assign defining parameters to the spaces within the Revit models. Once assigned, these parameters served to update as the room/space qualities evolved. We then used these parameters to capture and graphically display design information as a two-dimensional colour map in an effective and clear manner to the clients, other members of the design team and associated stakeholders.

This innovative NDY tool maximises scope for economically evaluating options during the early stages of design. To illustrate we can produce a 2D colour map that indicates each laboratory's requirements in relation to PC rating, pressure regime, and combination of laboratory gases. Similarly we can graphically represent assignment of a room to an air handling unit, a specific zone or an associated VAV. This feature then enables us to communicate our design intentions for the thermal zoning of the building, cross checks between fire zones and air handling unit zones.

NDY can deliver complete virtual buildings, with **interactive flythrough presentations** of the facility that clearly communicate the building services and their implications on the final built form.

Use of our BIM capability supports the definition of critical spaces, and enables the team to develop budgets and confidently proceed with the detailed design phases, and critical areas, such as incoming utilities, plant rooms, and major risers and services routes.

The 3D modelling approach employs clash detection technology to deliver a coordinated product, which enhances both stakeholders and the design team's understanding of the proposed services solutions.



BIM model for the South Australian Health and Medical Research Institute



A salutogenic approach is evident in the design of Melbourne's Royal Children's Hospital

Sustainability & laboratories

At NDY, sustainability is in our DNA. It's not an 'add-on' but an intrinsic part of everything we do.

We're committed to delivering buildings, facilities and infrastructure that contribute to a sustainable future – because we know that sustainability is not only better for our cities and communities, but also translates to operational cost savings for our clients.

NDY's point of difference is our commitment to 'enlightened engineering'. Our team applies 'salutogenic' design principles to create sustainable living environments that enhance health, wellness and wellbeing.

We've helped our clients in the healthcare sector to achieve significant financial savings by addressing building operations issues – from energy and emissions minimisation to water conservation, and from waste management to noise reduction.

And we continue to develop efficient, cost-effective solutions that deliver on the 'triple bottom line' of environmental, economic and social sustainability, and leave a legacy of places that enrich people's health, wellbeing and lives.

At NDY, we practice what we preach. We have attained global ISO14001 accreditation, we report annually on our own corporate sustainability initiatives through the Global Reporting Initiative (GRI) framework, and our Australian offices are either certified or registered for Green Star and NABERS ratings.

NDY laboratories experience

For more than sixty years NDY has provided consulting engineering services on strategic projects throughout Asia, Australia, Canada, Europe, New Zealand and the UK.

These award-winning projects are testament to the quality of our innovation, expertise and personnel. The following examples of our experience are a snapshot of our ability to deliver world's best practice for master planning projects of all sizes.

To view a comprehensive outline of our project experience visit our website **www.ndy.com**



University Laboratories Australia

Western Edge Biosciences Stage 1 (WEBS) University of Melbourne, VIC

Services:

- › Communications (ICT & AV)
- › Electrical
- › Fire Protection
- › Fire Engineering
- › Hydraulics
- › Mechanical
- › Security
- › Vertical Transportation

About the project:

The WEBS project is a specialist laboratory and teaching space to service the Faculty of Veterinary and Agricultural Sciences along with other university groups.

The project consists of the following elements as suitable for a 140pax cohort:

- › Dry Labs and workshops
- › Wet Labs & support
- › Informal & Collaborative Learning spaces
- › Dissection Laboratory & Support
- › Student Support Spaces
- › Loading Dock & Stores
- › Infrastructure & Plant.

Key issues within the project that NDY addressed were the requirement to achieve laboratory accreditation by January 2019, the replacement of an existing authority substation and its impact on the construction sequence timing, odour control from the dissection laboratory, lifts and loading dock, and design for connections to potential future UoM building works.

Several of the surrounding buildings are impacted by the new building works, requiring refurbishment of some, temporary decanting of others and diversion of services (or provision of temporary plant) to facilitate business continuity.

An overarching understanding of the universities master plans was essential in relation to their vision for egress pathways, ESD blueprints and future works facilitation.

Our understanding of the importance of Laboratory Standards & Regulations compliance for the project, and our ability to involve Brad George's as a DAWR (previously AQIS/DAFF) accredited assessor ensure that the overall design is subject to ongoing compliance assessment, ensure that solutions are optimised for the application avoiding over design.



New Children's Hospital Nedlands, WA

Services:

- › Acoustics
- › Audio Visual
- › Communications
- › Electrical
- › Fire Engineering
- › Fire Protection
- › Hydraulics
- › ICT
- › Mechanical
- › Security
- › Sustainability
- › Vertical Transportation

About the project:

The \$1.2 billion Perth Children's Hospital provides the best possible clinical care for future generations in Western Australia and is the base for continuing WA's outstanding paediatric research with the co-location of the Integrated Research and Education Facilities, including the Telethon Kids Institute.

The hospital has almost 300 inpatient beds and provides tertiary-level health services and key secondary health services, acute treatment and diagnostics. The facilities include intra-operative MRI, specialist theatres and imaging, emergency department, burns, oncology, pharmacy, sterile services unit, 24 bed Child and Adolescent mental health inpatient and outpatient care, allied health services and ambulatory care.

The building features a Northern Winter Garden, a double skin active facade, a hydrotherapy pool, an auditorium, a large central atrium, a helipad, cinema and recreation facilities (indoor and outdoor) including the Starlight Foundation, and significant additional back of house support and office accommodation.

Replacing the existing Princess Margaret Hospital, the new facility is located on the QEII Medical Centre health precinct in Nedlands, Perth. The project was procured via a 2 stage managing contract arrangement.

Construction began in January 2012 and was completed in late 2016. Witness testing and commissioning of complex building services systems, clinical equipment and FF&E fit-out activities and clinical readiness/handover processes were completed in early 2017.

NDY were appointed as the building services consultants for all core disciplines and specialist services, and were at the forefront of the adoption and use of BIM/Revit throughout the project, including for 3D visualisation, clash detection, change management, laser guided services setting out, on site quality management and preparation for FM integration.



Research Facilities Australia

South Australian Health and Medical Research Institute (SAHMRI) Adelaide, SA

Services:

- › Acoustics
- › Architectural Lighting (NDYLIGHT)
- › BIM Management
- › Communications
- › Energy Modelling
- › Fire Engineering
- › Hydraulics
- › Laboratory Gases
- › Mechanical
- › Security

About the project:

The \$200 million landmark SAHMRI project brings world class research facilities to Adelaide and introduce the new Royal Adelaide Hospital (NRAH) to be built on the adjacent development site.

The new Institute provides 25,000 sq m of flexible laboratory and specialist research space, publicly accessible and inviting commercial offerings, and a high profile auditorium.

Features and Innovations:

- › SAHMRI is Australia's first LEED (Leadership in Energy and Environmental Design) Gold rated laboratory.
- › Many of the spaces are designed for PC2 certification or higher, which requires positive and negative air pressure regimes. Venturi valve controls were used to maintain these pressurisation regimes: SAHMRI is one of the largest facilities in Australia where this system has been implemented.
- › The building contains a cyclotron, which require Good Manufacturing Practice (GMP) accreditation.
- › A services zone corridor is provided on the rear of the building, through which all of the specialist exhaust systems (such as fume cupboards) are run.
- › The acoustic design of the project will impact the quality of research equipment and activities the facility can attract.
- › The building has been designed with flexibility in mind. The current fitout requirements are for six wet laboratories, three dry laboratories, and one animal house.

Watch our SAHMRI video
documentary on NDYTV
bit.ly/NDYTV11





Forensic Facilities Australia

Australian Federal Police (AFP) Forensic Facility Majura, ACT

Services:

- › Acoustics
- › Electrical
- › Fire Safety
- › Fire Protection
- › Hydraulics
- › ICT
- › Mechanical
- › Sustainability
- › Vertical Transportation

About the project:

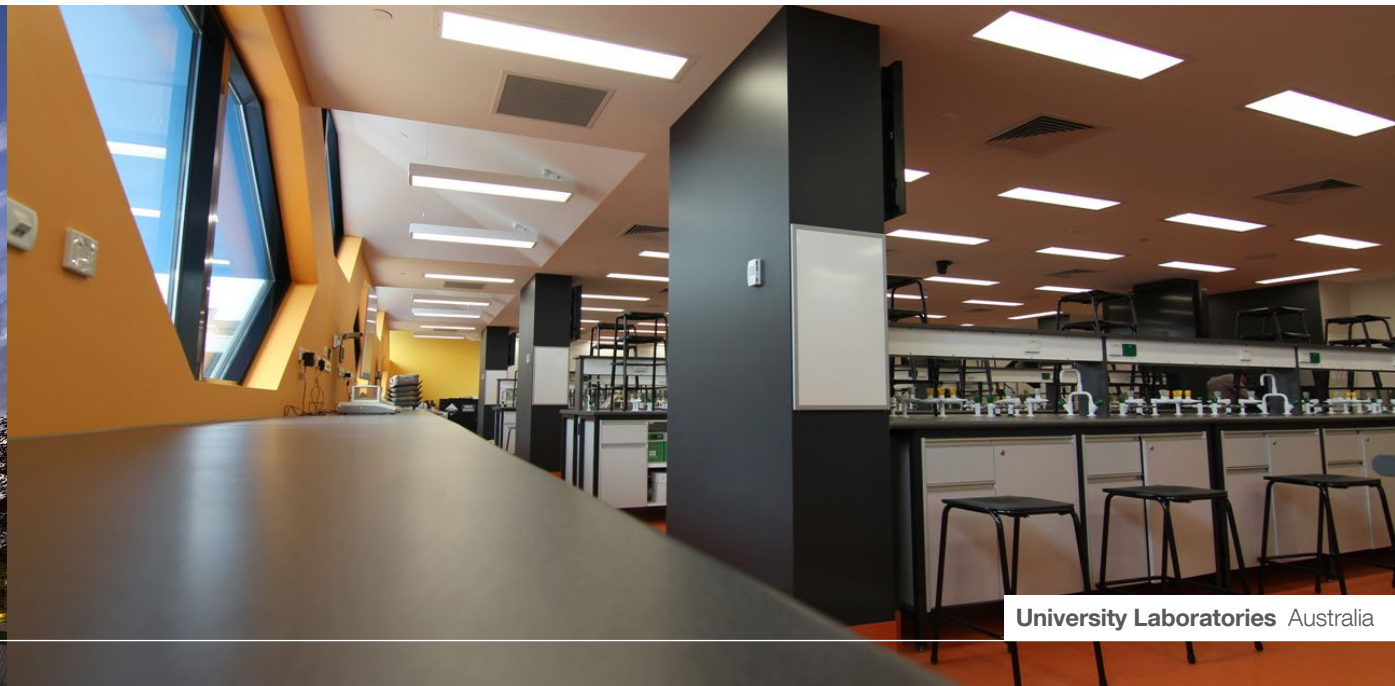
NDY have been engaged to provide multidiscipline services for the Australian Federal Police new forensic facility in Majura.

The project seeks to develop a new purpose built 15,000 sq m facility that will overcome the present shortcomings and provide exemplar forensic accommodation for the next 30 years of operation.

Features and Innovations:

- › The new facility will enable AFP Forensics to maintain, improve and expand its forensic business capability.
- › The facility will provide optimum adjacencies of forensic departments to significantly improve work practices, process streaming and efficient functional delivery.
- › The facility will accommodate current activities with capacity for growth within a single purpose built complex.

“The project seeks to develop a new...facility that will overcome the present shortcomings and provide exemplar forensic accommodation for the next 30 years of operation.”



University Laboratories Australia

La Trobe Institute for Molecular Science (LIMS) Bundoora Campus, Melbourne

Services:

- › Acoustics
- › Audio Visual
- › Communications
- › Electrical
- › Fire Protection
- › Hydraulics
- › Mechanical
- › Security
- › Sustainability
- › Vertical Transportation

About the project:

The La Trobe Institute for Molecular Science (LIMS) project delivered a state-of-the-art scientific teaching and research building facility for La Trobe University, Bundoora Campus.

The brief was to create a building that is both functional and symbolic of the future rather than reflective of the past. Therefore, functional design was a fundamental aspect of this build.

As the services and sustainability consultant on the project, NDY acted as a facilitator between all the design disciplines, and assisted the design team by providing our own internal tools which included a Green Star pathway and documentation matrix. Both established very clear frameworks for the design team to work within and this management aspect of our involvement was fundamental to the successful delivery of this project.

Features and Innovations:

- › Approximately 70 per cent of the building cooling capacity is provided by absorption chillers, derived from the campus cogeneration system
- › Water efficient design is also a key aspect with 2 x 50,000 litre rainwater collection tanks employed for water recycling
- › The air conditioning systems are overseen by a central building management system which is a critical component in terms of monitoring and controlling the different mechanical services in the building.

“

The brief was to create a building that is both functional and symbolic of the future rather than reflective of the past.

”

Watch our LIMS video
documentary on NDYTV
<http://bit.ly/NDYTV5>





University Laboratories Australia

University of Southern Queensland (USQ) D Block Lab Refurbishment **USQ Toowoomba Campus, QLD**

Services:

- › Communications
- › Electrical
- › Fire
- › Hydraulics
- › Laboratory Gases
- › Mechanical

About the project:

USQ Toowoomba engaged NDY to design the \$7 million refurbishment and redevelopment of three separate blocks of their existing laboratory spaces. W Block levels 1 & 2, D Block level 3, and C Block level 3.

The brief was to design foremost a functional space where plant pathogens, PC2 laboratories and open laboratory teaching areas were to be created or replaced. Further to the functional aspect of the refurbishment was to create a current and interesting environment where students and staff will enjoy working.

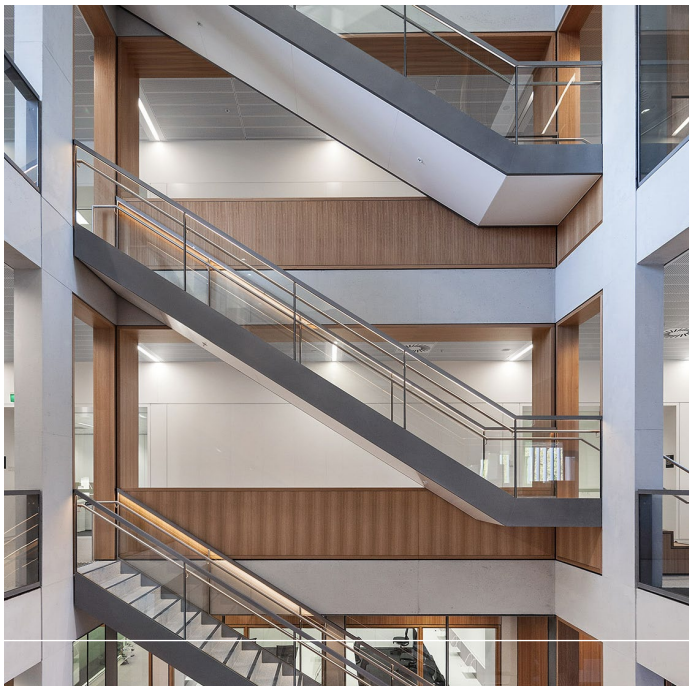
Features and Innovations:

- › NDY designed to use the high existing windows to maximise natural light, with daylight sensing where possible to incorporate energy efficiencies.
- › With tight budget restraints, cost effective solutions were sought to achieve the design intent within budget limitations.
- › NDY worked closely with the architects to provide services on lab benches which complemented the contemporary design whilst being highly functional.
- › Being a laboratory installation, lighting levels and uniformity were of high importance. Therefore some common elements to creating interest to lighting with highlights and shading was affected by the use of wall and space colour rather than varying lighting levels.

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Research Facilities NSW

Westmead Millennium Institute for Medical Research **Westmead, NSW**

Services:

- › Acoustics
- › BIM
- › Communications
- › Sustainability

About the project:

Located on the Southern Hemisphere's largest public hospital campus, the Westmead Millennium Institute for Medical Research (WMIMR) was designed to accommodate over 500 researchers, laboratories and high-tech equipment. The nine storey facility is one of Australia's leading medical research centres.

Features and Innovations:

› Sustainability

NDY's Sustainability team provided Green Star advice, BCA Section J compliance advice and carried out energy modelling to assist WMIMR achieve its sustainability aspirations.

› BIM - Model Management

Norman Disney & Young (NDY) assisted BVN Donovan Hill during the design development stage with model management, this included producing a set of protocols from which the project model would be developed. This enabled the design team to visualise potential coordination issues. Clash detection reports and federated models were issued on a regular basis and the model assessed to ensure it complied with the set protocols.

› Acoustic Design

NDY provided detailed acoustic design advice for the facade (helicopter noise), mechanical plant noise emission to the environment, internal mechanical plant noise control, privacy and sound insulation between spaces as well as reverberation control in the public and atrium spaces. This advice was provided throughout the schematic design and detailed design stages. NDY coordinated designs with the architects and mechanical consultants and looked to develop innovative and cost effective noise control solutions.



Research Facilities United Kingdom

Queen Mary University of London Biosciences Innovation Centre **London, UK**

Services:

- › Communications
- › Electrical
- › Hydraulics
- › Mechanical

About the project:

The 'Queen Mary Innovation Centre' is a development by Queen Mary BioEnterprises, in conjunction with the Queen Mary University of London and supported by the London Development Agency. NDY were engaged as the building services consultants to provide mechanical, electrical, public health and communication services within this £35 million, 80,000 square foot facility.

The unique facility is designed to lead the way in commercialising scientific discovery by offering early stage companies, particularly from east London, a broad range of biological research facilities and knowledge. It aims to provide the ideal environment in a building dedicated to incubating scientist entrepreneurs and promoting knowledge transfer.

Features and Innovations:

- › The centre provides state of the art, fully serviced specialist laboratory and office space, designed to be flexibly divided to provide for growing biotechnology enterprises. Typical users would include organisations involved in healthcare, pharmaceuticals, biomedical engineering, agricultural or other industrial/ environmental development.
- › An important feature of the centre is the ability to provide a mix of space to serve organisations from the very-small emerging businesses ("hatchery space") to more mature, established businesses ("anchor tenant space"). Clients will be able to design their own layouts and have them delivered in days, allowing a virtual 'plug and play' environment, and take advantage of meeting rooms and conference facilities. Flexibility of the building services was key to NDY's design ensuring that ultimately the Centre is able to provide a problem free service to their clients.

“ The centre provides state of the art, fully serviced specialist laboratory and office space, designed to be flexibly divided to provide for growing biotechnology enterprises. ”



Defence Facilities Australia

Defence Science and Technology Organisation (DSTO) – HPPD and Security Upgrade Fishermans Bend, Melbourne, VIC

Services:

- › Electrical
- › Fire
- › Mechanical
- › Sustainability

About the project:

NDY were appointed as part of a Design Services Contract with Jackson Architecture to undertake detailed design of a series of upgrade projects at the DSTO Fishermans Bend precinct, Melbourne for the Department of Defence. The \$41 million project includes the following works packages:

- › Construction of a new 4 storey facility, including PC3 laboratory, PC2 chemistry laboratories and associated office/meeting spaces
- › Construction of a crisis management centre
- › Sitewide security upgrade, including new site wide LED lighting system, consolidation of emergency management and response systems across the site.

Features and Innovations:

- › The PC3 lab design is based on the current 2010 code and includes heat reclaim on the 100% outside air system for reduction in energy consumption. The design has been carefully developed to meet user requirements for functionality and equipment whilst considering the requirements for certification, decontamination, controls, leakage testing and bio-containment. Along with the PC3 laboratory, the project also includes PC2 laboratories with a focus on suitability for chemistry research. Office and meeting facilities combined functionality with ESD and specialist acoustic design.
- › The project required development of services concepts to enable the works to be undertaken amongst a continuing laboratory research program, and whilst adjacent building areas are occupied. Innovative solutions were developed for services infrastructure with a view to minimizing disruption and cost; this required an assessment of existing site power and thermal plant.
- › Other specialist roles included plume study modelling for fume cupboard discharges and fire engineering of the facility due to adjacent building constraints. Our role covered detailed design of mechanical, electrical, fire protection, fire engineering, acoustic design and sustainability consultancy in accordance with the objectives of the Defence Green Building Requirements.



Burlington Danes Research Facility **London, UK**

Services:

- › Communications
- › Electrical
- › Hydraulics
(including central RO water system)
- › Mechanical
- › Medical Gases
- › Security

About the project:

NDY were engaged by Imperial College London to undertake the detailed design of a state of the art clinical imaging and research facility located on a brown field site on the Hammersmith Hospital Campus.

GlaxoSmithKline (GSK) and the Medical Research Council (MRC) together with Imperial College will occupy the 13,000 sq m facility as part of their collaborative approach to medical research. The project consists of two main laboratory and research buildings connected by a common entrance node which adjoins a dedicated energy centre.

Features and Innovations:

- › The laboratories are designed as modular, flexible spaces that will allow future alterations to the ratio of general laboratory, low level containment and secure containment spaces within the facility.
- › Unique design features such as external services risers have been incorporated to provide the required level of flexibility, whilst ensuring future modifications can be undertaken without affecting the operations of the internal research facilities.
- › A cutting edge clinical imaging centre was constructed within the building, containing PET/CT and MRI scanners, self shielded cyclotrons, and NMR suite, cGMP pharmaceutical labs and clean rooms.
- › NDY's computational fluid dynamics (CFD) analysis led to a unique solution that optimised the distribution of air, preventing recirculation and dirty air entrainment whilst ensuring the costs were less than that of more conventional systems.
- › The lack of local infrastructure capacity meant that an 8MVA supply was required to the site and adjacent hospital. This supply was competitively tendered from a source some 5km away, inclusive of two parallel redundant HV feeders, parallel feeder protection and HV switchgear. NDY's contribution to the procurement of this supply allowed the client to make substantial cost savings in comparison with the initial budgets quoted by the local electrical supply authority.



Murdoch Children's Research Institute (MCRI) Melbourne, VIC

Services:

- › Communications/ICT
- › Electrical
- › Fire Engineering
- › Fire Protection
- › Hydraulics
- › Mechanical
- › Security
- › Sustainability
- › Vertical Transportation

About the project:

MCR represents a major stakeholder in the new \$1 billion Royal Children's Hospital (RCH). As part of the new RCH, MCRI has expanded their facilities from 1,400 sq m to 20,000 sq m, including PC2 and PC3 laboratories, offices, support spaces, animal house, diagnostic laboratories, pathology, microbiological research, cell and gene therapy, tissue culture, cryo storage, clinical trials and common areas.

MCRI is one of the top three medical research institutes in Australia and specialises in children's health. It is a separate legal entity with its own board of directors, but works closely with RCH in undertaking and facilitating research into infant, child and adolescent health. MCRI has approximately 700 staff, with an annual operating budget of approximately \$60 million.

Features and Innovations:

- › All the laboratories were fitted with high and low level exhaust ventilation to remove any contaminants and prevent against spills and gas leakages. Provisions were also made for snorkel exhaust systems to be extended over specific test benches. Oxygen depletion sensors and alarm systems were provided to detect against gas leaks and ensure a safe working environment. These control and monitoring systems were also connected to the building management systems.
- › Airflows and pressure regimes were carefully set-up and monitored where required to ensure compliance with the PC2/PC3 containment requirements.
- › The lab bench systems were fully integrated with the engineering services (power, data gases etc) to provide the most flexible working environment for the users. Each of the labs was made as generic as possible to enable flexibility in the usage of each of the lab pods for future adaptability.



The Telethon Kids Institute (TKI) Perth, WA

Services:

- › Acoustics
- › Communications
- › Electrical
- › Fire Engineering
- › Fire Protection
- › Hydraulics
- › ICT Consultancy
- › Lab Gas
- › Mechanical
- › Security
- › Sustainability
- › Vertical Transportation

About the project:

The Telethon Kids Institute is an independent, not for-profit and non-government organisation working to improve the health, development and lives of children and young people through excellence in research and the application of that knowledge.

Originating in the early 1990's, they have shared the journey in relocation from their premises opposite Princess Margaret Hospital in Subiaco to a part of the new Perth Children's Hospital. Funded by both the State and Federal governments, Telethon Kids new premises occupies the top two floors of the brand new children's hospital on the QEII Medical Centre campus in Nedlands. This also positions the Institute closer to some of their research partners, increasing opportunities for greater collaboration.

The move provides the Institute with world-class facilities, flexible work space and state-of-the-art technology. Co-located with other members of the paediatric care and medical research community, the Institute has shared access to facilities and amenities in the new Children's Hospital as part of the Integrated Research and Education Facility.

Entry to the Institute commences with an Interactive Discovery Centre and Reception on the Ground floor, with the main areas located at levels 6 & 7 surrounding the grand atrium of PCH. The facility encompasses an area of approximately 10,000sqm and comprises:

- › Wet laboratories with separate tissue culture and specialised workspaces, as well as open plan lab space
- › Bioresources facility

- › Contemporary office and meeting spaces (including views across picturesque Kings Park)
- › Cryogenic store and liquid nitrogen generation plant
- › Sterilisation and washing facilities (dedicated to the Institute)
- › Storage, plant and facilities, and staff amenities

In addition to their dedicated floor space, the Institute also is provided with facilities in other parts of the building including ground floor circulation, consulting rooms in an Outpatients clinic, seminar rooms and shared use of auditorium, as well as service/ maintenance access.

NDY have been involved from the original planning through the detailed design of the base building facilities, as well as the detailed fit out design and construction phases, to compliance testing and handover.



Forensics Australia

Queensland Health Forensic & Scientific Services (QHFSS) Block 8 Laboratories

Coopers Plains, QLD

Services:

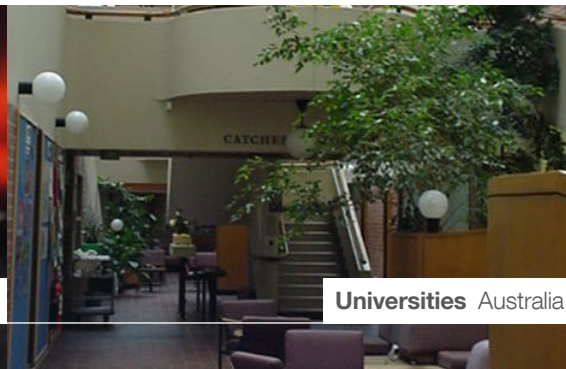
Electrical, hydraulics and mechanical services.

About the project:

QHFSS is Australia's most comprehensive public health science laboratory. Their world-class microbiology, chemistry, physics and forensic facilities utilise the latest technology.

Features and Innovations:

- › The \$3.5 million refurbishment and fitout of Block 8 at the Coopers Plains campus included the replacement of an existing waste water treatment system with new, replacement of entire drainage system with stainless steel (to allow safe decontamination of the laboratories), and refurbishment and upgrade to the mechanical services to meet the intent of current upgraded regulations
- › Works were staged as one laboratory was required to be operational at all times during the upgrades.



Universities Australia

Australian National University (ANU) Research School of Biological Sciences

Canberra, ACT

Services:

Electrical, fire and mechanical services.

About the project:

The Research School of Biological Sciences (RSBS) is one of nine research schools that form the Institute of Advance Studies at ANU. The RSBS required an upgrade of the school's Plant and Animal Culture (PAC) capacity. The goal of the upgrade was to secure facilities that reflect the quality of the world class research conducted by the School and which can fully meet the regulatory constraints under which the work needs to be conducted.

Features and Innovations:

Stage 1 of the PAC rebuilding project included:

- › 690 sq m Central Services Building (CSB)
- › Soil Handling Building
- › 680 sq m Controlled Environment Facility (CEF)
- › Head House (Office area)
- › 240 sq m PAC/ main building link and Bush House/ Hardening off area.



Universities Australia

University of New South Wales (UNSW) Analytical Building

Kingsford, NSW

Services:

Electrical services.

About the project:

The Analytical Building at UNSW is a state of the art 8,500 sq m teaching and research facility. The building houses a wide range of sensitive electronic equipment including Electronic Microscope Units & Nuclear Magnetic Resonance equipment.

Features and Innovations:

- › The electrical services design solution involved EMI/RFI mitigation and power quality design including surge protection and filtering to protect this critical equipment
- › The project involved a high density of services reticulated through the building and NDY produced 3D CAD designs for coordination with other disciplines
- › The lighting design incorporated energy savings with lighting control systems installed with presence and daylight detection.



Universities Australia

ANU Phenomics Facility, Level 1 Laboratory Fitout

Canberra, ACT

Services:

Electrical, Fire, Hydraulic and Mechanical.

About the project:

During construction of the ANU Phenomics building, an area of 450 sq m was set aside as a shell for future laboratory use. The project involved fitting out the shell area to serve as laboratories and offices for laboratory staff. This included laboratory gas reticulation, monitoring and alarm system; power and data reticulation; fire sprinkler and fire detection and early warning system provision; provision of a hydraulics services including compliance with PC2 requirements for floor waste and provision of fitting to laboratory specification.

Features and Innovations:

In conjunction with typical engineering requirements for the fitout, NDY were responsible for design and documentation of the following:

- › Laboratory areas with PC2 and PC2 Animal Holding area. This included the provision of an odour controlled exhaust system for laboratory mice from the mouse holding area (IV Racks)
- › Dedicated exhaust and preconditioned make-up air system to operate in conjunction with intermittently operating fume cupboards to maintain the net inflow of air required for PC2 areas.



Universities Australia

Bioscience Research Centre (AgriBio) Bid Phase

**La Trobe University Bundoora Campus,
Melbourne, VIC**

Services:

Audio visual, Communications/ICT, Electrical, Fire Protection, Fire Engineering, Hydraulics, Mechanical, Security and Vertical Transportation.

About the project:

Under the PPP delivery mechanism, the construction of the Bioscience Research Centre (BRC) was contested by three consortia. NDY provided the engineering building services component for the InfraNova consortium team headed by Leighton in partnership with ABN Amro. The overall research facility provides building construction over three floor levels and occupying approximately 30,000 sq m, and provides state-of-the art laboratory and research facilities including numerous PC2 and PC3 laboratory areas, attendant research and development facilities and an animal research facility.

Features and Innovations:

- › The Bioscience Research Centre is a joint initiative between the Victorian Government and La Trobe University providing bioscience and biotechnology research and development facilities for use by the State and the University under a deliverable project budget of approximately \$230 million.



Laboratories Australia

Garvan Institute

Sydney, NSW

Services:

Mechanical.

About the project:

The purpose of the project was to provide research facilities for use by medical teams. The project included adaptive re-use of the former nurses' quarters (modified to research laboratories), and a new office wing. The new and old wings are joined by an atrium that features a spectacular spiral staircase.

Features and Innovations:

- › Designing systems into the very tight ceiling spaces in the former nurses quarters.
- › Providing flexibility in services to allow them to be adapted to the specific needs of research teams.
- › Designing a rat breeding facility which has very specific environmental requirements, as well as a need to provide differential pressurisation to reduce the risk of contamination.

NDY Key Differentiators

NDY VALUE PROPOSITION

- » Senior “Thought Leadership” skills
- » Experience in infrastructure design
- » Experience working on “live” sites
- » Cost management experience
- » Multi-disciplinary service
- » Experienced in stakeholder interaction.
- » Client Focus and excellent understanding of key client issues
- » Global Experience in designing patient centric mental health environments
- » Understanding of next generation clinical practices
- » Industry leaders in BIM, Revit and DRofus integration
- » Experienced design team with healthcare, mental health and correctional design experience
- » SCEC accredited Security Consultants with healthcare and prisons experience.
- » Strength in Depth across key healthcare disciplines
- » Health ICT and Cyber Security specialisms

RANGE OF NDY SERVICES

- » Acoustics
- » Asset Performance
- » Audio Visual
- » BIM (Building Information Modelling)
- » Commissioning Management
- » Communications
- » Controls & System Integration
- » Electrical
- » Fire Engineering
- » Fire Protection
- » Hydraulics
- » ICT Consultancy
- » Interiors
- » Mechanical
- » NDYLIGHT (Specialist Lighting Design)
- » Property Consultancy
- » Security (including Cyber Security)
- » Sustainability
- » Vertical Transportation

NDY COMMITMENT TO QUALITY

- » Uniform group approach
- » ISO 9001:2008-2015 certified
- » ISO 14001:2004 certified
- » ISO 18001:2007 certified
- » Emphasis on processes that produce quality coordination, including the use of 3D Modelling tools
- » Systems are central and accessible to all our offices
- » Ongoing personnel training
- » Regular external audits
- » Project peer reviews
- » Commitment to Revit for coordination
- » Deltek Vision Resource planning and project management tools

NDY EMBRACING SUSTAINABILITY

- » Numerous industry sustainability awards
- » Founding member of GBCA
- » Over 100 completed Green Star certified projects
- » R&D program with a focus on sustainability
- » LEED Gold rating for the South Australian Health & Medical Research Institute
- » Independently assessed 5 star Green Star rating for the Royal Children's Hospital based on the health pilot tool
- » International team of experts, qualified to manage and deliver a suite of sustainable benchmarking tools including Green Star, One Planet Living, WELL Building Standard, BREEAM, LEED, LENSES, NABERS, CF SH, Passive Haus, etc.
- » Specialist skills in building fabric optimisation and energy management, knowledgeable in validation of complex design solution modelling, such as CFD, energy, indoor environment (daylight autonomy, glare, thermal comfort, air change effectiveness and acoustics), JV3, etc.

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At NDY we take our responsibility to our clients very seriously. A clear understanding of their objectives enables us to provide the best possible advice specific to their needs.



Brad George

Technical Director
Scientific Research & Containment
Norman Disney & Young

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