PROPOSED CSIRO MINERALS LABORATORY EXTENSIONS AT WATERFORD, PERTH, WA

Statement of Evidence
To the Parliamentary Standing Committee on Public Works

Commonwealth Scientific Industrial Research Organisation

July 2005

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1.0 INTRODUCTION

1. The proposal presented in this submission to the Parliamentary Standing Committee on Public Works (PWC) is for the construction of building additions and alterations as well as associated site works at the existing CSIRO Minerals Research Facility at Waterford in Perth, WA.

2. The CSIRO Division of Minerals (CSIRO Minerals) was established in 1994 from a merger between the CSIRO Divisions of Mineral Products and Minerals & Process Engineering. It is the largest public domain organisation in Australia conducting research into minerals processing and metal production across a broad range of mineral commodities (such as alumina, base metals, gold, iron ore, magnesium titanium). The Division Headquarters are located at the CSIRO Campus at Clayton, Victoria. The Division also conducts research at the Queensland Centre for Advanced Technology at Pullenvale in Queensland, at Lucas Heights in Sydney, at Urrbrae in South Australia and at Waterford in Western Australia.

3. CSIRO Minerals research is conducted through eight programs. Three of these, Alumina Production, Base Metals and Gold are based at Waterford in WA. Another three (High Temperature Processing, Process Design & Optimisation and Light Metals) are based at Clayton in Melbourne. Iron Ore Processing is based in Brisbane and On-line Analysis and Control is located at Lucas Heights in Sydney.

4. The three Waterford based programs focus on hydrometallurgy research for the Aluminium and Base Metals (eg copper, nickel, zinc) and Gold sectors of the minerals processing industry. The common skill base utilised by these programs enables sharing of major instrumentation, equipment and staff. The main research projects conducted at Waterford involve Solid-Liquid Handling, Solvent Extraction, Gold Processing Technology, Bioleaching and Bayer Process Technology.

5. Development of the proposed additions and alterations at Waterford will provide additional accommodation to enable the Division to grow from the current 70 to 100 staff. It will also provide accommodation for students undertaking Minerals related post-graduate and undergraduate studies at the three Universities in WA.

6. The development will replace current sub-standard temporary seminar and lunch room facilities housed in transportable buildings and inadequate storage and general technical support amenities on the site which create inefficiency and impede communication between CSIRO staff, students and collaborators. The proposed alterations will also create safe, consolidated accommodation for highly serviced research instruments currently located in a number of rooms throughout the existing buildings and not readily accessible to collaborators and customers.

7. Staff from collaborator organisations will relocate from other locations in Perth and will be accommodated in the expanded Waterford facility. These include personnel from the headquarters of the Parker Cooperative Research Centre for Integrated Hydrometallurgy Solutions (Parker Centre), the Sustainable Resource Processing Cooperative Research Centre (CSRP) and the Western Australian office of the Australian Mineral Industries Research Association (AMIRA) International.

8. The proposed works by CSIRO will be the first step towards the creation of a world-leading “Minerals Research and Education Centre” at Waterford, built upon existing close collaboration between CSIRO, Universities, Cooperative Research Centres and Industry.

9. Curtin University of Technology (Curtin University) has initiated development of new facilities to accommodate its School of Applied Chemistry, which will house around 50 staff and 300 students, and the Chemistry Centre of Western Australian (CCWA), with 90 staff, on a site adjoining the western boundary of the CSIRO Waterford facility. The new Curtin University development will create a world-leading "Chemistry Research and Education Centre".

10. The Minerals and Chemistry Research and Education Centres will jointly comprise a "Minerals and Chemistry Precinct" and benefit from close collaboration between staff and students as well as sharing of facilities, instruments and equipment.

11. The proposed CSIRO and Curtin University projects will form part of the new Western Australian Technology Precinct (WATP) that currently incorporates the existing Curtin University, WA Technology Park, the Australian Resources Research Centre, the Department of Industry and Resources WA (DOIR), the Department of Agriculture WA, Department of Education and Training WA and CSIRO Minerals. The WATP also includes vacant land and infrastructure for other business, research and education entities to develop new facilities. By Australian and international standards, the WATP will become one of the largest consolidated business, research and education precincts covering approximately 40 hectares with potential accommodation for 40,000 people. This will increase opportunities to attract new research and development to WA and Australia through innovation, knowledge and infrastructure collaboration as well as creating critical mass in fields such as Minerals and Chemistry research and education.

2.0 BACKGROUND

2.1 General

12. The research activities of CSIRO Minerals are presently located on five CSIRO sites in five states:

- Clayton, Victoria (155 staff) – the Division Headquarters;
- Waterford, Perth, Western Australia (70 staff);
- Lucas Heights, NSW (25 staff);
- Pullenvale, Brisbane, Queensland - the Queensland Centre for Advanced Technologies (QCAT) site (35 staff); and
- Urrbrae, South Australia (2 staff).

13. CSIRO established a mineral processing research capability (with a particular focus on hydrometallurgy) in Western Australia through the relocation of six staff from Melbourne in 1984. This group and five local recruits, were housed in laboratories and offices within Curtin University School of Applied Chemistry. Over the next ten years a close relationship developed between CSIRO and Curtin University through joint supervision of students and joint collaborative research projects with mineral processing companies producing alumina, gold, nickel, copper, zinc and other metals utilising hydrometallurgical processes.

14. The CSIRO Minerals group, together with Curtin University, Murdoch University, DOIR and a number of mineral processing companies formed the AJ Parker Cooperative Research Centre for Hydrometallurgy (Parker Centre) in 1992.

15. The great success of hydrometallurgical research resulted in CSIRO staff numbers rapidly out-growing the available accommodation within Curtin University's School of Applied Chemistry. In response the Western Australia Government, through DOIR, developed a new minerals-focused laboratory and pilot-scale research facility on land at the corner of Townsing Drive and Conlon Street in Waterford, south of the Swan River and Perth CBD. The facilities were designed to accommodate up to 65 CSIRO staff and students. CSIRO occupied the Koch building (laboratory and office facilities) under lease arrangements in 1994 and subsequently occupied the Becher building (laboratory and office facilities) under separate lease arrangements in 1998. These lease arrangements are ongoing.

16. Increasing engagement with the Australian minerals industry and continued investment by CSIRO resulted in CSIRO staff numbers at Waterford reaching full capacity of the Koch and Becher buildings (65 people) by early 2002. Further growth since then to about 70 staff and 10 students has only been possible through the use of temporary transportable buildings for accommodation of staff, students and support functions.

17. The growing demand for and prominence of minerals research in WA has created the need for additional accommodation for research personnel, a clearer point of address for public interaction with researchers and industry collaborators and improved permanent amenities for research staff, students, visitors and collaborators. This will be achieved through development of a new single storey wing on the southern side of the Koch Building that will provide a highly visible point of address for the public and visitors, a three floor extension to the eastern side of the Koch Building to accommodate additional research staff and students, amenities and storage and development of a large volume extension to the western end of the Becher Building for bulk storage of research equipment and samples. The planned additions will necessitate alterations to specific associated areas within the existing Koch and Becher Buildings. There are no environmental or heritage impediments to the planned development.

18. The proposed works will provide improved amenities for staff and the public, including a new seminar facility, a lunch room accessible to staff and visitors and a public exhibition area for research works, publications and displays relating to minerals research and the related industry.

2.2 Need

19. The Parker Centre has recently been renewed for a further seven year period from 1 July 2005. The case for renewal was based upon the growing needs for research skills and education related to hydrometallurgy processes used by Australian mineral processing and supplier companies. This was demonstrated by the strong financial support and direct participation of seventeen companies in the bid to renew the Centre. There are also rapidly growing links with other Australian research peers as well as growing links with international researchers and mineral processing companies.

20. It is anticipated that the number of CSIRO research staff will need to grow over the next seven years, as outlined above, to be able to deliver to the hydrometallurgical related research needs of the minerals industry.

21. In particular, it is expected that demand from the alumina industry for research skills will grow slightly as Australia increases its share of total world production (from its already dominant position in producing 16 million tonnes per annum of alumina valued at $6 billion per annum that represents approximately 30% of total world capacity). Major growth in research is also expected in areas related to base metals (nickel, copper, zinc), gold and other precious metals, and in the application of hydrometallurgical skills to other areas (such as metal recycling and water utilisation).

22. The proposed growth in CSIRO staff numbers at Waterford will also provide an underpinning critical mass and associated infrastructure to support the co-location of other research providers and the technology arms of minerals processing companies, Small and Medium Enterprise supplier companies and Consultants to the minerals industry.

2.3 Options Considered

23. Two main options to provide additional accommodation for the existing and planned growth in CSIRO staff and student numbers at Waterford were investigated.

24. The preferred option is to remain at Waterford and expand the facilities and site to accommodate the Division's growth and importantly help facilitate immediate and future collaborative research and education opportunities with mineral processing peers from Cooperative Research Centre, universities, State Government agencies and industry.

25. A further option which involved closing the Waterford site and relocating 70 CSIRO staff to another CSIRO site in Perth was rejected on the basis that it would have required considerable expense associated with the development of the extensive wet chemistry laboratories already at Waterford. Whilst there would be operational benefits gained from collocation with other CSIRO Divisions and their staff on another site, it is considered that collaboration with the mineral processing research and education community in general at the Waterford site will provide greater benefit to the Division and strengthen medium to long term growth.

26. The "do nothing" option is not viable as there is a clear pattern of strong growth in demand for minerals research capabilities which will require additional staff. If suitable accommodation is not provided for the current and new staff then this will be detrimental to operation performance, lower staff morale and compromise safety. In addition, the "do nothing" option will greatly hinder the planned growth in Minerals and Chemistry research and education that has already developed credibility in Australia and internationally and attracts income from institutions and companies.

3.0 OVERVIEW OF CSIRO

27. CSIRO is one of the world's top scientific institutions and Australia's premier strategic research organisation. It has a total of approximately 6,500 staff located at 57 sites throughout Australia and in several locations overseas. From 1 July 2005, the organisation will comprise 19 research Divisions and Corporate elements including National Research Flagships.

28. Since its inception in 1926, CSIRO has played a vital role in shaping Australia and generating the nation's wealth. The organisation and its scientists have established an international reputation for excellence and achievement in basic and applied research. Its work contributes to the ongoing prosperity of Australia's primary and secondary industries, to the creation of new technologies, products and techniques for the continuing development of Australia's manufacturing and service-based industries.

29. CSIRO's primary functions under the Science and Industry Research Act are to:

- carry out scientific research for any of the following purposes:
  - assisting Australian industry;
  - furthering the interest of the Australian community;
  - contributing to the achievement of Australian national objectives or the performance of the national and international responsibilities of the Commonwealth; and
  - any other purpose determined by the Minister;
- encourage or facilitate the application or utilisation of the results of any other scientific research; and
- carry out services and make available facilities, in relations to science.

30. In achieving its functions CSIRO collaborates with industry and maintains close and mutually profitable relationships with universities and other research and tertiary education bodies in Australia and overseas.

31. Sixty percent of staff hold university degrees, including more than 1850 doctorates and 420 masters. In collaboration with university colleagues, CSIRO staff supervise or co-supervise more than 550 postgraduate research students annually, over 20 per cent in collaboration with Cooperative Research Centre's (CRCs).

32. Total CSIRO revenue per annum exceeds $900 million. In 2004/05 CSIRO received Parliamentary appropriation funding of $577 million. Over 70 per cent of CSIRO's Parliamentary appropriation funding is directed towards the priority goals associated with the National Research Priorities.

33. CSIRO generated $332 million in 2004/05 in external earnings for research, specialised consultancy and other services. This revenue was derived from the Federal and State governments, Australian Industry and international companies and organisations.

34. In 2003, CSIRO launched the National Research Flagships. These are partnerships of leading Australian scientists, research institutions, commercial companies and selected international partners. Their scale, long timeframes and clear focus on delivery and adoption of research outputs are designed to maximise their impact in key areas of economic and community need.

4.0 CSIRO ORGANISATIONAL STRUCTURE

4.1 General

35. CSIRO has been structured to respond to Australia's needs and to ensure that its research effort and scientific resources are focused in areas of national priorities. Strong links with industry and the community mean a better understanding of future

directions in Australian industry and improved community understanding of new technologies.

36. As the basic business units of CSIRO, Divisions are organised largely along discipline lines and each headed by a Chief who plans, guides and evaluates the research efforts of the Division.

37. The 19 Divisions have been strategically grouped together as follows:

Agribusiness
Ensis/Forestry and Forest Products
Entomology
Food Science Australia (+Nutrition)
Livestock Industries
Plant Industry
Textile and Fibre Technology
Sustainable Energy & Environment
Marine & Atmospheric Research
Sustainable Ecosystems
Land & Water
Energy Technology
Petroleum Resources
Information, Manufacturing & Minerals Group
ICT Centre
Australia Telescope National Facility
Industrial Physics
Mathematical and Information Sciences
New Division (Molecular Science + HSN Parkville)
Manufacturing and Infrastructure Technology
Minerals
Exploration and Mining

4.2 National Research Flagships

38. In April 2003 the Prime Minister, Mr John Howard, launched the Flagship Initiative. The National Research Flagships are multidisciplinary research partnerships that align Divisions across CSIRO and external agencies to tackle specific objectives in areas of major national significance. Their larger scale, longer timeframes and clear focus on adoption of research outputs are designed to provide maximum impact.

39. Flagships are targeted at achieving national goals in fields of health, water, energy, food, light metals and oceans. They have been established to address the following national objectives;

- Strong, sustained economic growth, new industries, competitive enterprises and quality jobs;
- Healthier, more productive lives for Australians;
- Clean, cost-efficient energy;
- More productive and sustainable use of water;
- Sustainable wealth from our oceans; and
- Growth and prosperity for regional Australia.

40. Each Flagship addresses two or more of these national objectives and the initiative as a whole, aligns with the Commonwealth Government's National Research Priorities.

41. The six Flagships and their goals are:

- **Preventative Health** – to improve the health and well being of Australians and save $2 billion in annual direct health costs by 2020 through the prevention and early detection of chronic diseases;
- **Light Metals** – to lead a global revolution in light metals, doubling export income and generating significant new industries for Australia by the 2020s while reducing environmental impact;
- **Food Futures** – to transform the international competitiveness and add $3 billion annually to the Australian agrifood sector by the application of frontier technologies to high-potential industries;
- **Energy Transformed** – to halve greenhouse gas emissions and double the efficiency of the nation's new energy generation, supply and use, and to position Australia for a future hydrogen economy;
- **Water for a Healthy Country** – to achieve a tenfold increase in the social, economic and environmental benefits from water by 2025; and
- **Wealth from Oceans** – to position Australia by 2020 as an international benchmark in the delivery of economic, social and environmental wealth based on leadership in understanding ocean systems and processes.

42. Flagships are large-scale science partnerships in action. They integrate, direct and focus scientific resources on issues of urgent national significance. Research partners in Flagships research include:

- Alcoa
- Australian Bureau of Agricultural and Resource Economics
- Australian Greenhouse Office
- BHP Billiton
- Comalco
- Australian Bureau of Meteorology
- Curtin University
- Flinders University of South Australia
- Fisheries R&D Corporation
- General Motors Holden
- Ludwig Institute for Cancer Research
- Murray-Darling Basin Commission
- National Ageing Research Institute
- Neurosciences Australia
- Royal Australian Navy
- The Menzies Centre for Population Health
- The University of Adelaide
- The University of Auckland
- The University of Melbourne
- The University of New South Wales
- The University of Queensland

43. The 2004 Federal Budget included an extra $305 million allocation to CSIRO for the Flagships initiative over the next seven years to which CSIRO will redirect additional funding from its own external resources. This is planned to grow substantially over

the next few years, making Flagships one of the largest, focussed scientific undertakings in Australian history.

5.0 RESEARCH ACTIVITIES OF THE DIVISION

5.1 Overview

44. The major mineral commodities produced in Australia are:

Commodity	$billion per annum
Iron ore and pellets	6.5
Bauxite and alumina	6.0
Gold	5.1
Aluminium	3.7
Nickel	2.5
Iron and Steel	2.0
Copper	2.0
Zinc	1.5
Diamonds	0.6
Other	5.6
Total	35.5

45. CSIRO Minerals research and development adds value to these commodities, both through enhancing current performance and the provision of breakthrough technologies for future needs. There is also a focus on developing new opportunities for Australia, such as in titanium and magnesium metal production.

46. CSIRO Minerals' purpose is to:

- Support the growth of the existing minerals industry.
- Create new opportunities for the minerals industry.
- Apply research and development capabilities to generate new opportunities for Australia.
- Balance environmental responsibility with industry growth.

47. The Division's key strategies are to:

- Generate novel and diverse options by identifying and combining advances in scientific research;
- Translate these options to deliver practical and effective solutions; and
- Secure industry involvement in the Division's portfolio choices and capability building.

48. The work of CSIRO Minerals complements that of other CSIRO Divisions including Exploration and Mining (CEM) and Manufacturing and Infrastructure Technology (CMIT) that conduct research and development which enhances the minerals value chain.

49. CSIRO Mineral's capabilities are developed through Commonwealth Government appropriation as well as co-investment with State Governments and Industry. CSIRO Mineral's annual budget in (2004/05) was $45 million. The results and expertise created by CSIRO Minerals are transferred to end-users through a mixture of co-investment projects, consulting and testing, commercialisation of IP, and movement of people to industry and other research organisations.

50. The Division's research activities are organised into eight research programs. Five programs are market orientated;

- Alumina Production (located at Waterford in Western Australia);
- Base Metal Hydrometallurgy (located at Waterford);
- Gold (located at Waterford)
- Iron Ore Processing (located at Pullenvale in Queensland); and
- Light Metals (located at Clayton in Victoria).

The remaining three are capability orientated:

- High Temperature Processing (located at Clayton);
- On-line Analysis and Control (located at the Lucas Heights site in NSW); and
- Process Design and Optimisation (located at the Clayton).

51. The principle research and development undertaken by the Division's Program Groups in WA includes the **Alumina Production** and **Base Metals Hydrometallurgy and Gold Programs.**

52. **The Alumina Production Program** focuses on enhancing the performance of Australia's seven alumina refineries (four in Western Australia, two in Queensland and one in the Northern Territory). Collectively they produce about 17 million tonnes of alumina per annum (representing approximately 30% of total world production). There is significant opportunity for growth through enhanced productivity, expansion of existing refineries and the development of new refineries. All of the Division's alumina production research and development is conducted at Waterford and is directed towards five key research areas:

- Red-side Issues;
- White-side Issues;
- Impurity Control;
- Solid-Liquid Handling; and
- Bayer Environmental Issues.

53. CSIRO Minerals works closely with research and development managers from Australia's alumina companies to align its research activities with the needs of the Australian alumina industry and help in setting research strategy and directions.

54. **The Base Metals Hydrometallurgy Program** researches the extraction of metals such as copper, nickel, zinc, silver from ores using hydrometallurgical processing routes. The main research areas are:

- Leaching, including Mineral Bio-processing involves a multidisciplinary team (chemists, engineers, mathematicians, microbiologists) conducting research into the factors controlling the extent and rate of in leaching, pressure leaching and bioleaching. In addition the group conducts research related to the mineral characterisation in ores, concentrates and leach residues; and

- Solvent Extraction involves research in metals separation using aqueous and non-aqueous fluids. It has a strong emphasis on reagent chemistry, especially the use of synergistic reagent systems. It also involves work on reactor and flowsheet development.

55. The Gold Program's main research is focussed on enhancing the current "Carbon-in Pulp" cyanide based process for extraction of gold from low grade ores. Other research is conducted on the development of alternative gold extraction processes using thiosulfate as well as the development of on-line analysis methods and process models. This area is developing a strong capability in flowsheet modelling and ore characterisation.

5.2 Proposed Future Research Activities at the CSIRO Minerals Waterford Site

56. Over the next seven years, staff numbers at the CSIRO Minerals Waterford site will grow to approximately 100 in response to increased activities in the following areas:

- Growth in Light Metals Flagship alumina and related activities;
- Increased opportunities in base metals research, especially related to bioleaching;
- New areas of gold technology research, including further development of flow-sheeting opportunities; and
- Development of a comprehensive "Computational Hydrometallurgy" capability spanning process modelling and computational fluid dynamics.

57. The achievement of these goals will be greatly enhanced through the establishment of the proposed Minerals Research and Education Centre and the collocation of the Parker Centre, the CSRP, the WA office of AMIRA and other research groups at the Waterford site.

6.0 SITE

6.1 General Description

58. The CSIRO Minerals facility occupies a 2.95 hectare site within the Curtin Precinct of the Town of Victoria Park.

59. The site is irregular in shape and adjoins Canning College to the north, residential accommodation to the east, Brand Drive to the west and Conlon Street and Townsing Drive to the south. Townsing Drive also links the site with Manning Road which is a major arterial road that connects to the Kwinana Freeway, Leach Highway and Albany Highway.

60. The proposed new Curtin University Chemistry Precinct will be developed immediately to the west of the CSIRO Minerals site. A new road system is being developed to service Curtin University and the CSIRO site, including a new major southern entrance to the University and WATP off Manning Road.

61. Existing CSIRO occupied buildings on the Waterford site include:

- The **Koch Building** which was constructed in 1994 and has a gross floor area of 3,785 square metres Gross Floor Area (GFA) over three levels. This includes laboratories, laboratory support, offices, meeting rooms, reception, library, amenities, plant-rooms and circulation.

- The **Becher Building**, also constructed in 1994, has a gross floor area of 2,980 square metres GFA over two levels and houses laboratories, laboratory support, offices, meeting rooms, pilot plant process bay, storage, amenities, plant-rooms and circulation.

- Two transportable buildings that comprise approximately 70 square metres each and accommodate seminar and lunch room functions.

62. Curtin University also occupies a small building on State Government land to the north of the Becher Building. This building was constructed in 1994 and houses offices, a lecture room, meeting rooms, library, storage, amenities, plant-rooms and circulation.

6.2 Site Master Planning

63. During 2004 a master plan was developed for the proposed Minerals and Chemistry Precinct. This identified potential for shared facilities and the appropriate location for key research equipment, highly serviced and specialised functional areas and storage to strengthen synergies and develop efficiencies in Minerals and Chemistry research and education.

64. The master plan incorporates CSIRO's proposed expansion of the Koch Building with a new southern wing and linking element to the southeast of the existing building. This will develop a strong connection between the new CSIRO southern wing and the proposed new Curtin University and CCWA buildings and create a complex of research and development and analytical laboratory buildings in the Minerals and Chemistry Precinct.

65. Future expansion of the Minerals Research and Education Centre would occur predominantly to the east of the site, with limited expansion to the west and north.

6.3 Site Development Options

66. A number of site development options were considered during the master planning phase and reviewed with CSIRO during a value management workshop. Each option involved a western expansion of the Becher Building to integrate with existing high volume technical bay areas. Options for expansion of the Koch Building included development of new additional floor area to the south, west or east.

67. The adopted site development option comprises expansion of the Koch Building to the east, together with a new southern wing and associated linking element. The new southern wing will incorporate a new main entrance and public foyer. This will also provide a clear point of address for the Minerals Research and Education Centre in the context of the Minerals and Chemistry Precinct. It will also be clearly visible from Manning Road and Townsing Drive which will assist visitors in locating the facility.

6.4 Geotechnical Conditions

68. The site is located off Manning Road in an area previously occupied by a school, the old school playing fields still being evident to the eastern side of the Becher and Koch buildings.

69. The ground beneath the surface is expected to predominantly comprise sand of varying compaction and a varying degree of silt. No clay or rock layers are expected to be found at the levels to be excavated for the new works. No specialist foundation or road construction treatment is expected.

7.0 ENVIRONMENTAL MANAGEMENT

70. Specific environmental management actions to be implemented as part of this proposed development will include:

- Appropriate tree planting and landscaping adjacent to the building;
- The filtering and control of all storm water run-off to contain any potential pollutants on-site;
- Sound attenuation and vibration isolation within the new facilities to maintain acceptable noise and vibration limits on the site;
- The collection, dilution and treatment of non-toxic liquid waste prior to discharge to sewer and agreed trade waste approvals;
- Collection of wastes such as flammable liquids, oils and toxic liquids at the point of use in waste containers which will be collected for disposal by a licensed industrial waste collector;
- Storage of hazardous goods in accordance with respective codes and standards; and
- Appropriate filtration and odour management of airborne exhaust discharges to avoid impact on the environment.

71. An Environmental Management System consistent with AS/NZS ISO 14001:1996 was developed for the existing Waterford facility and will be expanded as part of the post-occupancy management of the expanded building and existing site areas.

72. A Construction Environmental Management Plan has been developed in preparation for the proposed works. The construction contractor will be required to implement the Construction Environmental Management Plan during the construction phase to manage waste, noise, airborne pollutants and dust, erosion and stormwater control.

8.0 HERITAGE CONSIDERATIONS

73. The site and buildings at Waterford were developed in 1994. It is understood that there are no heritage related issues associated with the site and buildings.

74. A formal application under the EPBC Act has been lodged with the Environment Minister.

9.0 CONSULTATION

75. The following authorities and Departments have been contacted and/or consulted by CSIRO and its consultants during the preparation of this submission:

Commonwealth Government
Department of Transport and Regional Services
Department of Prime Minister and Cabinet
Department of Industry, Tourism and Resources
Department of the Treasury
Department of Education, Science and Training
Department of Employment and Workplace Relations
Department of Environment and Heritage
Department of Family and Community Services
Department of Foreign Affairs and Trade

Department of Health and Ageing
Department of Immigration and Multicultural and Indigenous Affairs
Attorney-General's Department

WA State and Local Government
WA Department of Conservation and Land Management
WA Department of Premier and Cabinet
WA Department of Industry and Resources
WA Fire and Emergency Management Authority
Western Power
Canning City Council
Town of Victoria Park
City of South Perth

Federal and Local Members
Federal Member - Member for Swan – Mr Kim Wilkie MP
State Government Member - Member for South Perth - Mr John McGrath MLA
State Government Member - Member for Victoria Park - Hon. Dr Geoffrey Gallop MLA

Unions
CSIRO Division of Community Sector Union (CPSU)

Other Organisations
Clontarf Aboriginal College
Parker Centre
Centre for Sustainable Resource Processing
AMIRA
Curtin University of Technology
Murdoch University
University of Western Australia

Neighbouring Residents
Waterford Residents

76. CSIRO has also conducted information and consultation sessions during the master planning and schematic design phases with the CSIRO Divisional staff seeking comment and input to the design of the new proposed facilities.

10.0 TECHNICAL SOLUTION

10.1 General

77. The proposed works will involve development of approximately 3,200 square metres gross floor area (GFA) of additions and 550 square metres GFA of alterations to the main buildings on the Waterford site.

78. The proposed CSIRO additions and alterations to the Koch Building will comprise a three storey extension to the east and a single storey wing extending to the south of the existing building totalling 2,800 square metres GFA, and 500 square metres GFA of alterations. This will include:

1. Ground Floor - 1,730 square metres GFA of additions and 375 square metres GFA of alterations providing:

Eastern Addition and Alterations:

- lunch room;
- meeting rooms;
- laboratory fitout alterations;
- staff toilets;
- staff shower and change facilities;
- storage;
- lift and stair access to all levels; and
- additional plant area.

New southern wing and link additions:

- entry foyer and reception area;
- large seminar room;
- Divisional administrative and collaborator administrative offices;
- Information Service Point (small Library);
- staff and visitor toilets; and
- storage.

2. First Floor – 500 square metres GFA additions and 125 square metres GFA alterations providing:
   - Divisional research office accommodation;
   - meeting rooms;
   - laboratory storage areas;
   - existing laboratory support, office and circulation fitout alterations;
   - staff toilets;
   - storage; and
   - lift and stair access to all levels.

3. Second floor – 500 square metres GFA of additions providing:
   - Divisional research office accommodation;
   - meeting rooms;
   - laboratory storage areas;
   - staff toilets;
   - storage; and
   - lift and stair access to all levels.

79. Proposed additions and alterations to the Becher Building include:

- 400 square metres GFA of high-bay bulk storage areas suitable for storing samples, research materials and consumables used by the Division;
- alterations in the existing Process Bay and Wet Laboratory areas to accommodate new research activities totalling 50 square metres GFA; and
- additional central plant to cope with additional demand for air-conditioning and related services.

10.2 Design and Construction Standards

80. Design of the facilities will be consistent with the general design philosophy for all CSIRO research accommodation, requiring long-term flexibility (multiple use of space), adaptability (easy conversion of layout/simple re-servicing) and simplicity of maintenance (with fully accessible engineering services).

81. All buildings, services and external infrastructure will comply with all relevant town planning, Commonwealth and State building, health and safety regulations, the Building Code of Australia and all relevant Australian Standards, including the "Safety in Laboratories" and "Laboratory Construction" Codes.

82. In accordance with WA Government requirements, the proposed building development has been submitted for Development Approval by the WA Planning Commission and comment by the Town of Victoria Park which is the relevant Local Government authority.

83. All consultant agreements and construction contracts will be in accordance with the National Code of Practice for the Construction Industry 1997.

10.3 Building Design Concept and Planning

Design Concept

84. The CSIRO Minerals buildings will become a focal point for minerals processing research and education in Australia and internationally and strengthen the marketing of CSIRO Minerals to its customers and stakeholders.

85. The design of the buildings will allow leading edge, scientific research within a comfortable work environment that encourages interaction of all staff and their research visitors and collaborators.

86. The design of the building form will reflect CSIRO's aspirations in a combination of public and private spaces which:

- provide a public interface for clients and visitors;
- act as a catalyst and attractor for promotion of CSIRO's work;
- assist in creating conditions for product, staff and visitor security and personnel safety;
- provide differentiation between communal areas and work areas;
- provide differentiation between work areas dedicated to particular programmes or groups and shared support zones;
- provide medium and long term flexibility and adaptability; and
- provide quality working facilities for research.

87. New building additions and alterations to the Koch Buildings will merge with the existing building form and fabric to create a cohesive architectural image. The overall appearance of the buildings will be functional and business-like in preference to ostentatious forms of expression. Careful consideration will be given to the use of materials which will also showcase mineral products.

88. The existing north and south office and laboratory wings of the Koch Building will be expanded to the east to provide office accommodation at the two upper levels. The design allows for glazed walls to have a north and south orientation. The ground floor level will include a lunch room, meeting rooms and amenities.

89. The additions will match the materials and architectural language utilised in the existing building envelope. This comprises a face brickwork base, exposed concrete structure and painted fibre-cement sheet cladding and aluminium framed windows to upper levels.

90. Internal re-configuration of the existing wings will also be undertaken to rationalise the ratio between laboratories, offices and workstations and to reinforce circulation patterns within the building.

91. Future planned expansion of the Koch Building will involve extension of the north and south wings to the east with the added potential of extending the northern and southern wing to the west.

92. The proposed new single level southern wing to the Koch Building will include reception, senior management and site administration offices, a seminar room and office accommodation for collaborator groups including the Parker Centre, CSRP and AMIRA. Separate after-hours access to the seminar room and the collaborator office areas will be provided through separate entrances and security points.

93. The southern wing will be sculptural in form and have a different but compatible architectural language to provide visual strength to the building entrance. A curvilinear plan form with a similar curvilinear sculptural roof 'floating' above the glazed walls is proposed.

94. External materials for the new wing will comprise full height glazed walls, typically terracotta wall cladding to solid elements and natural aluminium cladding to the exposed soffit areas of the roof.

95. Internally, materials will be selected to reinforce the minerals theme. Metals such as copper, aluminium, stainless steel and zinc will be utilised, together with limited areas of honed or polished stone finishes for floor surfaces and reception desk.

96. Landscaped courtyards will be created between the existing Koch Building and its new southern wing. These will provide opportunities for external breakout areas as well as providing daylight to adjacent work spaces and visual interest to building occupants.

97. Water features, signifying the hydrometallurgy research conducted on the site, will be incorporated as a design element both within the building and the landscaped areas. The use of water will be underpinned by practical considerations, including stormwater treatment and management externally.

98. The existing Becher Building will be expanded to the west to provide additional storage facilities for equipment and research materials. Alterations will also be undertaken in the Becher Building to rationalise work areas in the high volume Pilot Scale Process Bay facility and Laboratory areas.

99. The Koch and Becher Buildings will be linked by an overhead covered walkway that will provide barrier free connection away from vehicles operating in the service area below. The walkway will be naturally ventilated and include weather shielding to the western side to ensure safe access.

10.4 Mechanical Services

100. The mechanical services will include expansion of existing building and site systems comprising:

- Central chilled water plant for the air conditioning systems including cooling tower replacement and chiller upgrade to serve the new areas and existing refurbished areas. The proposed chiller will be approximately 50% more

efficient than the existing unit and the control system will be modified to ensure the new chiller operates as the "base load" machine;
- Supplementary central gas fired heating hot water plant for the air conditioning systems;
- Air conditioning for comfort conditions to laboratories, laboratory support areas, offices, meeting rooms, lunch room, seminar, reception and foyer areas as well as those areas which will be occupied by staff for medium to long durations;
- Make-up air systems to satisfy room pressure requirements;
- Exhaust air ventilation systems for toilets, equipment heat removal and local fume extraction;
- Room pressure regimes to work in conjunction with fume cupboards and exhaust systems;
- Reticulated laboratory gases from a central bottled store; and
- Extension of the Building Management System to monitor and control the mechanical services, including after hours zoned control of public access areas.

10.5 Electrical Services

3.1 The electrical and communications services will be developed through expansion of existing building and site systems comprising:

- Substation switchboard modification;
- Multi-function metering for the new building connected to the Building Management System;
- New sub-mains cabling;
- Distribution boards;
- Emergency power cut outs of laboratory power;
- Internal lighting systems including emergency and exit lighting;
- External and security lighting systems;
- Electrical power installation including general-purpose and special-purpose power outlets;
- Voice and data communication wiring;
- New local sub-fire panel to be interconnected with the main fire panel, evacuation panel for a new emergency warning and intercommunication system (EWIS) and phones;
- Electronic security to the perimeter of the proposed new building and to internal doors separating public and laboratory/office areas; and
- Lightning protection.

10.6 Hydraulic Services

101. The site level precludes access to a gravity sewer mains. The existing sewerage system comprises holding tanks and pumps located near the western site boundary. These tanks are also utilised for holding and neutralising liquid waste prior to pumping it to the north of the site where it joins the gravity sewer.

102. The proposed building extensions and refurbishments will place additional load on the Hydraulic Services systems. Supplementary holding tanks and transfer pumps will be added as part of the project works.

103. The hydraulic services will include:

- Separate domestic and laboratory cold and hot water reticulation;
- Laboratory Grade (Reverse Osmosis) water reticulation;
- Sanitary plumbing and drainage;
- Laboratory and Process Bay trade waste drainage and pre-treatment;
- Rainwater harvesting and collection; and
- Stormwater drainage to soakwells.
- Development of an overland flood path to the eastern end of the site for surface stormwater to mitigate against building flooding. This will direct water overland towards the nearby Canning River.

10.7 Fire Services

104. The fire services systems will consist of fire hydrants, hose reels, extinguishers and electronic detection systems.

105. A new Sub-Fire Indicator Panel (FIP) and Emergency Warning and Intercommunication System (EWIS) Panel will be provided and linked to the main FIP and EWIS panel in the Koch Building.

10.8 Lifts

106. Existing passenger lifts in the Koch and Becher Buildings will be utilised to meet the service demands of the new building additions and provide barrier free access to all levels of both buildings.

10.9 Acoustics

107. Acoustic measures will be incorporated in the proposed works to meet WA Environmental Protection Regulations.

108. The building facades will be designed in order to accommodate the expected external noise levels including external mechanical services plant.

109. The design of the new elements will ensure that the following conditions can be achieved:

- Background noise levels within various areas including those requiring speech privacy will be designed to meet the requirements of Australian Standards;
- Maximum distance will be maintained between vibration sources and vibration sensitive laboratories; and
- Vibration control will be implemented at both source and received locations.

10.10 Site Works and Landscaping

110. The proposed landscape design will be co-ordinated with the proposed design for the Curtin University development on the adjoining Chemistry research and Education Centre site.

111. Landscaping will be designed to compliment the building form, scale, materials and function. It will also be designed for low maintenance, particularly watering requirements. Selected Australian native species compatible with site micro-climate and soil conditions will be used in preference to exotic species.

112. Landscaped areas will be watered by a reticulated system that is appropriately zoned to ensure adequate water pressure and flow. The design will include electronic timer controls connected to the site BMS system.

113. Paved areas will comprise unit masonry pavers compatible with building textures and colours and selected to provide longevity and safety to building users.

10.11 Vehicular Access

114. Car access to the site by staff, students and visitors will be provided off Townsing Drive to the south and a new access road to be developed by Curtin University on the northern side of the site early in 2006. The existing Brand Drive on the western side of the site will be removed by Curtin University to make way for construction of the Chemistry Research and Education Centre.

115. Service vehicle access will also be provided off a new Curtin University access road. Vehicle movements will be limited to the existing service road between the Koch and Becher Buildings. This provides access for service vehicles to the existing workshops and Process Bays in the Becher Building. It will also be utilised for large vehicle access to the proposed large volume store addition at the western end of the Becher Building and parcel deliveries to the Koch Building.

10.12 Car Parking and Bicycle Storage

116. Visitor and supplementary staff parking will be located adjacent to the main entrance within the new southern wing. It will be accessible via a new driveway off Townsing Drive. The new carpark will incorporate barrier free parking bays located near the new public entrance.

117. Staff parking will be retained within the existing car park to the west of the Koch Building and south of the Becher Building. Access to this carpark will be provided from the new Curtin University access road.

118. Bicycle storage for staff commuting to work will be provided in the existing secure vehicle compound that adjoins the northern side of the Koch Building.

10.13 Pedestrian Access

119. Pedestrian access between the Koch and Becher Buildings will be enhanced by the development of an overhead covered walkway at first floor level. This will also provide barrier free access between the buildings away from vehicles.

120. This area between the Minerals building entrance and new Curtin University development entrance will be landscaped and paved to provide safe pedestrian access and sitting areas between the buildings. There will be no vehicle access in this area. It will also provide a pathway for visitor and student access to the Minerals Research and Education Centre from or to the west and the Curtin University main campus to the north.

121. The majority of vehicle access and movement will be kept to the perimeter of the site. Limited access to large vehicles in the areas between the Koch and Becher Buildings will be controlled through use of an access control boom gate.

122. Access ways will be graded and comply with the Code of Practice on Barrier Free Accessibility in Buildings.

10.14 Site Security

123. The existing Koch and Becher Buildings are connected to a site security monitoring system that includes access control to external doors. The additions and alterations will also be connected to the system with access control and monitoring to all external doors and internal doors separating public and laboratory/office areas.

124. Perimeter lighting will be expanded to include new building additions and carparks to improve night security.

125. A CSIRO security plan has been developed for the Waterford site.

10.15 Maintenance and Servicing

126. Access will be provided for vehicles and equipment required for the maintenance and the cleaning of the building and its environs. Access for fire brigade, ambulance and other emergency vehicles will be provided consistent with local regulatory requirements.

11.0 ECOLOGICALLY SUSTAINABLE DESIGN PRINCIPLES

11.1 Energy Conservation Initiatives

127. The new facilities will incorporate both active and passive energy conservation initiatives. Passive energy conservation measures will be incorporated into both building and landscape design, whilst the design of mechanical, electrical and hydraulic services will incorporate active energy conservation initiatives. Such initiatives will include:

- Building orientation providing maximum north / south exposure in order to maximise passive solar energy;
- Optimum building layout enabling maximisation of day-lighting conditions;
- Provision of primary or borrowed natural light in all major functional spaces thus minimising the use of artificial lighting;
- Incorporation of water saving devices on hydraulic fittings and fixtures to reduce water consumption;
- Utilisation of fluorescent lighting with electronic ballasts and tri-phosphor tubes for energy conservation and extended lamp life;
- Provision of a dedicated automatic lighting control system with features such as:
  - time clock control to turn the bulk of lighting off at pre-determined times;
  - passive infra-red detectors to activate / de-activate lighting to intermittently used rooms such as toilets, store-rooms and meeting rooms;
  - photo-electric control of lighting in perimeter rooms with access to natural lighting;
- The use of variable fresh air supply (to suit the population density) in the auditorium and motion detectors to control meeting room air–conditioning;
- Selection of cost effective and energy efficient mechanical plant;
- The use of operable windows in offices to create the opportunity for natural ventilation:

- The use of variable speed pumps and fans (where applicable) to closely match systems load fluctuations and minimise power requirements.

128. Management of energy efficiency / conservation initiatives will be provided by the Building Management System. Energy audits will be available from the system to monitor actual and planned performance.

129. The above initiatives and measures are consistent with a continuing commitment by CSIRO to reduce energy use through the adoption of better and more efficient energy management practices in the design and operation of its facilities.

11.2 Environmental Impact Considerations

130. The new facilities will incorporate initiatives to minimise the impact on the environment. Such initiative will include:

- Selection of materials with low volatile organic compound emissions and those of a proven sustainable manufacture;
- Selection of materials with consideration of their embodied energy;
- Module selection of building materials to minimise wastage;
- Provision of sun-screening elements to northern and western facade;
- Incorporation of water saving devices on hydraulic fittings and fixtures to reduce water consumption; and
- Collection of roof rain water and use for flushing toilets and irrigation.

12.0 BARRIER FREE ACCESS

131. An access audit of the existing building has been undertaken to identify all non-conformances within the existing buildings. Barrier free access for people with disabilities will be provided to both the existing and new building areas.

132. All new work will be designed to provide barrier free access in accordance with the requirements of the Building Code of Australia and Australian Standard 1428.1.

133. The existing site area has been filled to provide near level platform with suitable barrier free access to all buildings and parking areas. New buildings and carparks will also be developed on fill that will extend the existing platform.

13.0 OCCUPATIONAL HEALTH AND SAFETY

134. CSIRO pursues an active Occupational Health and Safety Policy within the workplace and this will be extended to include all facilities. Strict compliance with these requirements will be adhered to in all construction work.

14.0 CHILD CARE PROVISIONS

135. CSIRO is negotiating with Curtin University to procure child care places at the Curtin University child care centre.

15.0 LOCAL IMPACT

136. The proposed complex will have a positive effect on the local economy as follows:

- During the construction period, construction and associated industries will benefit with up to 80 persons working on the project at one time;
- Enhanced opportunities will be provided for research interaction with Curtin University; and
- The completed facility will be of sufficient size to employ up to an additional 30 CSIRO personnel, 15 students and 15 collaborator personnel in the long term.

16.0 COST

137. The indicative cost, exclusive of GST for this proposal is $12.0 million at May 2005 prices, inclusive of escalation costs, contingencies, all professional fees and authorities' charges. The estimate does not include the cost of staff relocation, loose furniture, fittings and equipment.

17.0 PROJECT DELIVERY SYSTEM

138. It is intended to call for expressions of interest from prospective Building Contractors to undertake construction of the proposed works. A short list of tenderers will be selected to tender for the works under a lump sum contract. Tenders will be required to comply with the National Code of Practice.

18.0 CONSTRUCTION PROGRAM

139. It is anticipated that, subject to a favourable report from the Parliamentary Public Works Committee and Parliamentary approval, construction will commence early 2006 with completion in 2007.

140. The project will need to be staged to minimise disruption to staff and CSIRO projects. A detailed staging programme is being developed in conjunction with Division staff.

19.0 CONCLUSION

141. This proposal aims to construct alterations and additions to safely and comfortably accommodate CSIRO research personnel, students and collaborator personnel in the CSIRO Waterford facilities, including the replacement of existing unsuitable and inadequate temporary transportable buildings.

142. CSIRO is satisfied that the proposed works as described in this submission are the most appropriate, timely and cost effective way to achieve the foregoing objectives.

143. The design properly reflects the CSIRO functional brief and will cater for future changes in research activities and priorities.

20.0 ASSOCIATED DRAWINGS

144. Sketch plan drawings are enclosed as follows:

1. Location Plan
2. Existing Site Plan
3. New Site Plan
4. Koch Building New Level 1 Floor Plan
5. Koch Building New Level 2 Floor Plan
6. Koch Building New Level 3 Floor Plan
7. Becher Building New Level 1 Floor Plan
8. South Elevation and Section Looking West
9. East and West Elevations
10. North Elevation
11. Perspective Views – External
12. Perspective View - Internal

LOCALITY PLAN

MINERALS RESEARCH AND EDUCATION CENTRE

WOODS BAGOT

CSIRO WATERFORD

EXISTING SITE PLAN

DRAWING 02

22/06/05

PROJECT 7-70-379

CSIRO

WOODS BAGOT

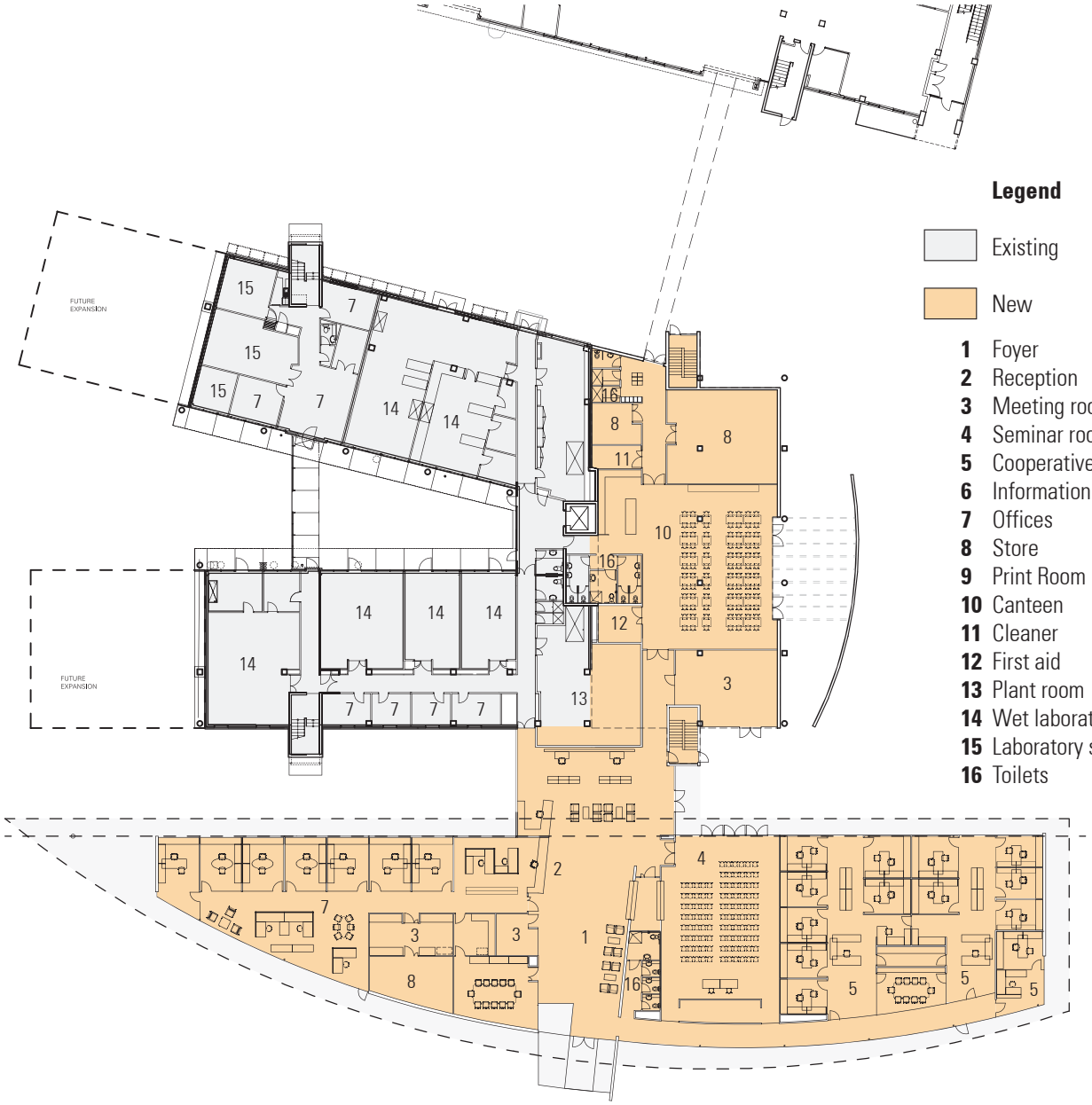
CSIRO WATERFORD

NEW SITE PLAN

DRAWING 03

22/06/05

PROJECT 7-70-379



WOODS BAGOT

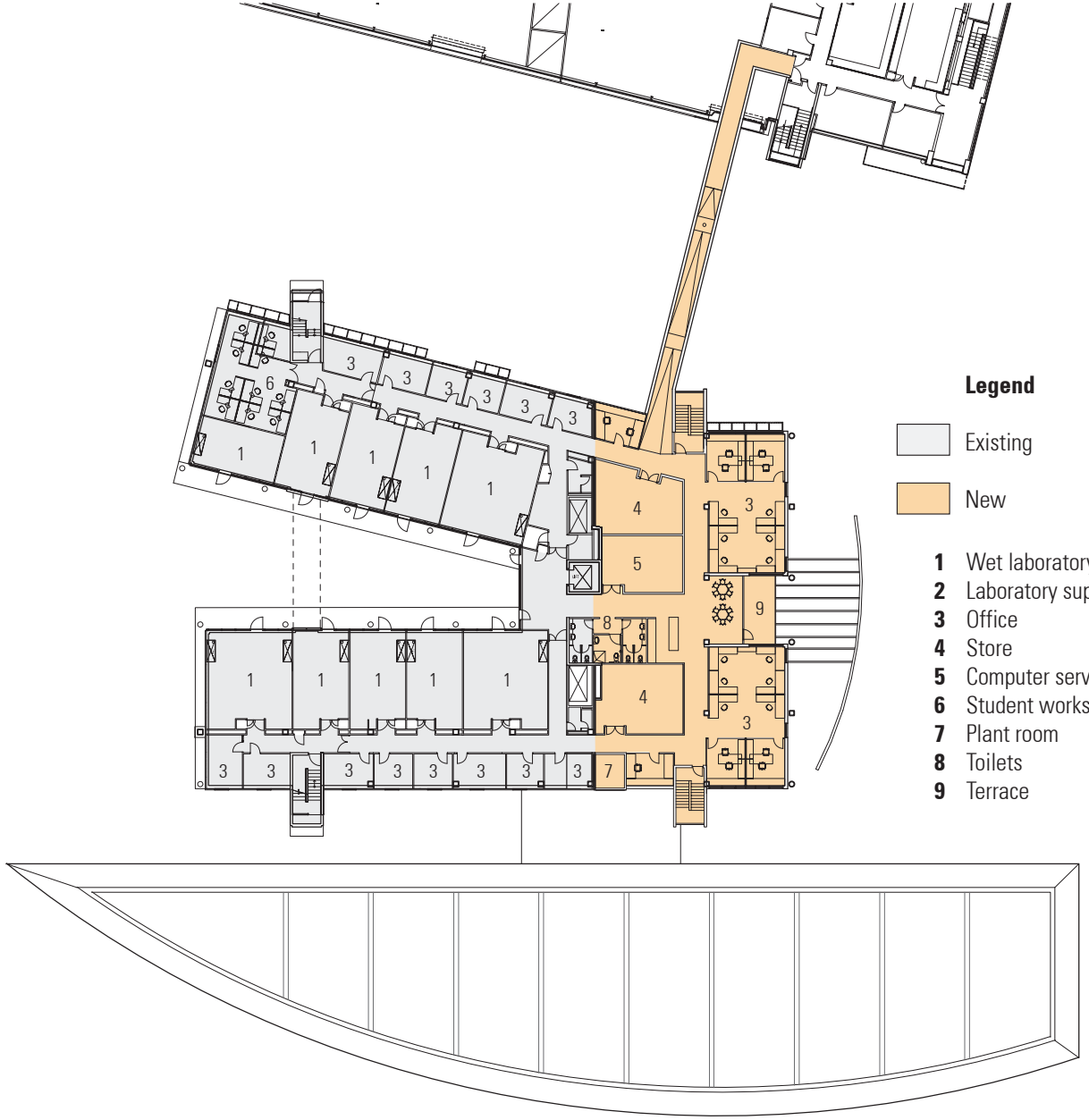
CSIRO WATERFORD

NEW LEVEL 1 - KOCH BUILDING

DRAWING 04

22/06/05

PROJECT 7-70-379



WOODS BAGOT

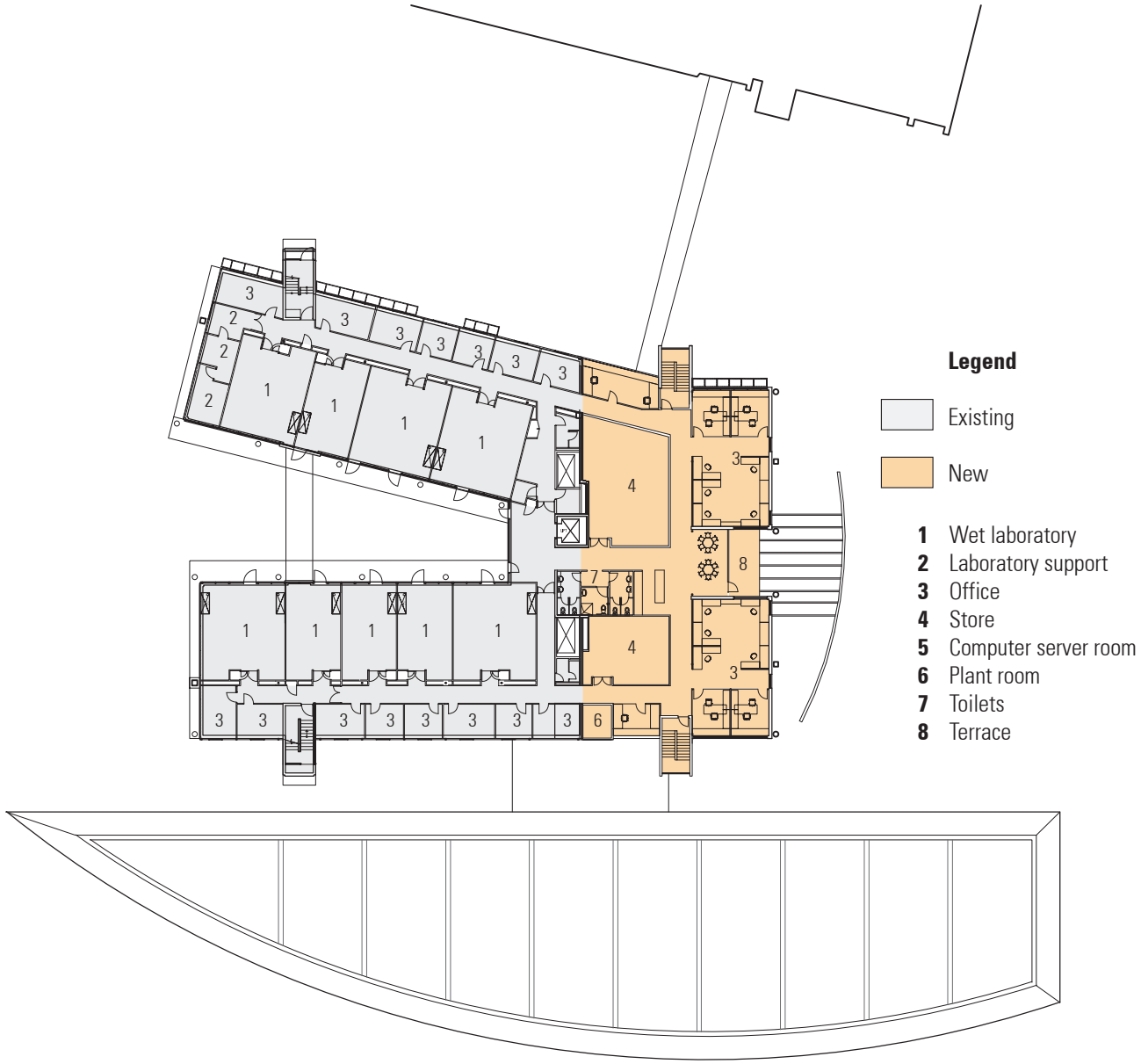
CSIRO WATERFORD

NEW LEVEL 2 - KOCH BUILDING

DRAWING 05

22/06/05

PROJECT 7-70-379



WOODS BAGOT

CSIRO WATERFORD

NEW LEVEL 3 - KOCH BUILDING

DRAWING 06

22/06/05

PROJECT 7-70-379

Legend

Existing

New

1 Store
2 Office
3 Chemical processing
4 Reaction engineering
5 Workshop
6 Welding bay
7 Plastics fabrication
8 Plant
9 Acoustic enclosure
10 Toilets

0 2 4 10m

WOODS BAGOT

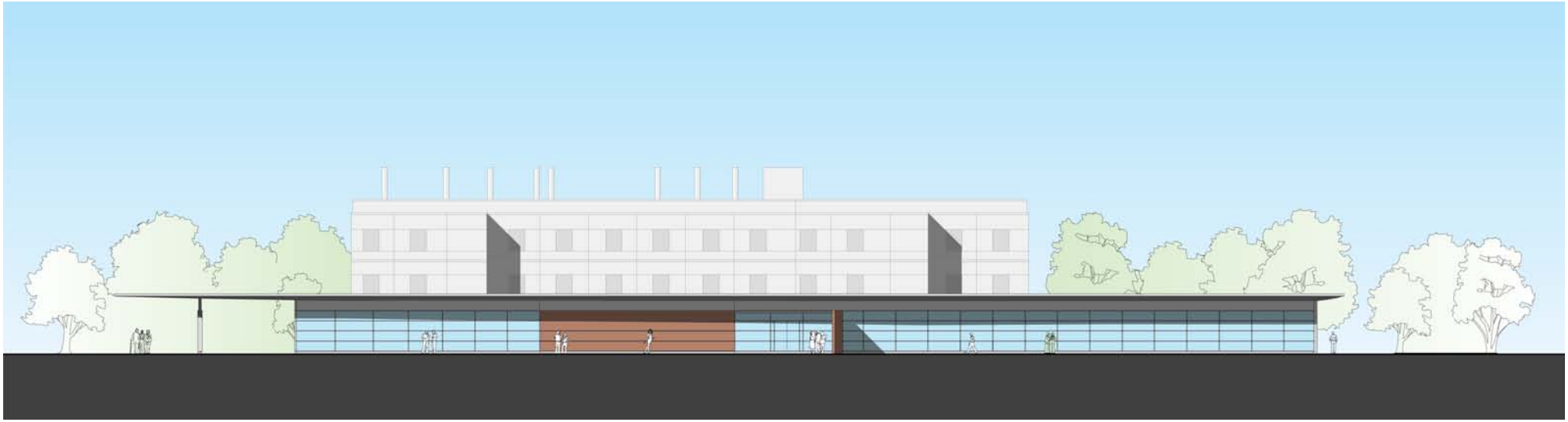
CSIRO WATERFORD

NEW LEVEL 1 - BECHER BUILDING

DRAWING 07

22/06/05

PROJECT 7-70-379



SOUTH ELEVATION

SECTION LOOKING WEST

0 2 4 10m

WOODS BAGOT

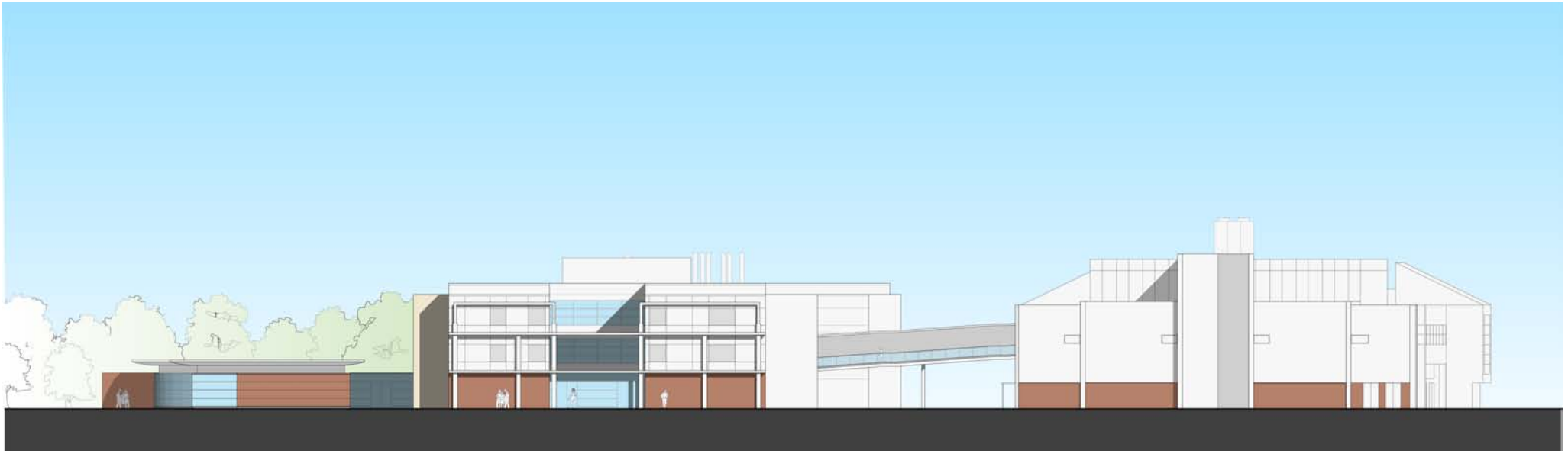
CSIRO WATERFORD

ELEVATIONS AND SECTIONS

DRAWING 08

22/06/05

PROJECT 7-70-379



EAST ELEVATION

WEST ELEVATION

0 2 4 10m

CSIRO

WOODS BAGOT

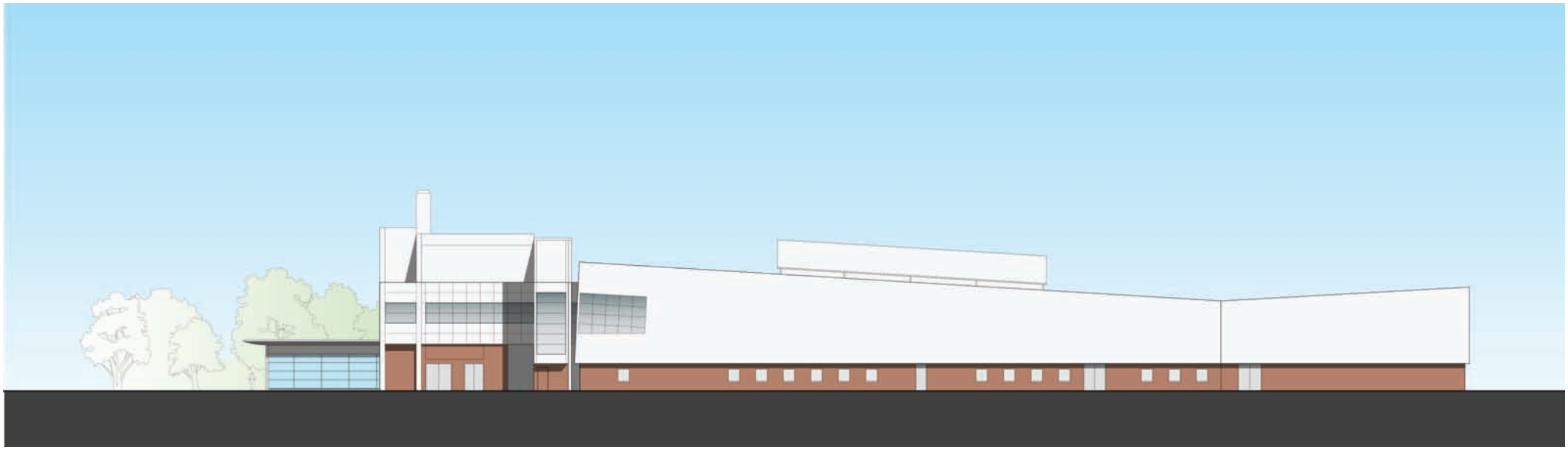
CSIRO WATERFORD

ELEVATIONS

DRAWING 09

22/06/05

PROJECT 7-70-379



NORTH ELEVATION

0 2 4 10m

CSIRO

WOODS BAGOT

CSIRO WATERFORD

ELEVATIONS

DRAWING 10

22/06/05

PROJECT 7-70-379

VIEW FROM SOUTH WEST

VIEW FROM SOUTH EAST

CSIRO

WOODS BAGOT

CSIRO WATERFORD

VIEW OF LOBBY

DRAWING 12

22/06/05

PROJECT 7-70-379