CORE FUND PROJECT - FINAL REPORT FOR 2016/17

Please complete and email to ESR.research@esr.cri.nz by Friday 14th July 2017.
ESR is fully accountable for Core Funding. Information in this report will be used to demonstrate what ESR Core Funding has been invested in, and to quantify the benefit from the investment in e.g. the Board Report. It will also inform future investment of Core Funding.

Project title:

Centre for Integrated Biowaste Research (CIBR)

Project leader(s):

Dr Jacqui Horswell

Duration:

Until 2017. Report covers period of 1st July 2016 – 30th June 2017.

Budget (amount allocated per year and total spent)

Allocated: $1,250,074	**Spent: $1,764,030**

List the capabilities developed and by whom (include students)

CIBR core capabilities

CIBR is a virtual centre, combining the expertise of 9 New Zealand research institutes, universities and research partners. Led by ESR, it brings together a multi-disciplinary team of scientists and researchers from ESR, Scion, Cawthron Institute, Landcare Research, NIWA, Lincoln University, Lowe Environmental Impact, Northcott Research Consultants Ltd., and Kukupa Research.

Four teams, one aim: The CIBR combines researchers with over 20 years' experience in Soil Science, Micro and Molecular biology, Ecotoxicology, and Social and Cultural Research.

The CIBR has core capabilities and innovation to support biowaste beneficial reuse/resource recovery; this includes:

- The development of trans-disciplinary solutions (technical/social/cultural/economic) for beneficial reuse of biowaste.
- Providing NZ's leading capabilities in utilising field trials, laboratory data and cutting edge experimental science to assess:
    - Environmental fate and effects of contaminants in different waste streams;
    - Waste processing technologies for reducing harm (e.g. reduction in environmental impacts) and economic potential;
    - Technologies and systems to mitigate the environmental and public health impacts of recycling waste to land;
    - Risks of new and emerging contaminants (biophysical/social/cultural science).

Capability development - students and postdocs

[Withheld under section 9(2)(a) of the OIA]
[Withheld under section 9(2)(a) of the OIA]
[Withheld under section 9(2)(a) of the OIA]
[Withheld under section 9(2)(a) of the OIA]
[Withheld under section 9(2)(a) of the OIA]
[Withheld under section 9(2)(a) of the OIA]
[Withheld under section 9(2)(a) of the OIA]
[Withheld under section 9(2)(a) of the OIA]
[Withheld under section 9(2)(a) of the OIA]
[Withheld under section 9(2)(a) of the OIA]
[Withheld under section 9(2)(a) of the OIA]
[Withheld under section 9(2)(a) of the OIA]

[Withheld under section 9(2)(a) of the OIA]
[Withheld under section 9(2)(a) of the OIA]
[Withheld under section 9(2)(a) of the OIA]
[Withheld under section 9(2)(a) of the OIA]
[Withheld under section 9(2)(a) of the OIA]
[Withheld under section 9(2)(a) of the OIA]
[Withheld under section 9(2)(a) of the OIA]
[Withheld under section 9(2)(a) of the OIA]
[Withheld under section 9(2)(a) of the OIA]

List the external research or grant proposals submitted (include $ value) and any research funding obtained that have been made possible as a result of CF investment in the project, include proposals awaiting funding decisions:

Grant proposals submitted

Funding body	Project title	Funding requested	Successful/declined/pending
Greater Wellington Regional Council	Manuka riparian planting for improving water quality of Lake Wairarapa	$135,000	Successful
MfE WasteMINZ	Centralised biosolids processing facility	$542,110	Successful
[Withheld under section 9(2)(b)(ii) of the OIA]	*[Withheld under section 9(2)(b)(ii) of the OIA]*	*[Withheld under section 9(2)(b)(ii) of the OIA]*	Pending
Vision Matauranga Capability fund, MBIE	Measuring the benefits of riparian vegetation restoration on the health and well-being of the lake and whanau of Matahuru	$ 180,000	Successful
Waikato River Authority	Manuka-dominated ecosystems to improve water quality and provide economic return in the Lake Waikare catchment	$556,200	Successful

MfE FIF The Pot	Water quality improvement in the Waiwiri catchment through strategic establishment of native ecosystems with bioactive properties used at a land treatment site	$ 1,445,600	Successful
[Withheld under section 9(2)(b)(ii) of the OIA]	*[Withheld under section 9(2)(b)(ii) of the OIA]*	*[Withheld under section 9(2)(b)(ii) of the OIA]*	ESR successful *[Withheld under section 9(2)(b)(ii) of the OIA]*
[Withheld under section 9(2)(b)(ii) of the OIA]	*[Withheld under section 9(2)(b)(ii) of the OIA]*	*[Withheld under section 9(2)(b)(ii) of the OIA]*	Pending
Royal Society of New Zealand Catalyst: Seeding General	Managing the risk of emerging organic contaminants in New Zealand through an international science partnership	$ 52,230	Successful
[Withheld under section 9(2)(b)(ii) of the OIA]	*[Withheld under section 9(2)(b)(ii) of the OIA]*	*[Withheld under section 9(2)(b)(ii) of the OIA]*	Unsuccessful
[Withheld under section 9(2)(b)(ii) of the OIA]	*[Withheld under section 9(2)(b)(ii) of the OIA]*	*[Withheld under section 9(2)(b)(ii) of the OIA]*	Unsuccessful
*[Withheld under section 9(2)(b)(ii) of the OIA]*Endeavour Fund -	*[Withheld under section 9(2)(b)(ii) of the OIA]*insecticides pose a threat to New Zealand's stream ecosystems?	*[Withheld under section 9(2)(b)(ii) of the OIA]*	Unsuccessful

Research Programmes			
[Withheld under section 9(2)(b)(ii) of the OIA]	*[Withheld under section 9(2)(b)(ii) of the OIA]*	*[Withheld under section 9(2)(b)(ii) of the OIA]*	Unsuccessful
[Withheld under section 9(2)(b)(ii) of the OIA]	*[Withheld under section 9(2)(b)(ii) of the OIA]*	*[Withheld under section 9(2)(b)(ii) of the OIA]*	Pending
[Withheld under section 9(2)(b)(ii) of the OIA]	*[Withheld under section 9(2)(b)(ii) of the OIA]*	*[Withheld under section 9(2)(b)(ii) of the OIA]*	Declined

List all external research revenue obtained seeded by this CF project:

Co-funding and subcontracting

Funding type	**Organisation name**	**Amount**
Sub-contract	*[Withheld under section 9(2)(b)(ii) of the OIA]*	*[Withheld under section 9(2)(b)(ii) of the OIA]*
Sub-contract	*[Withheld under section 9(2)(b)(ii) of the OIA]*	*[Withheld under section 9(2)(b)(ii) of the OIA]*
Sub-contract	*[Withheld under section 9(2)(b)(ii) of the OIA]*	*[Withheld under section 9(2)(b)(ii) of the OIA]*
Co-funding	*[Withheld under section 9(2)(b)(ii) of the OIA]*	*[Withheld under section 9(2)(b)(ii) of the OIA]*
Sub-contract	*[Withheld under section 9(2)(b)(ii) of the OIA]*	*[Withheld under section 9(2)(b)(ii) of the OIA]*

Sub-contract	*[Withheld under section 9(2)(b)(ii) of the OIA]*	*[Withheld under section 9(2)(b)(ii) of the OIA]*
Sub-contract	*[Withheld under section 9(2)(b)(ii) of the OIA]*	*[Withheld under section 9(2)(b)(ii) of the OIA]*
Sub-contract	*[Withheld under section 9(2)(b)(ii) of the OIA]*	*[Withheld under section 9(2)(b)(ii) of the OIA]*
Sub-contract	*[Withheld under section 9(2)(b)(ii) of the OIA]*	*[Withheld under section 9(2)(b)(ii) of the OIA]*
Sub-contract	*[Withheld under section 9(2)(b)(ii) of the OIA]*	*[Withheld under section 9(2)(b)(ii) of the OIA]*
Commercial	*[Withheld under section 9(2)(b)(ii) of the OIA]*	*[Withheld under section 9(2)(b)(ii) of the OIA]*

*

Show commercial benefits from the investment, list any new products or services made possible by CF, both actual and potential (*be realistic, not far fetched*) and estimate revenue, clients and timeframe for achieving this:

[Withheld under section 9(2)(b)(ii) of the OIA]

Explain how your research contributes to ESR's IMPACT/s? (don't just list the impacts)

The CIBR programme contributes specifically to the **Water and Environment Outcome 4** of the outcomes and impacts in the Statement of Corporate Intent (2015-2020). "Improve the safety of freshwater and groundwater resources for human use and the safer use of biowastes"

Our work contributes to the ESR impacts:

New Zealanders have assurance that drinking water is safe

Land use and water resources are inextricably linked. This is illustrated in many Regional plans where certain activities such as on-site wastewater treatment is restricted in drinking water catchments. Our research into the use of native plants such as manuka to remove pollutants before they reach water ways has the potential to reduce microbial and chemical contaminants that could potentially end-up in drinking water catchments.

Improvements in rivers, streams and groundwater quality are informed by scientific

analysis

Water pollution in NZ is an increasing concern for regulatory bodies and environmentalists. Nutrient loss from agricultural areas and wastewater treatment plant effluent are major sources of pollution for freshwater systems. CIBR research is contributing to the improvement of water quality by:

- *Increasing our knowledge of viruses present in wastewater and methods to enhance their removal;*
- *Using bioactive/antimicrobial compounds produced by myrtaceaeous plants, especially Manuka (Leptospermum scoparium), to inhibit the conversion of ammonia into nitrate and nitrous oxide, and enhance the die-off of pathogenic organisms in the wastes that pass through their root systems.*
- *Determining which emerging organic contaminants are of the most concern in terms of environmental impact and investigating ways to reduce them (e.g., behaviour change) or which waste processing technologies remove them.*

Safer use of biowastes

CIBR aims to facilitate the safer use of biowastes by providing holistic fully integrated solutions that take due cognisance of the environmental, social, cultural and economic aspects of re-use as well as the regulatory environment in NZ (The Resource Management Act, RMA). We have characterised chemical and microbial levels and collected fate, transport and effects data in a variety of organic wastes. We can combine this data with our research on waste processing technologies, our community and Iwi engagement expertise and our site management to ensure that the impacts of biowaste re-use is "less than minimal" as required under the RMA. We can provide mitigation tools to reduce environmental contamination risks associated with agricultural wastes such as dairy shed effluent and to manage pollution run-off from farms ultimately leading to the safer use of biowastes.

CIBR continues to provide the science that underpins the development of national guidelines and is jointly leading a review of the NZ Biosolids Guidelines. Programme leader Jacqui Horswell is a member of the steering group supported by CIBR team members (Tremblay, Gielen, Northcott, Horswell, Robinson and Esperschuetz). Jacqui Horswell also represents the Australia/NZ Biosolids partnership on the new international ISO standard for biosolids application to land. CIBR provides advice for resource consent applications and district planning, with respect to land application of wastes and works in partnership with environmental engineers to provide the science expertise where required.

Environmental threats to human health from chemicals, microbes and physical contaminant are mitigated.

CIBR has extensive expertise in the detection of biological and chemical contaminants in

waste – this is an incredibly difficult medium to work in and often traditional techniques are not applicable to this complex waste stream. Our extensive emerging organic chemical analysis capability coupled with our ecotoxicology platform allows us to characterise the range of contaminants commonly detected in biowastes including mixtures of chemicals. We have worked closely with government agencies, iwi and industry to coordinate resources to better address concerns and provide solutions to the management of this increasingly important issue. Our experience in isolating microbiological contaminants allows us to reliably detect and enumerate bacteria and viruses present in wastewater and solid wastes. Using these techniques we can improve knowledge on the effectiveness of waste treatment and use this enhanced knowledge to improve the effectiveness of treatment of waste for the future. We are developing methods to detect and identify pharmaceuticals, and enzymes present in wastewater, which will have a direct use for response to contamination in the environment in the future.

Demand for Social and Cultural Tapu to Noa report and advice in the Organic waste guidelines.

Repeated requests have been received for copies of the report that the Social and Cultural team produced on tapu and noa (tapu is often understood to mean forbidden or restricted and noa, ordinary or free from restriction) last year. The report provides a summation of many years of work with communities around New Zealand and is intended to guide non-Māori towards knowing how to ask the right questions in their conversations and engagement with local hapū and Iwi regarding biowaste and biosolids issues. The report is designed to support local government staff and engineers in better understanding and incorporating Māori worldviews into biowaste management negotiations and solutions.

In addition, demand for Social and Cultural advice on community engagement has been sought in a number of submissions to the organic waste material guidelines. This has arisen to a large degree from council staff and others in the waste sector gaining knowledge of research by the CIBR Social and Cultural on working with communities, and in particular, Māori since 2003 through presentations of CIBR research at New Zealand Land Treatment Collective Conferences, CIBR newsletters and website, international journal papers and the Community Engagement Framework which was widely distributed last year.

List anything else that can demonstrate value from this CF investment:

Science Quality:

Indicator	Number
Accepted Peer-reviewed journal publications	20
Completed masters or doctorate theses	1
Conference presentations	20
Book Chapters	0
Commissioned or CIBR Reports:	5
Workshop/hui presentations	9
Awards for science achievement	5
Travel grants awarded for conference attendance	$1000
Newsletters	3
Science education/outreach	6

Executive summary – *Three to four sentences giving an overview of your project and the results obtained. This will be used for the board report so keep in mind that not everyone is an expert in your field.*

CIBR provides unique and holistic solutions for the sustainable management of biowastes (organic waste). We deliver value-added science that improves human well-being and protects the environment.

CIBR is a virtual research centre with multi-disciplinary expertise within nine research organisations. Integrating our research skills enables us to offer a full range of biowaste solutions backed up by cutting edge science and innovation. Not only do we solve today's problems, but we are working to solve the tomorrow's issues today.

New Zealand produces nearly 700,000 tonnes of solid biowaste each year, of which 62% goes to landfill. Landfilling is not a viable long-term management option and is becoming more difficult due to increased levies, lack of space and transportation distance, and a general community expectation of a need to develop sustainable use options. In addition, landfilling creates a significant regional economic and environmental issue and runs contrary to central government policy.

Unlike many other waste streams, there are good prospects for alternative, economical and beneficial end-use options for organic wastes, and in an agricultural context, re-use of biowaste may offset the cost of inorganic fertilizers, while improving soil quality.

CIBR has been working on finding sustainable solutions for the management of

biowastes, centred on land application. We have developed systems for mitigating and minimising environmental impacts; and developed frameworks to support and aid the community and iwi engagement often required.

CIBR also provides the science behind the development of policy and guidelines for biowastes re-use in New Zealand and much of our research is focused on future proofing by gaining an understand of the new challenges the industry may face, for example the fate and effects of new and emerging contaminants. We have also broadened our historical focus on biosolids to encompass other waste streams including greywater, municipal effluent, dairy shed effluent, green waste and construction plasterboard.

We work jointly with the wastewater industry and have many examples of partnership-co-funded projects which will make our core-funded programme self-sustaining in the future.

Project report – *Make this a stand-alone final report suitable to include in a consolidated report to the ESR Board. Include brief background, what you did, what you found, conclusions (**2-3 pages**). This is the opportunity to tell a success story that ESR can use in Briefing and other communications.*

The CIBR group has continued to deliver valuable science that informs environmental and public health decision making in New Zealand. The group has continued existing successful research topics, particularly beneficial reuse of biosolids, greywater, the long-term Rabbit Island Field trial and a robust social and cultural program. These projects span multiple research streams within CIBR (Soil Science, Microbiology, Ecotoxicology, Social and Cultural). Several research projects are emerging that have strong future potential with significant collaborative opportunities and high likely hood of bringing in more revenue for the group. *[Withheld under section 9(2)(b)(ii) of the OIA]*

A summary of key projects and developments within the CIBR group for 2016-2017 is presented below.

Ecotoxicological research has continued to provide a greater understanding of the potential negative environmental effects associated with the presence of micro-pollutants in biosolids to land. This year, much resources have been allocated to the risk characterisation of emerging contaminants that are commonly found in a range of biowastes. We are focussing on 2 main groups, drugs and pharmaceuticals and high production volume (HPV) chemicals found in a range of commonly used household products. We have used the range of toxicity tests to assess their risk and characterise their mechanism of action. This is a very important area of research with significant challenges requiring a coordination of resources and a trans-disciplinary approach to

develop solutions. The ecotoxicology team has worked with other CIBR colleagues to facilitate a Royal Society workshop to develop a National Strategy to manage emerging contaminants and keep NZ safe. This very important event gave us the opportunity to discuss the requirements for such a document. It also confirmed CIBR as the key expert centre on emerging contaminants. It also gave the team the key elements to develop a solid MBIE Endeavour proposal. On the research front, we have made great progress on establishing methods to assess the risk of complex mixtures of pollutants. We have establish a collaboration with colleagues from the University of Copenhagen who are assisting us with the modelling of our results. We have also initiated experiments to investigate the long-term impacts of pollutants using high throughput sequencing, and epigenetics methodologies

Mine rehabilitation. Collaborative work between Solid Energy and CIBR researchers at Rotowaro - Waipuna coal mine has contributed data to underpin an updated, accurate value case for spreading biowaste on mined (or degraded) land by providing data on the medium-term benefits of biowaste for pasture and soil quality. Discussions in May 2016 with Stockton Mine staff indicate they are keen to co-design and install trials on use of biowastes to transition erosion-controlling grasses to native ecosystems.

Enhancing ecosystem services in cities. In urban areas, trials are helping identify the potential uses/values of organic biowastes such as arborist (tree-pruning) mulch, composted organic materials (green waste / food waste) to enhance performance of urban green areas. These urban biowastes are used as amendments to earth-worked natural soils. This has potential to 'close the loop', i.e. from kerbside collection to placement (after composting) to enhance plant and soil function. Specific biowastes are being tested as components of specialist media/mulches in devices treating stormwater (bioretention devices).

Greywater. This has continued to be research of interest to councils and the wastewater industry. Trials conducted to investigate pathogen regrowth in various mulches that could be used to cover greywater sub-surface irrigated areas were valuable. This data was disseminated to councils and end-users via conference and council presentations. *[Withheld under section 9(2)(b)(ii) of the OIA]*

Pathogen removal in wastewater. We have continued this year to identify the behaviour of viruses in wastewater by undertaking more experiments on the attachment and settlement properties. We have found the attachment is very variable in wastewaters and is dependent on the size fractions present, and the type of virus (surface properties). We have also found that there is very little settlement occurring in wastewater (WSP). The potential of naturally occurring enzymes for virus removal has been extended through a Pioneer project to identify the specific enzymes present in wastewater. We will then investigate the inactivation of viruses by these specific

enzymes. Bronwyn is continuing to write up her master's thesis investigating the use of coral beach sand to enhance pathogen removal in on-site wastewater disposal fields in the Pacific. Bronwyn presented her research at Water NZ and LTC conferences and she also was awarded a student travel grant to attend LTC conference. Hazel Clemens undertook a summer project with us, funded through Pioneer funding to investigate the potential for crushed green glass to enhance wastewater treatment. Previous research has eluded to an enhanced operation due to slower bioclogging rate and enhance removal of pathogens using green glass but there is little evidence of this occurring. Hazel demonstrated that the green glass did enhance operation of sand filters in wastewater treatment due to a slower clogging rate. Hazel has now turned her attention to a masters project which aims to improve the Setback Distance Guidelines for virus removal in on-site wastewater treatment systems. We have continued to sample and analyse NIWA pilot high rate algal ponds (HRAP) on a seasonal basis to provide information on the pathogen removal potential of these wastewater treatment systems.

Mānuka. The CIBR team have been exploring the benefits of native plants to restore degraded areas, treat biowaste, and improve water quality. The main findings of numerous experiments in laboratory, lysimeter and small field trials, carried out at Lincoln University and ESR, are:

a) The antimicrobial properties of mānuka and kānuka roots, apart from enhancing the die-off of pathogens, affect the activity of bacteria involved in the nitrogen cycling, reducing nitrate leaching and nitrous oxide emissions.

b) Under very high irrigation regimes, the roots of mānuka and kānuka create routes of preferential flow, which increases infiltration of biowaste and water into the root systems, where the antimicrobial effect takes place.

c) A wide range of pioneer native plants –including mānuka and kānuka- benefit from the application of biosolids in degraded and low fertility soil, which could led to the beneficial reuse of biowaste – increasing production of essential oils or honey – in marginal areas where other type of economic productivity is discouraged.

d) Land-treatment of biowaste such biosolids or treated municipal wastewater into native plant plantations is a safe way of diverting the disposal of these wastes into landfill or waterways. The importance of this is evident since many disposal schemes are currently under review for creating new consents.

e) About 150,000 native plants – mainly mānuka and kānuka - are being planted in full scale operations to demonstrate the reduction of nitrogen, phosphorous and pathogens by root systems of native plants receiving farm run-off and treated municipal wastewater, allowing the improvement of water quality. *[Withheld under section 9(2)(b)(ii) of the OIA]*

Rabbit Island Long-term field trial. Built from our 20 year-long data and newly collected data at the end of rotation age from biosolids-applied pine plantations at Rabbit Island,

we have been investigating the beneficial reuse and sustainability of biosolid land application in forests through assessing the environmental, ecological and economic impacts. This year our research has been focussed on the residual effects of biosolids-derived nutrients and contaminants on tree nutrition and growth, wood quality, and the soil and groundwater quality. This information is required to develop decision support tools for assisting Tasman District Council to monitor and manage land application of biosolids in a way that minimises the risks and maximise the benefits. Our research will facilitate the implementation of sustainable biosolids management practices for enhancing soil fertility and functions (e.g. carbon sequestration), forest productivity and ecosystem service, reducing the impact of biosolids application on environmental quality (soil, surface water and groundwater), and maintaining the ecological, recreational and cultural values of Rabbit Island. The research findings from this long-term forest field trial will finally contribute to improving forest economic return and profitability, environmental and ecological sustainability by ensuring that initiatives to capitalise on 'biowastes to land re-use' can be implemented in an informed and sustainable way throughout New Zealand.

Transformation changes. This year the Social and Cultural team has identified opportunities, critical success factors, conditions, and obstacles (and ways to overcome) in building a trans-disciplinary approach to emerging contaminants. Using developmental evaluation design methodology they conducted in-depth interviews with biophysical scientists, key national stakeholders and key case study stakeholders to determine appropriate trans-disciplinary approaches to emerging contaminants. Findings were shared with end-users in a presentation at the NZ Land Treatment Collective conference and with research colleagues in a video presentation. A critical review of behaviour change and positioning of the programme and 'Up the Pipe' project in education, science communication/engagement led to both a presentation at the 19th Biennial Australian Association for Environmental Education Conference in Adelaide and a draft paper. A study the preferences of people towards choosing household products with a focus on pump soaps was developed and an online survey implemented based on two focus groups, a literature review and discussion with colleagues and choice experimental design theory.

The Social and Cultural Team also have commenced dialogue with *[Withheld under section 9(2)(a) of the OIA]* to create an opportunity at Te Pā School in Ōtautahi/Christchurch. A leader in advancing Māori educational research, *[Withheld under section 9(2)(a) of the OIA]* is an outstanding contributor to both indigenous education and psychology. The Social and cultural team are exploring a number of goals where our science can link with pedagogy and curriculum at Te Pā school. The use of action research in this school setting will cover both practical and participatory elements that will look at reductions of chemical use and waste production as the practical element and follow this to a transformational change as the participatory element. CIBR

will lead the practical and participatory components using a series of goals in the areas of waste production and reuse, chemical management and awareness, carbon footprint, energy, biodiversity changes, culture towards a transformational change in the whānau. *[Withheld under section 9(2)(a) of the OIA]* will follow education, cultural stories, community resources and the cultural atlases of mana, tapu, noa, and utu to provide data to redesign Te Pā as it will move to a purpose built facility in 2019-20. The outcomes of this trans-disciplinary research will use practical and conceptual (CIBR) and theoretical (UC) innovations to address social and cultural issues in education.

Science education/outreach CIBR has continued to play a leading role in ESR's outreach programme by hosting multiple school visits, providing professional development in the science space for teachers and supporting career and science fairs.

In conclusion, CIBR actively works in the multi-disciplinary space with multiple research partners including Universities and the public sector as recommended by key Government officials and policy (e.g. *[Withheld under section 9(2)(a) of the OIA]*). A recent external review of ESR's Food, Water and Biowaste activities strongly supported the collaborative approach developed by CIBR and the research and the approach that the programme undertakes were flagged as having potential for revenue growth. Our challenge this year is to focus on key projects and turn them into commercial revenue so that the CIBR can become less reliant on Core Funding and self-sustaining in the future.

Please attach a copy of your final full year financial report with commentary.

CIBR Biowastes budget:

External expenses were on target with a slight overspend of 3 % ($29,988). This was due to local and international travel being higher than expected due to the set-up of the Lake Waikare manuka trial and two CIBR team members attending a biosolids conference in Australia

Total labour costs were significantly over budget. This was due to the employment of Maria J Gutierrez-Gines who was recruited to bring in more money for the manuka work which she has done so (two research projects, MBIE VM and FIF MfE).

Profit and Loss	Mth - 2	Mth - 1	This Mth	Plan	Variance	YTD Actual	YTD Plan	Variance	Total Plan	% Used
Commercial Domestic						14,145-		14,145		
CRI Capability Fund	135,556-	135,556-	135,556-	134,336-	1,220	1,626,667-	1,626,672-	5-	1,626,672-	100
External Income	135,556-	135,556-	135,556-	134,336-	1,220	1,640,812-	1,626,672-	14,140	1,626,672-	101
Grants/Scholarships										
Fringe Benefit Tax		63				77		77-		
Training/Conferences						2,032	5,000	2,968	5,000	41
Other Staff Expenses		122	501	500	1-	1,104	2,000	896	2,000	55
Material/Consumables	108	508	1,090	2,000	910	8,781	22,298	13,517	22,298	39
Equipmnt Maintenance						1,205		1,205-		
Equipment Hire				334	334		3,000	3,000	3,000	
Sub Contracted Work	87,177	87,337	95,312	87,799	7,513-	1,080,549	1,051,144	29,405-	1,051,144	103
Freight & Courier		13	15	50	35	424	500	76	500	85
Postage			141		141-	811	500	311-	500	162
Tolls/Local/Fax						54		54-		
Maintenance IT						140		140-		
Network Charges						55		55-		
Software						7,000		7,000-		
Vehicle Expenses			113		113-	609		609-		
Maintenance Building						311		311-		

Travel Local	1,348	321	1,729	545	1,184-	14,778	5,000	9,778-	5,000	296
Travel Overseas						6,411	3,000	3,411-	3,000	214
Travel Allowances		274	125	100	25-	557	1,000	443	1,000	56
Advertising & PR							1,500	1,500	1,500	
External Publication							500	500	500	
Donations/Sponsorshi			500		500-	500		500-		
Entertainment			69		69-	160		160-		
Entertainment Non De			69		69-	178		178-		
Information Supply										
General Expenses		9-	54	300	246	1,660	3,000	1,340	3,000	55
Printing/Stationery	164	478	253	15	238-	2,022	1,000	1,022-	1,000	202
Bank Charges			4		4-	13		13-		
External Expense	88,798	89,107	99,973	91,643	8,330-	1,129,430	1,099,442	29,988-	1,099,442	103
Labour Bands	8,493	23,305	19,958	12,316	7,642-	191,991	150,632	41,359-	150,632	127
Corp O/head Alloc	12,059	22,885	27,924		27,924-	248,335		248,335-		
Program O/head Alloc	7,001	16,059	13,695		13,695-	187,609		187,609-		
Alloc RC O/h Prog	1,950	545-	559-		559	435		435-		
Internal Cost		62	487		487-	6,230		6,230-		
Internal Expenses	29,503	61,768	61,505	12,316	49,189-	634,600	150,632	483,967-	150,632	421
Expenditure	118,301	150,875	161,478	103,959	57,519-	1,764,030	1,250,074	513,955-	1,250,074	141
Margin	**17,254-**	**15,319**	**25,923**	**30,377-**	**56,300-**	**123,218**	**376,598-**	**499,816-**	**376,598-**	**33-**
LABAST LABAST		16	7		7-	104		104-		
SCNLDR SCNLDR	40	63	51	36	15-	616	459	157-	459	
SCNTST SCNTST	82	173	215	62	153-	1,404	655	749-	655	
SNRSCN SNRSCN	34	100	37	110	73	972	1,311	339	1,311	
SNRTEC SNRTEC		139	120		120-	267		267-		
TECHN TECHN	13			36	36	675	600	75-	600	
*** Hours**	**169**	**491**	**428**	**244**	**184-**	**4,036**	**3,025**	**1,011-**	**3,025**	
% Margin	13	11-	19-	23	42-	8-	23	31-	23	

%Mgn ex Subcontracts	216	149	172	254	82-	171	248	77-	248	
% Consumables to Rev	0	0	1	2	1	1	2	1	2	
Band Multiplier	3	0	0-	3	4-	0	4	3-	4	
Annual Rev per FTE	1,352	464	532	925	393-	683	903	220-	903	