

**Final Report**

**Industry-specific impact assessment  
program: Turf**

**Impact assessment report for project *Turf industry  
statistics and research 2016/17 (TU16001)***

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## Executive Summary

### What the report is about

This report presents the results of an impact assessment of a Horticulture Innovation Australia Limited (Hort Innovation) investment in *TU16001: Turf Industry Statistics and Research 2016/17*. The project was funded by Hort Innovation over the period October 2016 to October 2017.

### Methodology

The investment was first analysed qualitatively within a logical framework that included activities and outputs, outcomes, and impacts. Actual and/or potential impacts then were categorised into a triple bottom line framework. Principal impacts identified were then considered for valuation in monetary terms (quantitative assessment). Past and future cash flows were expressed in 2020/21 dollar terms and were discounted to the year 2020/21 using a discount rate of 5% to estimate the investment criteria and a 5% reinvestment rate to estimate the modified internal rate of return (MIRR).

### Results/key findings

The investment in TU16001 is likely to contribute to improved financial performance for a percentage of turf businesses making use of project generated industry data. The investment is also likely to improve turf industry resource allocation including research, marketing, and biosecurity budgets. Data from the project will be available to government to inform policy development affecting the turf industry. Capacity has been built in the collection and interpretation of industry data and spill-over benefits for regional/peri-urban communities are anticipated from a more profitable turf industry.

### Investment Criteria

Total funding from all sources for the project was \$0.12 million (present value terms). The investment produced estimated total expected benefits of \$0.45 million (present value terms). This gave a net present value of \$0.33 million, an estimated benefit-cost ratio of 3.62 to 1, an internal rate of return of 39.8% and a modified internal rate of return of 9.3%.

### Conclusions

The Hort Innovation investment in Project TU16001 has delivered industry data for use by turf growers, industry fund managers, government, and other stakeholders. As three economic and social impacts identified were not valued, the investment criteria estimated by the evaluation may be underestimates of the actual performance of the investment

## Keywords

Impact assessment, cost-benefit analysis, turf, industry, statistics, research.

## Introduction

All research, development, and extension (RD&E) and marketing levy investments undertaken by Horticulture Innovation Australia Limited (Hort Innovation) are guided and aligned to specific investment outcomes, defined through a Strategic Investment Plan (SIP). The SIP guides investment of the levy to achieve each industry's vision. The relevant industry SIPs apply for the financial years 2016/17 – 2020/21.

In accordance with the Organisational Evaluation Framework, Hort innovation has the obligation to evaluate the performance of its investment undertaken on behalf of industry.

This impact assessment program addresses this requirement through conducting a series of industry-specific ex-post independent impact assessments of the berry (RB + BS), mango (MG), turf (TU) and nursery (NY) RD&E investment funds.

Fourteen RD&E investments (projects) were selected through a stratified, random sampling process. The industry samples were as follows:

- Four RB + BS projects were chosen worth \$1.44 million (nominal Hort Innovation investment) from an overall population of 16 projects worth an estimated \$8.59 million,
- Three MG projects worth \$1.77 million (nominal Hort Innovation investment) from an overall population of 16 projects worth approximately \$7.9 million,
- Four TU projects worth \$0.66 million (nominal Hort Innovation investment) from a total population of 15 projects worth \$4.81 million, and
- Three NY projects worth \$0.96 million (nominal Hort Innovation investment) from an overall population of 19 projects worth \$7.32 million.

The project population for each industry included projects where a final deliverable had been submitted in the five-year period from 1 July 2015 to 30 June 2020.

The projects for each industry sample were chosen such that the investments represented (1) at least 10% of the total Hort Innovation RD&E investment expenditure for each industry, and (2) the SIP outcomes (proportionally) for each industry where possible given the small sample sizes.

## General Method

The impact assessment follows general evaluation guidelines that are now well entrenched within the Australian primary industry research sector including Research and Development Corporations, Cooperative Research Centres, State Departments of Agriculture, and some universities. The approach includes both qualitative and quantitative descriptions that are in accord with the impact assessment guidelines of the CRRDC (CRRDC, 2018).

The evaluation process involved identifying and briefly describing project objectives, activities and outputs, outcomes, and impacts. The principal economic, environmental, and social impacts were then summarised in a triple bottom line framework.

Some, but not all, of the impacts identified were then valued in monetary terms. Where impact valuation was exercised, the impact assessment uses cost-benefit analysis as its principal tool. The decision not to value certain impacts was due either to a shortage of necessary evidence/data, a high degree of uncertainty surrounding the potential impact, or the likely low relative significance of the impact compared to those that were valued. The impacts valued are therefore deemed to represent the principal benefits delivered by the project. However, as not all impacts were valued, the investment criteria reported for individual investments potentially represent an underestimate of the performance of that investment.

## Background & Rationale

### Background

The Australian turf industry has a five-year average production volume of 38.9 million square metres and a gross value of production of \$250.2 million – Table 1. In 2019/20, turf had an estimated farmgate value of \$280.2 million (Turf Australia/Hort Innovation 2021).

Table 1: Turf Industry Performance 2016-2020

Year Ended 30 June	Area (ha)	Production (million m <sup>2</sup> )	Gross Value of Production (\$m)	Wholesale Value (\$m)
2016	3,736	42.8	257.5	257.5
2017	3,880	38.5	228.6	270.6
2018	3,863	38.4	240.6	240.6
2019	3,880	36.4	243.9	243.9
2020	3,880	38.5	280.2	280.2
Average	3,848	38.9	250.2	258.6

Source: Australian Horticulture Statistics Handbook 2017/18, 2018/19 and 2019/20.

Turf covers live grass products grown for parks, gardens, residential and commercial properties, sporting venues and for land rehabilitation and landscape improvement purposes. Production occurs in all states and territories of Australia. The majority of production occurs in New South Wales (NSW) and Queensland (QLD). Production is year-round, with a number of different varieties being grown, although there is a peak of production during the spring and summer months. (Australian Horticulture Statistics Handbook 2019/20).

Turf research and development (R&D) activity is guided by the Turf industry's Strategic Investment Plan (SIP). The activities are funded by levies payable on turf produced in Australia; and the R&D levy funds are managed by Hort Innovation.

The recently completed SIP has been driven by levy payers and addressed the Australian turf industry's needs from 2017 to 2021. The SIP focussed on five outcome areas:

- Turf revenue has increased by five per cent plus consumer price index (CPI) from targeted marketing programs.
- Improved strategic decision making by turf growers from increased knowledge of industry data and consumer insights.
- Improved farm practices and profitability from increased awareness and adoption of turf R&D.
- Turf industry leadership program graduates are adopting innovation and using their leadership skills in business and industry decision making.
- Improved industry sustainability from identifying and managing risks.

Turf Australia is the representative body of the turf industry comprising of levy-paying turf producers and individual members Australia wide. Turf Australia plays a vital role in the dissemination of information of both levy-funded R&D and marketing outputs as well as industry intelligence.

### Rationale

Prior to this project, data collected on the Australian turf industry by the Australian Bureau of Statistics (ABS) and others lacked the granularity and coverage required to usefully inform strategic industry planning, resource allocation and enable the monitoring of industry performance over time. Estimates of Australian turf production varied considerably, and the error margins associated with data collections were often large.

## Project Details

### Summary

Project Code: TU16001
Title: Turf Industry Statistics and Research 2016/17
Research Organisation: Western Research Institute
Project Leader: Danielle Ranshaw
Period of Funding: October 2016 to October 2017

### Objectives

The objective of this project (TU16001) was to address shortcomings in critical turf industry data via a dedicated industry data collection program (i.e., a national survey of turf industry businesses) implemented using an appropriately detailed sample frame to ensure that a robust set of industry statistics was delivered.

The project was to:

- Build on the existing turf data that is currently gathered in the Horticulture Statistics Handbook, the ABS Agricultural Commodities publications, Turf Australia, a range of Turf Plant Variety owners and other market research and statistic providers (e.g., IBISWorld).
- Provide turf industry statistics of the necessary detail and accuracy which will facilitate industry strategic planning, resource prioritisation, and a means to evaluate R&D program performance.

### Logical Framework

Table 2 provides a detailed description of the project in a logical framework.

*Table 2: Logical Framework for Project TU16001*

Activities	<ul style="list-style-type: none"> <li>• Initiation meetings with Hort Innovation, Turf Australia, and the turf industry Strategic Investment Advisory Panel (SIAP) to finalise and agree the project delivery plan and appoint a project steering committee.</li> <li>• Evaluate existing data, prepare potential business participant lists and develop a preliminary sampling framework. Existing data sets were assessed for accuracy, timeliness, variation, and statistical significance (robustness). Review of data sets also provided an industry profile suitable for specification of a sample frame for the research. Business participant lists were assembled with the assistance of Hort Innovation, Turf Australia, and state-based turf associations. The sampling frame included representation from domestic lawns, commercial developments, parks/gardens, and sporting fields. Sample selection also ensured appropriate coverage of geographic location (by state).</li> <li>• Completion of a consultation workshop to confirm data collection needs, how best to engage turf businesses, obtain feedback on the preliminary sampling framework, and better understand the outcomes that the project dataset is to support.</li> <li>• Formulation of an industry engagement and evaluation plan including incentives for industry participation in the data collection survey and KPIs to measure project success.</li> <li>• Conduct quantitative research – develop the survey instrument, document, and communicate confidentiality measures, deliver the survey pilot, refine and rollout both the full online and telephone surveys. Full surveys delivered mid-August 2017.</li> <li>• Data analysis and reporting – apply weighting to the survey data where this was appropriate, provide analysis of each question, perform thematic coding of open-ended questions, and produce comparisons between end use segment and state. Extrapolation of the survey data to the population was used to produce estimates of total volume of turf sold, total farmgate value, total production area by turf variety, and the total</li> </ul>
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	<p>number of turf production employees by employment type. Where possible trends in the data were produced using available historical data.</p> <ul style="list-style-type: none"> <li>Project reporting included preparation of a draft report for Hort Innovation, a final report incorporating feedback and a snapshot report relevant to each use segment and state. Snapshots were provided to survey participants, Turf Australia and the SIAP.</li> </ul>
Outputs	<ul style="list-style-type: none"> <li>A final report outlining findings from data collection for the 2016/17 financial year, including aggregate measures of industry activity, trends, and issues.</li> <li>A snapshot to be used for planning by industry, researchers, and other stakeholders.</li> <li>An edited MS Excel dataset suitable for querying by a range of variables.</li> </ul>
Outcomes	<ul style="list-style-type: none"> <li>Relevant and timely data in the hands of stakeholders to aid decision making. Key stakeholders include turf businesses, banks and insurance companies, state and national industry associations, researchers (public and private), the Hort Innovation SIAP, Plant Health Australia and government departments.</li> <li>For the first time industry has credible data to inform decision making, resource prioritisation, strategic planning, the analysis of market trends and the tracking of performance.</li> </ul>
Impacts	<ul style="list-style-type: none"> <li>Improved financial performance for turf businesses that are able to use project generated data to make more informed and profitable business decisions (e.g., more informed product pricing).</li> <li>Improved resource allocation – industry research, marketing and biosecurity budgets that better reflect the ‘real world’ situation (and realise an efficiency dividend).</li> <li>Improved policy development for the turf industry based on sound statistical data.</li> <li>Capacity built in industry and capacity built in researchers in the collection and interpretation of data.</li> <li>Contribution to improved regional/peri-urban community wellbeing from spill-over income and employment benefits as a result of a more profitable turf industry.</li> </ul>

## Project Investment

### Nominal Investment

Table 3 shows the annual investment made in Project TU16001 by Hort Innovation and others. There were no other investors in the project.

*Table 3: Annual Investment in Project TU16001 (nominal \$)*

Year ended 30 June	HORT INNOVATION (\$)	OTHERS (\$)	TOTAL (\$)
2017	62,655	0	62,655
2018	20,885	0	20,885
<b>Total</b>	<b>83,540</b>	<b>0</b>	<b>83,540</b>

Source: Hort Innovation signed details of agreement, 2016.

### Program Management Costs

For the Hort Innovation investment the cost of managing the Hort Innovation funding was added to the Hort Innovation contribution for the project via a management cost multiplier (1.162). This multiplier was estimated based on the share of ‘payments to suppliers and employees’ in total Hort Innovation expenditure (3-year average) reported in the Hort Innovation’s Statement of Cash Flows (Hort Innovation Annual Report, various years). This multiplier was then applied to the nominal investment by Hort Innovation shown in Table 3.

### Real Investment and Extension Costs

For the purposes of the investment analysis, the investment costs of all parties were expressed in 2020/21 dollar terms using the Implicit Price Deflator for Gross Domestic Product (ABS, 2021). Project generated Australian turf industry snapshot reports were communicated via Turf Australia and the state associations.



## Impacts

Table 4 provides a summary of the principal types of impacts delivered by the project, based on the logical framework. Impacts have been categorised into economic, environmental, and social impacts.

*Table 4: Triple Bottom Line Categories of Principal Impacts from Project TU16001*

Economic	<ul style="list-style-type: none"> <li>Improved financial performance for turf businesses that are able to use project generated data to make more informed and profitable business decisions (e.g., more informed product pricing).</li> <li>Improved resource allocation – industry research, marketing and biosecurity budgets that better reflect the ‘real world’ situation (and realise an efficiency dividend).</li> <li>Improved policy development for the turf industry based on sound statistical data.</li> </ul>
Environmental	<ul style="list-style-type: none"> <li>Nil</li> </ul>
Social	<ul style="list-style-type: none"> <li>Capacity built in industry and capacity built in researchers in the collection and interpretation of data.</li> <li>Contribution to improved regional/peri-urban community wellbeing from spill-over income and employment benefits as a result of a more profitable turf industry.</li> </ul>

### Public versus Private Impacts

The majority of impacts identified in this evaluation are turf industry related and therefore are considered private in nature. However, some impacts accrue to government (improved policy settings) and the community (additional capacity built and spill-over income and employment benefits).

### Distribution of Private Impacts

Private impacts will mostly be retained by turf growers who control the supply chain and have a direct relationship with final purchasers.

### Impacts on Other Australian Industries

Impacts on other Australian industries are unlikely – the project only generated data on turf.

### Impacts Overseas

It is unlikely that there will be any significant spill-over impacts to overseas interests.

### Match with National Priorities

The Australian Government’s Science and Research Priorities and Rural RD&E priorities are reproduced in Table 5. The project outcomes and related impacts will contribute to Rural RD&E Priority 4.

Table 5: Australian Government Research Priorities

Australian Government	
Rural RD&E Priorities (est. 2015)	Science and Research Priorities (est. 2015)
<ol style="list-style-type: none"> <li>1. Advanced technology</li> <li>2. Biosecurity</li> <li>3. Soil, water and managing natural resources</li> <li>4. Adoption of R&amp;D</li> </ol>	<ol style="list-style-type: none"> <li>1. Food</li> <li>2. Soil and Water</li> <li>3. Transport</li> <li>4. Cybersecurity</li> <li>5. Energy and Resources</li> <li>6. Manufacturing</li> <li>7. Environmental Change</li> <li>8. Health</li> </ol>

Sources: (DAWR, 2015) and (OCS, 2015)

### Alignment with the Turf Strategic Investment Plan 2017-2021

The strategic outcomes and strategies of the turf industry are outlined in the Turf Industry's Strategic Investment Plan 2017-2021<sup>1</sup> (Hort Innovation, 2017). Project TU16001 addressed outcome two ('improved strategic decision making by turf growers from increased knowledge of industry data and consumer insights').

## Valuation of Impacts

### Impacts Valued

Analyses were undertaken for total benefits that included future expected benefits. A degree of conservatism was used when finalising assumptions, particularly when some uncertainty was involved. Sensitivity analyses were undertaken for those variables where there was greatest uncertainty or for those that were identified as key drivers of the investment criteria.

Two impacts were valued – improved financial performance for turf businesses using project generated data and improved resource allocation, turf industry levies.

### Impacts Not Valued

Not all of the impacts identified in Table 4 could be valued in the assessment. Those not valued included:

- Improved policy development for the turf industry based on sound statistical data.
- Capacity built in industry and capacity built in researchers in the collection and interpretation of data.
- Contribution to improved regional community wellbeing from spill-over income and employment benefits as a result of a more profitable turf industry.

These impacts were not valued due to lack of data to support credible assumptions.

### Summary of Assumptions

A summary of the key assumptions made for valuation of project impacts is provided in Table 6.

<sup>1</sup> For further information, see: <https://www.horticulture.com.au/hort-innovation/funding-consultation-and-investing/investment-documents/strategic-investment-plans/>

Table 6: Summary of Assumptions for Impact Valuation

Variable	Assumption	Source/Comment
<b>Impact 1: Improved financial performance for turf businesses using project generated data</b>		
Total turf production.	38,900,000 m <sup>2</sup> /year.	See Table 1.
Share of production aware of TU16001 data.	75%.	Estimate made after considering 104 surveyed turf grower businesses were provided with the Australian Turf Industry Snapshot 2016/17 and there are 190 businesses in the industry.
Share of production aware of TU16001 data that make management changes that rely on TU16001 information.	20%.	Consultant estimate informed by AgEconPlus 2019 and Agtrans 2009.
Proportion of production that make changes that rely on TU16001 information that achieve a profit increase.	10%.	Consultant estimate informed by AgEconPlus 2019 and Agtrans 2009.
Average profit on additional turf sales.	\$0.65/m <sup>2</sup> .	Average farm gate price \$6.50/m <sup>2</sup> (sourced from the Australian Turf Industry Snapshot, 2019/20) and an assumed profit margin of 10%.
Profit improvement impact.	10%.	Consultant estimate informed by AgEconPlus 2019 and Agtrans 2009.
Year of first impact.	2018/19.	Assumes 2 years required after completion of TU16001 for changes to be realised on-farm.
Year in which impact reaches peak.	2021/22.	Consultant estimate informed by AgEconPlus 2019 and Agtrans 2009.
Duration of maximum impact.	10 years.	Consultant estimate informed by AgEconPlus 2019 and Agtrans 2009.
Attribution of impacts to this project.	80%.	Consultant assumption, some additional costs incurred making changes on-farm.
Probability of the project generating useful outputs.	100%.	Outputs have been delivered – Snapshot provided to growers.
Probability of valuable outcomes.	90%.	Data may not provide opportunities to increase turf grower profit.
Probability of impact (assuming successful outcome)	90%.	Profit dependent on multiple factors including ruling market conditions.
Counterfactual.	80%.	In the absence of TU16001 research, it is 20% likely that results would have been generated by another project.
<b>Impact 2: Improved resource allocation, turf industry levies</b>		
Research, marketing, and biosecurity funds invested in the turf industry.	\$1.05 million per annum.	3 year average to 2019/20 sourced from Hort Innovation Turf Fund Annual reports.
Efficiency dividend.	5%.	Consultant assumption.
Duration of efficiency dividend.	5 years commencing 2018/19.	Consultant assumption noting that new editions of the Australian Turf Industry Snapshot will be prepared.

## Results

All costs and benefits were discounted to 2020/21 using a discount rate of 5%. A reinvestment rate of 5% was used for estimating the Modified Internal Rate of Return (MIRR). The base analysis used the best available estimates for each variable, notwithstanding a level of uncertainty for many of the estimates. All analyses ran for the length of the project investment period plus 30 years from the last year of investment (2017/18) as per the CRRDC Impact Assessment Guidelines (CRRDC, 2018).

### Investment Criteria

Table 7 shows the investment criteria estimated for different periods of benefits for the total investment. Hort Innovation was the only investor in the project.

Table 7: Investment Criteria for Total Investment in Project TU16001

Investment Criteria	Years after Last Year of Investment						
	0	5	10	15	20	25	30
Present Value of Benefits (\$m)	0.00	0.32	0.40	0.45	0.45	0.45	0.45
Present Value of Costs (\$m)	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Net Present Value (\$m)	-0.12	0.20	0.28	0.33	0.33	0.33	0.33
Benefit-Cost Ratio	0.00	2.59	3.21	3.61	3.62	3.62	3.62
Internal Rate of Return (%)	negative	37.0	39.4	39.8	39.8	39.8	39.8
MIRR (%)	negative	20.3	15.7	13.2	11.3	10.1	9.3

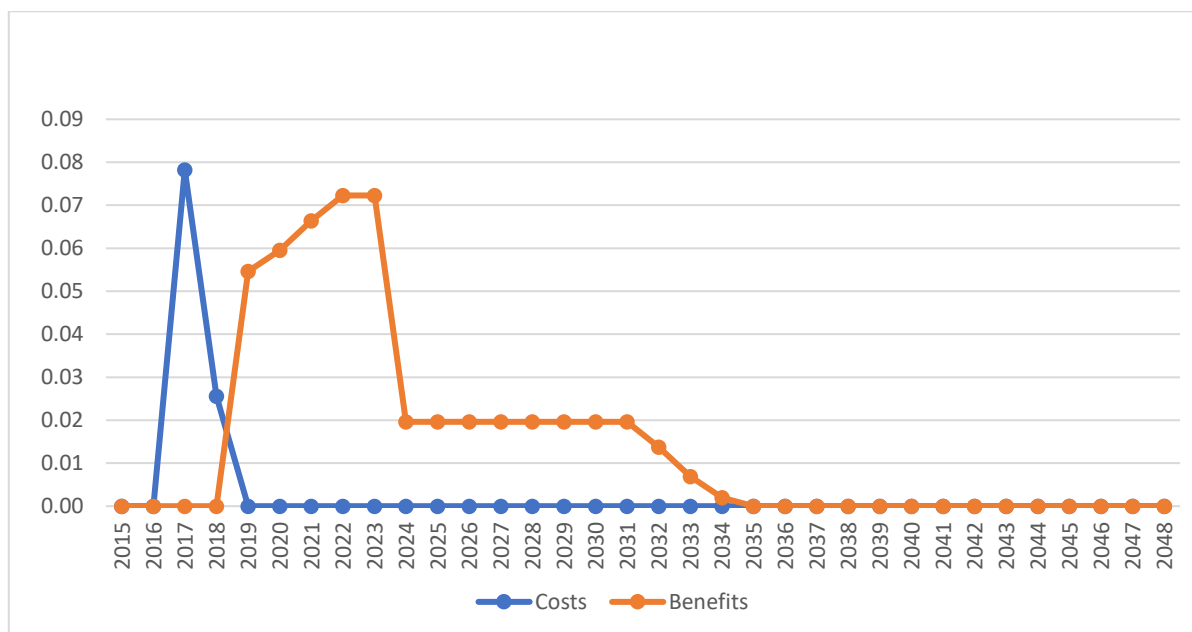
Table 8 shows the contribution of each impact to the total PVB.

Table 8: Contribution of Benefits

Impact	PVB (\$M)	% of Total PVB
Impact 1: Improved Financial Performance Turf Businesses	0.19	41.6
Impact 2: Improved Resource Allocation, Turf Industry Levies	0.26	58.4
Total	0.45	100.0%

The annual undiscounted benefit and cost cash flows for the total investment for the duration of the TU16001 investment plus 30 years from the last year of investment are shown in Figure 1.

Figure 1: Annual Cash Flow of Undiscounted Total Benefits and Total Investment Costs



### Sensitivity Analyses

A sensitivity analysis was carried out on the discount rate. The analysis was performed for the total investment and with benefits taken over the life of the investment plus 30 years from the last year

of investment. All other parameters were held at their base values. Table 9 presents the results. The results are moderately sensitive to the discount rate.

*Table 9: Sensitivity to Discount Rate (Total investment, 30 years)*

Investment Criteria	Discount rate		
	0%	5% (base)	10%
Present Value of Benefits (\$m)	0.50	0.45	0.42
Present Value of Costs (\$m)	0.10	0.12	0.15
Net Present Value (\$m)	0.40	0.33	0.27
Benefit-cost ratio	4.86	3.62	2.81

A sensitivity analysis was then undertaken on the increase in profit realised by those making enterprise changes based on TU16001 information. Results are provided in Table 10. Even when the assumed increase is zero, and all other factors remain unchanged, the project continues to show a favourable return on investment.

*Table 10: Sensitivity to Increase in Turf Grower Profit (Total investment, 30 years)*

Investment Criteria	Increase in Turf Grower Profit		
	0%	5%	10% (base)
Present Value of Benefits (\$m)	0.26	0.36	0.45
Present Value of Costs (\$m)	0.12	0.12	0.12
Net Present Value (\$m)	0.14	0.23	0.33
Benefit-cost ratio	2.11	2.87	3.62

A final sensitivity analysis tested the efficiency dividend from improved resource allocation in the turf industry (research, marketing and biosecurity funds). The results (Table 11) show that if the efficiency dividend is zero, and all other factors remain unchanged, then project benefits continue to exceed project costs.

*Table 11: Sensitivity to Change in Efficiency Dividend (Total investment, 30 years)*

Investment Criteria	Efficiency Dividend Realised		
	0%	2.5%	5% (base)
Present Value of Benefits (\$m)	0.19	0.32	0.45
Present Value of Costs (\$m)	0.12	0.12	0.12
Net Present Value (\$m)	0.06	0.20	0.33
Benefit-cost ratio	1.51	2.56	3.62

### Confidence Rating

The results produced are highly dependent on the assumptions made, some of which are uncertain. There are two factors that warrant recognition. The first factor is the coverage of benefits. Where there are multiple types of benefits it is often not possible to quantify all the benefits that may be linked to the investment. The second factor involves uncertainty regarding the assumptions made, including the linkage between the research and the assumed outcomes.

A confidence rating based on these two factors has been given to the results of the investment analysis (Table 12). The rating categories used are High, Medium, and Low, where:

- High: denotes a good coverage of benefits or reasonable confidence in the assumptions made
- Medium: denotes only a reasonable coverage of benefits or some uncertainties in assumptions made
- Low: denotes a poor coverage of benefits or many uncertainties in assumptions made

*Table 12: Confidence in Analysis of Project*

Coverage of Benefits	Confidence in Assumptions
High	Medium-Low

Coverage of benefits valued was assessed as High, two key impacts (improved financial performance and improved resource allocation) were valued. Confidence in assumptions was rated as Medium-Low, key data was estimated by the analyst.

## Conclusion

The investment in TU16001 is likely to contribute to improved financial performance for a percentage of turf businesses making use of project generated industry data. The investment is also likely to improve turf industry resource allocation including research, marketing, and biosecurity budgets. Data from the project will be available to government to inform policy development affecting the turf industry. Capacity has been built in the collection and interpretation of industry data and spill-over benefits for regional/peri-urban communities are anticipated from a more profitable turf industry.

Total funding from all sources for the project was \$0.12 million (present value terms). The investment produced estimated total expected benefits of \$0.45 million (present value terms). This gave a net present value of \$0.33 million, an estimated benefit-cost ratio of 3.62 to 1, an internal rate of return of 39.8% and a modified internal rate of return of 9.3%.

As three economic and social impacts identified were not valued, the investment criteria estimated by the evaluation may be underestimates of the actual performance of the investment.

## Glossary of Economic Terms

Cost-benefit analysis:	A conceptual framework for the economic evaluation of projects and programs in the public sector. It differs from a financial appraisal or evaluation in that it considers all gains (benefits) and losses (costs), regardless of to whom they accrue.
Benefit-cost ratio:	The ratio of the present value of investment benefits to the present value of investment costs.
Discounting:	The process of relating the costs and benefits of an investment to a base year using a stated discount rate.
Internal rate of return:	The discount rate at which an investment has a net present value of zero, i.e. where present value of benefits = present value of costs.
Investment criteria:	Measures of the economic worth of an investment such as Net Present Value, Benefit-Cost Ratio, and Internal Rate of Return.
Modified internal rate of return:	The internal rate of return of an investment that is modified so that the cash inflows from an investment are re-invested at the rate of the cost of capital (the re-investment rate).
Net present value:	The discounted value of the benefits of an investment less the discounted value of the costs, i.e. present value of benefits - present value of costs.
Present value of benefits:	The discounted value of benefits.
Present value of costs:	The discounted value of investment costs.

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## Abbreviations

CRRDC	Council of Research and Development Corporations
DAWR	Department of Agriculture and Water Resources (Australian Government)
GDP	Gross Domestic Product
GVP	Gross Value of Production
IRR	Internal Rate of Return
MIRR	Modified Internal Rate of Return
OCS	Office of Chief Scientist Queensland
PVB	Present Value of Benefits
R&D	Research and Development
RD&E	Research, Development and Extension
SIP	Strategic Investment Plan
SIAP	Strategic Investment Advisory Panel