

**Final Report**

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

**Impact assessment report for project  
*Communications program for the Australian  
nursery industry 2015-18 (NY15006)***

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**Project code:**

NY15006

**Date:**

November 2021

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**Funding statement:**

This project has been funded by Hort Innovation, using the research and development levy and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.

**Publishing details:**

Published and distributed by: Hort Innovation

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[www.horticulture.com.au](http://www.horticulture.com.au)

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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 Communications Program for the Australian Nursery Industry 2015-18. The project was completed over the period February 2016 to November 2018.

### 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 this nursery industry project produced effective tools that could be, and were, used to deliver targeted and focussed communications pertaining to industry activities. This enhanced set of communication mechanisms not only improved the engagement of stakeholders within the industry, but also built more effective relationships with those external to the industry.

### Investment Criteria

Total funding from all sources for the project was \$0.89 million (present value terms). The investment produced an estimated total expected benefit of \$3.67 million (present value terms). This gave a net present value of \$2.78 million, an estimated benefit-cost ratio of 4.14 to 1, an internal rate of return of 35.8% and a MIRR of 9.8%.

### Conclusions

The investment in Project NY15006 will likely contribute not only to improved decision making within industry sectors, but also to an improved understanding of the industry by those external to the industry.

## Keywords

Impact assessment, cost-benefit analysis, nursery industry, communications

## 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.

The 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 \$7.90 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. Also, for the NY sample only, there were three projects that had been evaluated previously in 2019 (two projects) and 2020 (one project). Hort Innovation requested that the three additional NY projects be assessed against the current sample criteria. All three projects that had previously been evaluated met the current sample criteria. As a result, and to increase the sample size for the NY industry evaluations, the benefit and cost cash flows from the 2019 and 2020 evaluations were updated and the three projects were incorporated into the current NY sample.

## 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 Council of Rural Research and Development Corporations (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 nursery and garden (N&G) industry (now known as Greenlife Industry Australia) is a diverse industry that is present in all Australian States and Territories. The N&G industry produces live plants for various uses such as production of fruit, vegetables, forestry, as well as plants for landscaping for households and community areas.

The N&G industry is a very large horticultural industry with value of production of \$2.56 billion for the year ending June 2020; wholesale value was higher at \$2.69 billion in the same year (Australian Horticulture Statistics Handbook 2019/20). The value of both nursery exports and imports is relatively minor compared to the Australian value of production.

Table 1 following shows the recent production, supply and value of the Australian nursery industry.

*Table 1: Australian Nursery Industry Production and Value for Years Ending June 2018 to 2020*

<b>Year ended June</b>	<b>Total Australian Production (million units)</b>	<b>Production (\$m)</b>	<b>Imports (\$m)</b>	<b>Supply Wholesale Value (\$m)</b>
2018	1,900	2,400.0	37.7	2,571.2
2019	2,030	2,440.0	41.9	2,563.0
2020	2,100	2,563.0	37.8	2,685.7
Average	2,010	2,467.7	39.1	2,606.6

Source: Australian Horticultural Statistics Handbook, 2019/20

The marketing and research and development activities of the nursery industry are guided by the industry's strategic investment plan (SIP) developed by Hort Innovation in consultation with the N&G industry and levy payers. The current SIP addresses the Australian nursery industry's research and development (R&D) needs from 2017 to 2021. The activities are funded by levies payable on nursery plants produced in Australia; the R&D levy funds are managed by Hort Innovation.

### Rationale

Project NY15006 was funded to continue development of the N&G industry's communication program. The project was aimed at improving communications relevant to N&G industry levy payers, as well as supply chain businesses and other allied industries. The project continued from the earlier communications project (NY12011) that produced Nursery Papers, digital communications, policy documents and position papers.

Also, an independent review project (NY15000) addressing industry communications had just been completed before the commencement of NY15006; the recommendations of the independent review were taken into account in the current project (NY15006).



## Project Details

### Summary

Project Code: NY15006

Title: *Communications Program for the Australian Nursery Industry 2015-18*

Research Organisation: Cox Inall Communications

Project Leader: Suzanne Lewis, Project Leader, Cox Inall Communications

Period of Funding: February 2016 to November 2018

### Objectives

The major aim of the project was to raise awareness and encourage uptake of nursery levy funded R&D and marketing to enable and stimulate practice change by the N&G industry. Nursery levy payers were the primary audience along with other industry stakeholders such as members of nursery input and product supply chains.

The objectives of project NY15006 were intimately aligned with two key objectives of the Nursery Industry SIP, namely:

- To enhance the capacity and efficiency of the industry's resources through upgrading industry skills, knowledge and practice, and
- To build industry support through shaping government, public and related industry understanding of the industry's benefits, and enhance these benefits through communication.

Another broad project objective was to build on and implement the recommendations of a recent communications review carried out by RM Consulting in 2015. This review had identified some areas for communications improvement associated with R&D awareness and the outcomes of the levy paid by the industry.

Specific objectives of the project were to:

- To develop a detailed stakeholder engagement plan that takes into account the preferred way levy payers and other stakeholders (government and the general public) receive information.
- To effectively leverage stakeholder networks to improve distribution and receipt of communication materials.
- To maximise the use of Industry Development Officer (IDO) networks and State Nursery and Garden Industry Associations (NGIAs).
- To embed information about the 2020 Vision in all communication messages to ensure greater understanding and awareness across the industry of the long-term strategy.
- To continue to provide hard copy communications where appropriate, but transition the industry to smart accessible digital delivery.
- To reflect best practice communications by increasing industry engagement on multiple social media channels.
- To adapt the highly valued Nursery Industry Papers to not just provide information, but to provide accessible advice on how to implement change.
- To improve the clarity and frequency of delivery of R&D information.
- To improve awareness of the NGIA website and online tool available and ensure they meet best practice criteria for design, usability and accessibility.

## Logical Framework

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

*Table 2: Logical Framework for Project NY15006*

<p>Activities</p>	<ul style="list-style-type: none"> <li>• An inception meeting was held with the Nursery and Garden Industry Association (NGIA) representatives (NGIA is now known as Greenlife Industry Australia)</li> <li>• During the project, Cox Inall worked closely with industry via the NGIA; the NGIA provided additional resources as well as technical and strategic support to the project.</li> <li>• The existing communication strategy was further enhanced by Cox Inall via addressing the recommendation of the 2015 independent review.</li> <li>• Annual telephone surveys of levy payers were conducted in 2016, 2017 and 2018 to finalise the stakeholder engagement plan and inform levy payers of the developing communications strategy.</li> <li>• Fortnightly work-in-progress meetings by teleconference or face-to face were held with NGIA.</li> <li>• Hort Innovation representatives would also join meetings around a six monthly period.</li> <li>• Cox Inall developed a detailed understanding of the levy funded R&amp;D and marketing projects underway, including communication with key project providers and researchers; this resulted in useful working relationships with NGIA, Hort Innovation and project providers.</li> <li>• Project NY15006 undertook an annual communications survey of levy payers to assess the effectiveness of their communication program activities.</li> <li>• Various channels were developed to communicate with levy payers and related businesses; these channels included for example blogs, newsletters, Nursery Papers, media releases, case studies (written and videos), and a levy payer kit.</li> </ul>
<p>Outputs</p>	<p>Outputs produced included:</p> <ul style="list-style-type: none"> <li>• An inception workshop that established positive relationships and understanding between Cox Inall, levy payers and NGIA representatives.</li> <li>• Surveys of levy payers that elicited stakeholder interest and maintained positive stakeholder engagement throughout the project.</li> <li>• A series of meetings with NGIA and Hort Innovation personnel throughout the project to ensure the communications strategy was on track.</li> <li>• Suggestions for improvement to the NGIA and Your Levy @ Work websites<sup>(a)</sup>.</li> <li>• A series of social media content plans including sourcing and writing content.</li> <li>• The development of an extensive catalogue of blogs and articles addressing the nursery levy R&amp;D and marketing; an average of one post per week was placed on the Your Levy @ Work website.</li> <li>• Examples of blog and newsletter content included:             <ul style="list-style-type: none"> <li>○ Levy projects improving industry protection from pests and disease</li> <li>○ Have your say on nursery and garden industry employment</li> <li>○ NGIA boosts efforts to tackle urban heat islands</li> </ul> </li> <li>• Continuation of the Nursery Papers via assisting with their redesign, as well as the development and writing of some of the 9-11 Nursery Papers per annum that were produced during the project.</li> </ul>

	<ul style="list-style-type: none"> <li>• A levy payer kit; a document that provides a snapshot of the levy, mapping out the process for levy collection and allocation, how to share project ideas, and how investments work directly towards achieving the 2017-20 Nursery Industry SIP outcomes; the kit is available at: <a href="https://yourlevyatwork.com.au/understand-your-levy-with-the-2020-levy-payer-kit/">https://yourlevyatwork.com.au/understand-your-levy-with-the-2020-levy-payer-kit/</a></li> <li>• The development, in conjunction with NGIA, of a new three-year robust communication strategy for the Australian nursery industry.</li> <li>• A series of nine recommendations was put to Hort Innovation as part of the final report for this project, all of which have been undertaken in the latest phase of industry communications.</li> <li>• Cox Inall recommended a continuation of the communications program to build on the momentum and capacity built from the current project (NY15006).</li> </ul>
<p>Outcomes</p>	<p><u>Continuation of communication investment</u></p> <ul style="list-style-type: none"> <li>• In November 2018, the next phase of the communication program commenced and was due to run until November 2021, however this has now been extended to April 2022 (Samuel Cox, pers. comm., 2021).</li> <li>• The new project, NY 18001, aims to build on the success of NY15006 and continues to raise awareness and encourage uptake of nursery levy funded research.</li> </ul> <p><u>Intermediate outcomes</u></p> <ul style="list-style-type: none"> <li>• Increased awareness of levy payers and other industry stakeholders of the outcomes of industry investment in both R&amp;D and marketing.</li> <li>• Improved access to information eliciting an increase by N&amp;G industry members in their use of available information.</li> <li>• A potentially higher level of knowledge and appreciation of the levy paid by industry members via the information it produces, leading to an increased ownership of the R&amp;D and marketing levy by levy payers.</li> <li>• An increase in awareness and understanding of non-levy payers (e.g. government and the general public) concerning the responsible management of the N&amp;G industry.</li> <li>• Significant growth of audiences on social media, setting up future projects for swift knowledge sharing (Samuel Cox, pers. comm., 2021).</li> <li>• Open rates and click through rates of newsletters which significantly exceed industry benchmarks, providing evidence of an increasingly engaged audience (Samuel Cox, pers.. comm., 2021)</li> </ul> <p><u>Final outcomes</u></p> <ul style="list-style-type: none"> <li>• Increased knowledge and ideas utilised by industry that have led to improved nursery management.</li> <li>• The project surveys reported not only that that the level of awareness of the levy was high, but also that the content of the communications program such as case studies, e-newsletters and Nursery Papers were all valuable in the implementation of practice change by levy payers.</li> <li>• More informed sectors that interface with the N&amp;G sector (e.g. environmental groups, input and output supply chain businesses, State government and local government organisations, residential sectors).</li> <li>• In the 2018 annual telephone survey for NY15006, 11 of the 16 respondents identified that they had made practice change on farm, having seen them in</li> </ul>

	<p>Nursery Papers (output of NY15006); further, in the first year of the latest communications project (NY18001), a survey was conducted which directly asked “Have you made any changes to your business based on R&amp;D levy funded communications to which 23% of the 48 respondents said yes. This survey was conducted in April 2019 thus it is fair to assume that a significant contribution towards this result came from NY15006 (Samuel Cox, pers. comm., 2021).</p> <ul style="list-style-type: none"> <li>• The distribution list for project NY15006 reached in excess of 2,200 individuals and targeted many third parties. There is also good acknowledgment of the production nursery sector through the retail, landscape, production horticulture, forestry, environmental and ornamental supply chains (Samuel Cox, pers. comm., 2021).</li> <li>• Anecdotally, Peter Vaughan, Chief Executive Officer (CEO) Greenlife Industry Australia, has been advised that the communications, statistics and other activities have “given the sector a different setting in horticulture”.</li> </ul>
Impacts	<ul style="list-style-type: none"> <li>• Improved business and technical management by some N&amp;G industry participants, leading to increased income and/or reduced costs of N&amp;G industry businesses, including input and product supply chains.</li> <li>• Greater appreciation of the N&amp;G industry as a respected and responsible industry, leading potentially to a strengthening of the industry’s future social licence to operate.</li> </ul>

(a) Available at <https://yourlevyatwork.com.au/your-nursery-levy-work/>

## Project Investment

### Nominal Investment

Table 3 shows the annual investment made in Project NY15006 by Hort Innovation. All funding was provided by Hort Innovation.

*Table 3: Annual Investment in Project NY15006 (nominal \$)*

<b>Year ended 30 June</b>	<b>HORT INNOVATION (\$)</b>	<b>TOTAL (\$)</b>
2016	156,400	156,400
2017	200,000	200,000
2018	156,349	156,349
2019	70,000	70,000
Total	582,749	582,749

### 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 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). No additional costs of extension were included as the project was directly concerned with communication and communicated findings to stakeholders within the project activities.

## 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 NY15006*

Economic	<ul style="list-style-type: none"> <li>Improved business and technical management of some N&amp;G industry participants.</li> <li>Increased sales and gross income and/or reduced costs of some N&amp;G industry businesses.</li> </ul>
Environmental	<ul style="list-style-type: none"> <li>Reduced incidence of any external negative impacts to nearby N&amp;G and non N&amp;G industries and communities.</li> </ul>
Social	<ul style="list-style-type: none"> <li>Greater appreciation of the N&amp;G industry as a respected and responsible industry, leading potentially to a strengthening of the industry's future social licence to operate.</li> </ul>

### Public versus Private Impacts

The major impact identified from the investment (management and economic impacts to some individual N&G operators) is predominantly a private impact due to potential productivity and profitability gains for some N&G operators. Public impacts also have been delivered, including a potential reduction in off-site impacts.

### Distribution of Private Impacts

The private impact to N&G industry participants will be shared with businesses operating across the N&G industry input and output supply chains, according to the relevant elasticities of supply and demand along each value chain.

### Impacts on Other Australian Industries

It is likely that most impacts will be confined to the Australian N&G industry and their supply chains. However, some impacts may well be captured by some industries operating or living near N&G industry locations.

### Impacts Overseas

There are assumed to be no 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 primarily to Rural RD&E Priority 4, with some outcomes and impacts also contributing to Priorities 2 and 3. In addition the project is likely to contribute to Science and Research Priorities 1 and 2.

Table 5: Australian Government Research Priorities

<b>Australian Government</b>	
<b>Rural RD&amp;E Priorities (est. 2015)</b>	<b>Science and Research Priorities (est. 2015)</b>
<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: DAWE (2015) and OCS (2015)

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

The strategic outcomes and strategies of the Australian nursery industry are outlined in the Nursery Strategic Investment Plan 2017-2021<sup>1</sup> (Hort Innovation, 2017). Project NY15006 addressed two of the four Plan outcomes:

Outcome 2: Increased marketing effectiveness and efficiency and better decision-making. This outcome was addressed via strategy 3: Disseminate industry information and insights to growers and key stakeholders.

Outcome 4: Improved productivity, profitability and professionalism through the creation and adoption of innovation and industry BMPs. This outcome was addressed via the following two strategies:

- Promote, survey and monitor growers' uptake of BMP and levy funded outcomes
- Develop and implement an effective communication program

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

## 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.

### Impact Not Valued

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

- Reduced incidence of any external negative impacts to nearby N&G and non-N&G industries and communities.
- Greater appreciation of the N&G industry as a respected and responsible industry, leading potentially to a strengthening of the industry's future social licence to operate.

Neither of these impacts were valued due to:

- lack of data on the extent of any reduction in N&G negative impacts and the extent of how these may have been reduced due to the project.
- lack of data on the extent and risk of such a loss of social licence if it had occurred and how the extent and risk may have occurred due to the project.

### Summary of Assumptions

The impact that was valued was that driven by improved business and technical management of some N&G industry participants. This was assumed to have driven increased sales, income and/or reduced costs of nursery and garden industry businesses.

#### Assumptions required for valuing impact of NY15006

The key base data required to carry out the impact valuation included:

- Gross farm gate value of Australian nursery industry
- Total number of nursery businesses
- Average gross farm gate value per business (turnover)
- Existing profit as a percentage of turnover

Other key assumptions required included the likely changes due to the project that related to:

- The proportion of businesses that increase profits due to the project
- Extent of profit increase for the businesses affected
- Year of first impact and longevity of impact

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



Table 6: Summary of Assumptions for Impact Valued

Variable	Assumption	Source/Comment
<b>Increased profitability</b>		
Gross farm gate value of Australian nursery industry	\$2.44 billion	Greenlife Industry Australia (2019)
Total number of nursery businesses	1,651	Hort Innovation (2018)
Average gross farm gate value per business (turnover)	\$1.48 million	\$2.44 billion /1,651 Also, Hort Innovation Project NY16004 data show that most greenlife businesses (59%) have a turnover of less than \$500,000 per year but that businesses with a turnover of more than \$2 million per year account for 74% of the industry's gross value of production.
Profit as a percentage of turnover	9.8% (average of 15% and 4.6%)	Previous benchmarking studies have previously estimated profit as a percentage of turnover of nurseries at between 4.6% and 15% (e.g. IBISWORLD)
Maximum proportion of businesses that increase profits due to the project	10.0% (5% earlier project)	Analyst assumptions
Extent of profit increase for the businesses affected	10.0% (5% earlier project)	
Year of first impact	2019/20	Analyst estimate of year in which increased profitability commences due to the project
Year of maximum impact	2022/23	Year of maximum profitability
Year in which impact ceases	2026/27	Analyst estimate of year in which impacts cease without further communication investment – declining linearly from 2022/23 to zero by 2026/27
<b>Risk and attribution factors</b>		
Probability of output	100%	Analyst assumptions
Probability of outcome (use of the outputs)	75%	
Probability of impact given usage	75%	
Attribution	75%	A proportion of the communication impacts is assumed to have been related to the previous communications project (NY12011 and the external review by RM; it is assumed that these investments would have had some impact without the investment in NY15006.
<b>Counterfactual</b>		
Without the NY15006 project funding, it is assumed that the impact assumed in Table 4 would not have occurred; any impacts from the previous communication project (NY12011) and the RM review have already been accommodated via the attribution factor provided in Table 6.		

## 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 (2018/19) as per the CRRDC Impact Assessment Guidelines (CRRDC, 2018).

### Investment Criteria

Tables 7 and 8 show the investment criteria estimated for different periods of benefits for the total investment and the Hort Innovation investment alone. The results in Tables 7 and 8 are the same as all investment was provided by Hort Innovation.

*Table 7: Investment Criteria for Total Investment in Project NY15006*

Investment Criteria	Years after Last Year of Investment						
	0	5	10	15	20	25	30
Present Value of Benefits (\$m)	0.00	3.06	3.67	3.67	3.67	3.67	3.67
Present Value of Costs (\$m)	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Net Present Value (\$m)	-0.89	2.17	2.78	2.78	2.78	2.78	2.78
Benefit-Cost Ratio	0.00	3.45	4.14	4.14	4.14	4.14	4.14
Internal Rate of Return (%)	negative	33.55	35.85	35.85	35.85	35.85	35.85
MIRR (%)	n.s.	25.57	18.32	14.22	12.04	10.70	9.78

n.s. no solution

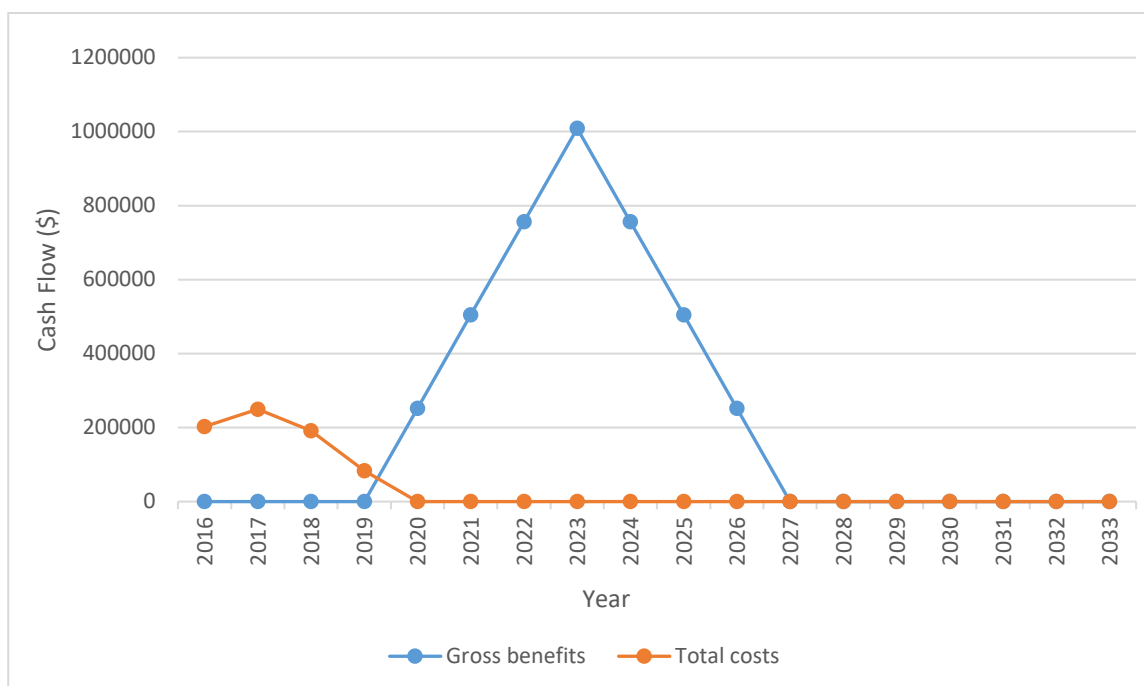
*Table 8: Investment Criteria for Hort Innovation Investment in Project NY15006*

Investment Criteria	Years after Last Year of Investment						
	0	5	10	15	20	25	30
Present Value of Benefits (\$m)	0.00	3.06	3.67	3.67	3.67	3.67	3.67
Present Value of Costs (\$m)	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Net Present Value (\$m)	-0.89	2.17	2.78	2.78	2.78	2.78	2.78
Benefit-Cost Ratio	0.00	3.45	4.14	4.14	4.14	4.14	4.14
Internal Rate of Return (%)	negative	33.55	35.85	35.85	35.85	35.85	35.85
MIRR (%)	n.s.	25.57	18.32	14.22	12.04	10.70	9.78

n.s. no solution

The annual undiscounted benefit and cost cash flows for the total investment for the duration of the NY15006 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 show a moderately low sensitivity to the discount rate, largely due to the short period of benefits.

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

Investment Criteria	Discount rate		
	0%	5% (base)	10%
Present Value of Benefits (\$m)	4.04	3.67	3.37
Present Value of Costs (\$m)	0.74	0.89	1.06
Net Present Value (\$m)	3.30	2.78	2.31
Benefit-cost ratio	5.48	4.14	3.18

A sensitivity analysis was then undertaken for the maximum proportion of businesses increasing profits and the extent of the profit increase assumed. Optimistic and pessimistic scenarios were tested for these two important assumptions that drive the impact. Results are provided in Table 10. The investment breaks even when each of the assumptions in Table 10 are set at 4.9%; the pessimistic scenario in Table 10 is very close to the break-even result.

Table 10: Sensitivity to Optimistic and Pessimistic Assumptions  
(Total investment, 30 years)

Investment criteria	Pessimistic	Base	Optimistic
	Businesses increasing profits (5%) and extent of profit increase (5%)	Businesses increasing profits (10%) and extent of profit increase (10%)	Businesses increasing profits (15%) and extent of profit increase (15%)
Present Value of Benefits (\$m)	0.92	3.67	8.26
Present Value of Costs (\$m)	0.89	0.89	0.89
Net Present Value (\$m)	0.03	2.78	7.37
Benefit-cost ratio	1.03	4.14	9.31

### 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 11). 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 11: Confidence in Analysis of Project

Coverage of Benefits	Confidence in Assumptions
Medium	Medium-Low

Coverage of benefits was assessed as Medium. The most important impact (improved business profitability) was valued. However, any impacts relating to the reduced incidence of any external negative impacts to nearby N&G and non-N&G industries and communities was not valued; also, any potential strengthening of the industry's future social licence to operate was not valued in the assessment.

Confidence in assumptions for valuation of impacts was rated as Medium-Low as some of the assumptions made were not supported strongly by surveys or other forms of evidence of change.

## Conclusion

The investment in Project NY15006 is likely to contribute to improved management of some N&G businesses via an increased exposure to the outcomes of the industry's investment in R&D and marketing.

Total funding from all sources for the project was \$0.89 million (present value terms). The investment produced estimated total expected benefits of \$3.67 million (present value terms). This gave a net present value of \$2.78 million, an estimated benefit-cost ratio of 4.14 to 1, an internal rate of return of 35.8% and a modified internal rate of return of 9.8%.

## 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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## Acknowledgements

AgEconPlus and Agtrans Research would like to thank all the project and program personnel associated with Horticulture Innovation Australia Limited that were involved in the evaluation process. Their cooperation and feedback throughout the evaluation process contributed significantly to this report.

Specific acknowledgements go to:

Samuel Cox, Account Director at Cox Inall Communications

Sarah Cumpston, Measurement and Evaluation Specialist, Hort Innovation

Suzanne Lewis, Group Account Director, Cox Inall Communications

Meg Pearce, Cox Inall Communications

Peter Vaughan, Chief Executive Officer, Greenlife Industry Australia

Adam Briggs, Head of Data & Insights, Hort Innovation

## Abbreviations

ABS	Australian Bureau of Statistics
BS	Berries
CEO	Chief Executive Officer
CRRDC	Council of Research and Development Corporations
DAWE	Department of Agriculture, Water and the Environment (Australian Government)
GDP	Gross Domestic Product
IDO	Industry Development Officer
MIRR	Modified Internal Rate of Return
N&G	Nursery and Garden
NGIA	Nursery and Garden Industry Association
NY	Nursery
OCS	Office of the Chief Scientist
RB	Rubus
R&D	Research and Development
RD&E	Research, Development and Extension
SIP	Strategic Investment Plan
TU	Turf