Hort Innovation

Final Report

Nursery industry natural disaster risk mitigation and recovery plan

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Delivery partner:

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Project code:

NY18008

Project:

Nursery industry natural disaster risk mitigation and recovery plan (NY18008)

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Content

Summary

The Australian production nursery industry has inherent strengths and vulnerabilities in the context of identifying risks to natural disasters. Inherent strengths include the process-driven production systems and water use efficiencies employed by production nurseries, especially those seeking continuous improvement through industry best management practices programs. On the flip side, nurseries tend to prefer a coastal, flood plain or peri-urban location, and this is a factor that can be severely tested when a natural disaster, impacts these regions, making nurseries vulnerable to adverse events.

Disruption to a production nursery business caused by a natural disaster, such as bushfire, flood or sudden hailstorm, can have a devastating blow to production cycles and affect staff, suppliers and customers. A natural disaster can impose significant cost to an individual nursery business and where the disaster impacts several regions or across multiple states or territories, can impact the overall industry value of production.

The objective of the Project (NY18008) is to determine the potential for natural disasters to impact the Australian production nursery industry.

The intent of this project is to assess the vulnerabilities of the production nursery industry and provide practical resources to improve the preparation, recovery time and resilience of a production nursery when confronted by a natural hazard.

The project identified six natural hazards common to the production nursery industry: bushfire, flood, frost, hail, heatwave, severe wind or cyclone. Drought or insufficient rainfall conditions was not specifically covered by the project, but is considered within the Recommendations for further research and development into the specific effects of drought on the industry, considering the reliance on available water by the industry.

The project delivered a Nursery Industry Spatial Mapping Portal, listing known nursery sites with a risk rating allocated for natural hazards for each site, and real time data from the Bureau of Meteorology integrated into the Portal.

The project delivered a series of resources including a set of six Nursery Preparation Checklists designed for businesses to mitigate the risks, prepare and manage the natural hazards most likely to impact a nursery operation. Each Preparation Checklist identifies characteristics of the hazard and lists activities recommended to be undertaken at different stages of an event:

1. General Nursery Preparation
2. Pre-season Preparation
3. Onset or threat detected Preparation

The project developed a business continuity management plan template, tested and implemented the template with participating nursery owners. The template was applied to the Australian Plant Production Standard, Ecohort process, where it can be used as part of the annual audit process.

Additional project outputs include a Glossary of Key Terminology, Damage Assessment Form for industry bodies to use in the initial assessment of a disaster.

The Project makes five priority Recommendations for the Nursery Industry. These are:

Recommendation #1: Embedding business continuity practices in the Nursery Industry

Continued engagement is needed with nursery operators to implement continuity management plans and embed preparation processes into production practices. Continuing to encourage nurseries to use the resources developed in this project, driving participation in the Australian Plant Protection Standard (APPS) as best management practices needs to occur.

Recommendation # 2: Integrating business continuity management into horticultural training

Include a business continuity training module into The Masterclass for Horticultural Business and introducing the concepts into regular staff training to encourage application and embedding of continuity practices.

Recommendation # 3: Integrating the Spatial Portal Risk Map into the Nursery Industry

Continue development and funding support of the Spatial Portal Risk Map. Use the instructional videos to educate industry and growers on the application and value to individual nursery sites. There is the potential for commercial opportunities or a fee for service by individual businesses wanting access to the Address-based Natural Hazards Risk Ratings and visual tools available in the Portal.

Recommendation # 4: Develop Drought management plans for the Nursery Industry

Undertake research and development into the specific effects of drought or insufficient rainfall on the industry; assess current drought policy for Nursery Industry.

Recommendation # 5: Inform plant selection in high risk bushfire and cyclone regions

The Nursery Industry to communicate with local government authorities, natural resource groups and community to ensure horticultural integrity of plant species selection in high risk natural hazard zones; collaboration with fellow industry bodies and research institutions to enhance plant selection research and development.

Keywords

Production nursery; Agriculture; Resilience; Natural Disaster; Business Continuity; Risk Mitigation; Spatial mapping.

Introduction

The Australian production nursery industry supports a number of sectors including urban horticulture, food supply via fruit and vegetable cropping, fibre production through forestry, and the environment under land care and revegetation. The industry underpins the production sector and provides substantial additional value down the supply chain in the retail and services sectors.

The Australian production nursery industry has inherent strengths and vulnerabilities in the context of identifying risks to natural disasters. Inherent strengths include the process-driven production systems and water use efficiencies employed by production nurseries, especially those seeking continuous improvement through industry best management practices programs. On the flip side, nurseries tend to prefer a coastal, flood plain or peri-urban location, and this is a factor that can be severely tested when a natural disaster, impacts these regions, making nurseries vulnerable to adverse events.

The intent of this project is to assess the vulnerabilities of the production nursery industry and provide practical resources to improve the preparation, recovery time and resilience of a production nursery when confronted by a natural hazard.

The origins for the project lay in the recovery work conducted by the Nursery & Garden Industry Queensland Limited (NGIQ) in response to numerous tropical cyclones and flood events that impacted the industry over a sixteen year period.

This project (NY18008) expanded the Nursery Industry Spatial Mapping Portal to map the Australian Production Nursery Industry. External consultant, Cohga Pty Ltd, was recruited under the project to provide a national spatial data map with access to risk assessment tools, live feeds from the Bureau of Meteorology, and nursery industry addresses, data stitching of open-data layers and back-end algorithms to enable an interactive functionality to the system. A set of short, instructional videos was produced to accompany the Portal. The Portal is available for use by the nursery industry bodies and interested levy payers. https://ngiq.cohga.com/weave/hip.html

The project delivered a series of preparatory materials to assist production nurseries identify risk, prepare their businesses and production systems for natural disasters, and embed a routine of exercise, maintenance and review of their continuity and recovery plans.

Within the series, six Nursery Preparation Checklists were produced to mitigate the priority natural hazards identified by the project. Identified hazards are bushfire, flood, frost, hail, heatwave, severe wind or cyclone. Each Preparation Checklist identifies characteristics of the Hazard and lists activities recommended to be undertaken at different stages of an event:

General Preparation
Pre-season Preparation
Onset or Threat detected Preparation

A template for business continuity and recovery plan was developed, tested and implemented by participating production nursery operators. The template has a foundation in business continuity theory, provokes thought and consideration of priority issues confronting a nursery business. The template offers a process-driven plan that nursery operators can embed within business-as-usual practices.

Methodology

The objective of the Project is to determine the potential for natural disasters to impact the Australian production nursery industry and produce a series of resources to equip levy payers and improve business preparedness, recovery and resilience. The project used the following priority methods to achieve its objective:

The project established a Project Reference Group comprised of a representative from NGIQ, two levy payers and a representative from the funding body, Hort Innovation, to oversee activity, monitoring and evaluation.

The project undertook a desktop review of resources. These resources were accessed from the Knowledge Hub of Australian Institute for Disaster Resilience (AIDR); publications of the Business Continuity Institute (UK); Australian Government and various State government reports on emergency management, business continuity and disaster recovery; and Australian Red Cross.

One output was the glossary of key terminology and definitions used by emergency management services, government agencies and industry groups, developed to enable the Australian nursery industry to have a consistent terminology and interpretation of terms aligned with government policy and emergency management language.

Activity was split into two Phases.

Phase 1 – A National Natural Disaster Risk Assessment for the Nursery Industry.
Phase 1 included:

- Development of the Glossary of key terminology and definitions.
- Desktop analysis of existing Commonwealth, State Government and relevant local Council "Get ready" natural disaster response plans to ascertain what is currently in operation and can be applied to the nursery industry.
- The Damage Estimate Form was developed and distributed to all of the state based nursery industry peak bodies (NGIs) and Greenlife Industry Australia (GIA). During the project, this Form was used by GIA and three of the NGIs (Qld, Vic, WA), in response to events.
- Development work on the spatial portal risk map commenced with the mapping of known addresses of nurseries listed in the GIA Nursery Trade Register publication.
- Industry and media releases to promote the project objectives.

Phase 2 – Comprehensive Natural Disaster Risk Map for the Australian Nursery Industry, Action Plan and stakeholder engagement and communication activities.

Phase 2 activity commenced in January 2020 and was soon affected by the Australian and state governments response to the SARS Cov-2 virus. The methodology of conducting site visits across state borders to deliver, test and implement the Natural Disaster Action Plan was changed to telephone, video and limited nursery site visits when travel was possible. As a consequence the project timeline was extended to allow for the disruption.

Meanwhile, development work continued on the Spatial Portal Risk Map with project consultants, Cohga Pty Ltd. The Portal: https://ngiq.cohga.com/weave/hip.html provides a series of data sets to assist in risk assessment for industry and individual locations. These layers include:

- Addresses of nursery businesses matched to risk rating (G-NAF database)
- LGAs and electorates
- Historic cyclone tracks
- Flood maps
- Plant and Animal Biosecurity zones (QLD)
- Bureau of Meteorology weather (live data)
- Bushfire risk zones
- Wind speed / gusts zones

The Project engaged consultants, Risk Frontiers, specialists in assessment and management of risk across the Asia-Pacific region (www.riskfrontiers.com) to add data to the Spatial Portal Risk Map. The national *Address-Based Natural Hazards Risk Ratings*, was applied to the Nursery Industry Spatial Portal Risk Map.

The Ratings database provides an overview of the natural hazards affecting an individual address or geographical area in which a property is located. Address-based ratings focus on the peril – mainstream riverine flood, hail, bushfire, coastal inundation, earthquake, tropical cyclone, storm tide, thunder and lightening. Each peril is ranked on a 5-points scale with 5 referring to the most and 1 the least severe.

For example, the bushfire risk rating is a distance-based, five-point scale applied to addresses in bushfire-prone areas:

Hazard Rating - Bushfire	Probability of building destruction
5 – Very High	distances less than 100 m from extensive bushland
4 – High	distance between 100 – 200 m from extensive bushland
3 – Medium	distance between 200 – 400 m from extensive bushland
2 – Low	distance between 400 – 700 m from extensive bushland
1 - Negligible	distance larger than 700 m from extensive bushland

The Project also subscribed to the Bureau of Meteorology GIS2Web service to provide 'real-time' data to the Spatial Portal Risk Map. Layers included severe weather warnings, severe thunderstorm warnings, fire weather warnings, heatwave assessments and forecasts, river conditions, flood watches and warnings.

A series of four (4) instructional videos were produced to educate users on the functionality of the Spatial Portal Risk Map.

Natural Disaster Action Plan.

In consultation with key participating stakeholders, the project developed a 3-Tier Template Preparation Plan for the Nursery Industry natural hazard risk and mitigation strategy.

In summary –

Tier 1 – 6 x Nursery Preparation Checklists based on priority natural hazards. Bushfire, Flood, Frost, Heatwave, Hail and Storm, Severe Wind/Tropical Cyclone. Each Checklist provides a definition of the hazard, General Nursery Preparation guide, Pre-Season Preparation guide and a Threat detected Activation Plan.
https://www.ngiq.asn.au/resources/emergency-disaster-planning/

Tier 2 – Nursery Business Continuity and Recovery Plan Template (Appendix 1).

Tier 3 – Industry Best Management Practices auditable checklists applied to Ecohort businesses. The project produced a chapter and audit plan to be incorporated into the next Edition of EcoHort, scheduled to be published late 2021. (Appendix 2).

Australian Plant Protection Standard - Ecohort Online Risk Assessment and Audit Process

Working in combination with the Biosecurity team at Greenlife Industry Australia (GIA), the project team adopted a reasonable and practical approach to introducing Natural Disaster elements into the production nursery industry EcoHort accreditation system. Application of the project's Natural Disaster Action Plan Tiers 1 and 2, should be seen as an introduction of this new concept to growers as a 'first step' as part of a wider adoption within the industry best management practice programs.

EcoHort is a living document and in future Editions more Natural Disaster resources could be added to the audit system (for example, drought resources). The Chapter will be supported by sample documents (from the natural disaster checklists), and steps are in place to allow simple completion of the documents required electronically through its Audit Management System (AMS). Further, GIA has added a 'Natural Disaster' page to its website, Australian Plant Production Standard (APPS) https://nurseryproductionfms.com.au/emergency-disaster-planning/

Stakeholder engagement, testing and implementation

To identify nurseries able to participate in Phase 2 activities, the project team reviewed several data sources to determine initial approach, ensuring the scope matched project requirements across each state and territory (Table 1. Nursery site allocation).

The current list of Ecohort businesses was identified on the Spatial Portal Risk Map for location and against the G-NAF natural hazard risk profile, then matched for their production type. The project team sought to follow up with nursery owners who had expressed interest at the GIA National Conference, and three owners were included in an initial list of levy payers. Other nurseries were included based on their location or known history of natural disaster damage. The project team sought to include industry opinion leaders, those that participate in Ecohort or NIASA, and a small number who did not yet participate in industry best management programs.

During May and June 2020, an initial telephone survey was conducted with 21 levy payers. From these surveys, 18 nurseries were identified and agreed to participate in the project via on site visits or online zoom calls.

Stakeholder engagement was adversely impacted due to government imposed travel restrictions, the project revised engagement methodology to focus on initial telephone and online video contact. Table 1 shows the number of nurseries engaged in the testing of the template, compared to the project plan set out in the initial project proposal. While the interest level was high for nursery owners who participated to testing the template, the project would have had improved engagement if on-site visits were able to be conducted across each state and territory.

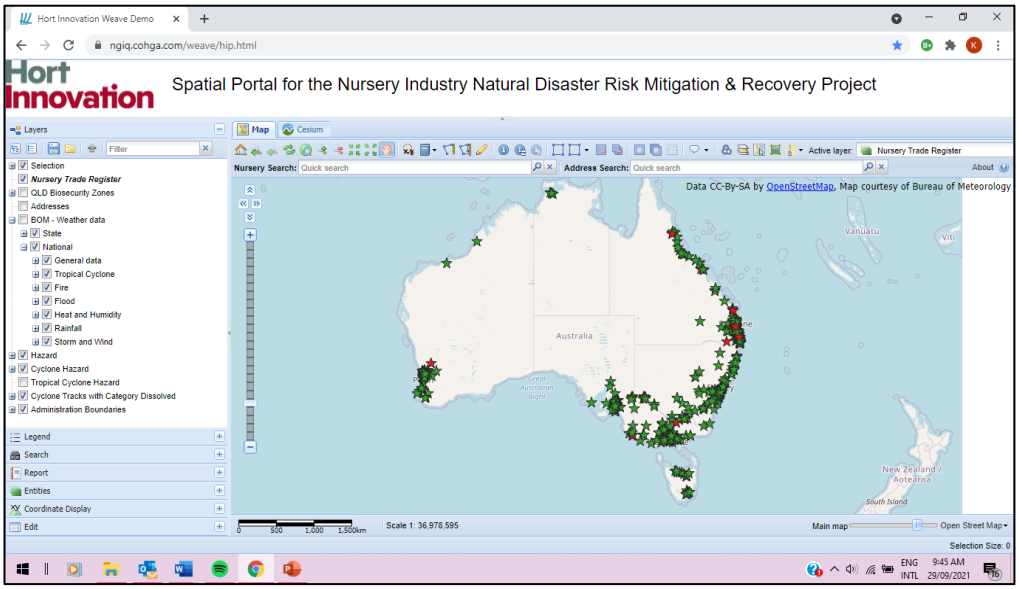
Table 1. Nursery site allocation

State/Territory	**Target Proposed No. of nurseries** (stated in RFP)	**No. of nurseries initially engaged** (telephone/email survey)	**No. of nurseries engaged and testing Template** (site visits, zoom/telephone/email)
NSW	4	5	2
VIC	4	4	2
QLD	2	4	1
SA	2	2	1
WA	2	3	2
TAS	1	2	0
NT	1	1	1
Total	**16**	**21**	**9**

Outputs

The project delivered the following outputs -

1. **Spatial Portal Risk Map for the Nursery Industry** - https://ngiq.cohga.com/weave/hip.html



Multiple layers inform the Spatial Portal, including subscription data of current weather conditions from the Bureau of Meteorology (BoM); an Address-Based Natural Hazards Risk Ratings, developed by Risk Frontiers, www.riskfrontiers.com, specialists in assessment and management of risk across the Asia-Pacific region.

A series of four (4) instructional videos were produced to educate users on the functionality of the Spatial Portal Risk Map. These are available at:

Instructional Video # 1 - Introduction to the Nursery Industry Spatial Portal: https://youtu.be/zrNR2MHQWfM

Instructional Video # 2 - Visualising Information on the Map: https://youtu.be/jw0yNK4d8ec

Instructional Video # 3 - Selecting Information on the Map: https://youtu.be/VgY5q1fmwx4

Instructional Video # 4 - Case Studies and Examples of how to use the Portal: https://youtu.be/nWIfseIkUmE

2. **A Glossary of key terminology** and definitions used by emergency management services, government entities and industry groups to enable the Australian nursery industry to have a consistent terminology and understanding of key terms, such as 'natural hazard', 'business impact analysis' and 'resilience'.
Glossary of Terms - https://www.ngiq.asn.au/wp-content/uploads/securepdfs/Glossary-of-Terms-for-Natural-Disaster-Risk-Mitigation.pdf (Appendix 3)

3. **A 'Damage Estimate Form'**, for industry use in the initial response phase of a natural disaster. The form was implemented by Greenlife Industry Australia (GIA) during the 2019-2020 Bushfire impact on nurseries in NSW, Victoria, with feedback provided to NGIQ enabling identification of extent of damage and nurseries impacted. (Appendix 4)

4. **Natural Disaster Action Plan: Nursery Preparation Checklists and Continuity Template**. **Set of Nursery Preparation Checklists** for each of the identified natural hazards: bushfire; flood; frost; hail, storm and severe weather; heatwave; tropical cyclone and severe wind.

   In consultation with key participating stakeholders, the project developed a 3-Tier Template Plan for the Nursery Industry natural hazard risk and mitigation strategy.

   Tier 1
   6 x Nursery Preparation Checklists based on priority natural hazards: Bushfire, Flood, Frost, Hail and Storm, Heatwave, Tropical Cyclone / Severe Wind. Each Checklist provides:

   - Definition and characteristics of the specific natural hazard
   - Nursery General Preparation guide
   - Pre-Season Preparation guide
   - Threat detected Activation Plan

   Copies of the Nursery Preparation Checklists are available online (Appendix 5):

   Bushfire https://www.ngiq.asn.au/wp-content/uploads/securepdfs/Nursery-Preparation-Checklist-Bushfire-1.pdf

   Flood https://www.ngiq.asn.au/wp-content/uploads/securepdfs/Nursery-Preparation-Checklist-Flood-1.pdf

   Frost https://www.ngiq.asn.au/wp-content/uploads/securepdfs/Nursery-Preparation-Checklist-Frost-1.pdf

   Hail and Storm https://www.ngiq.asn.au/wp-content/uploads/securepdfs/Nursery-Preparation-Checklist-Hail-Storm-1.pdf

   Heatwave https://www.ngiq.asn.au/wp-content/uploads/securepdfs/Nursery-Preparation-Checklist-Heatwave-1.pdf

   Tropical Cyclone / Severe Wind https://www.ngiq.asn.au/wp-content/uploads/securepdfs/Nursery-Preparation-Checklist-Cyclone-and-Severe-Wind-1.pdf

   Tier 2 – Business Continuity and Recovery Plan Template (Appendix 1). It is largely the purpose of Phase 2 activity of this Project to test and implement the Tier 2 Template with levy payers.

   Tier 3 – Industry Best Management Practices auditable checklists applied to Ecohort businesses. The project produced a chapter to be incorporated into the next Edition of EcoHort, scheduled to be published late 2021. (Appendix 2).

5. **Australian Plant Production Standard - Ecohort Online Risk Assessment and Audit Process**

   EcoHort is a living document and in further Editions more Natural Disaster resources could be added to the system. The Chapter will be supported by sample documents (including the project's natural disaster checklists), and steps are in place to allow simple completion of the documents required electronically through its Audit Management System (AMS).

   Further, GIA added a 'Natural Disaster' page to its website, Australian Plant Production Standard (APPS) https://nurseryproductionfms.com.au/emergency-disaster-planning/

6. A set of communication activities to promote project resources with the Nursery Industry, including the following with click rates as at 22/11/21:
    1. VIDEO Case Study: Mt Nathan Nursery (199 views)
    2. WRITTEN Case Study Reducing disaster risk through strategic planning at Mt Nathan Nursery
    3. MEDIA RELEASE Living turf and greenlife can play active role in bushfire management

       (43 views, 5 clicks e-news)
    4. PODCAST: Disaster and Risk mitigation, David Jakobs, Oasis Horticulture (67 plays)
    5. PODCAST: Assessing extreme weather events (127 plays)
    6. NURSERY PAPER: Risk Mitigation for the nursery industry
    7. VIDEO Case Study: Oasis Horticulture (598 views)
    8. WRITTEN Case Study: Learning from the past and preparing for the future
    9. BLOG Update on Project NY18008: Preparing for business interruption
    10. BLOG Nursery industry natural disaster risk mitigation and recovery plan
    11. BLOG Preparedness key to building nursery industry capacity in biosecurity incursions
    12. BLOG NEW natural disasters checklists available for industry
    13. BLOG NEW PROJECT explores the impacts of biosecurity incursions
    14. Nursery project seeks to enhance resilience to natural disasters

Outcomes

The project outcomes were delivered and include:

- **Identification of priority natural hazard risks for the production nursery industry.**
  A clear, visual Spatial Portal Risk Map of the potential impacts of natural disasters on the Australian Nursery Industry delivered as a spatial data mapping product utilised by key support groups to readily identify "at risk" production nurseries and that is complimentary to and informed by open data sets supplied by government and emergency management sources.
- **Improved capacity to prepare for, respond to and recovery from a natural hazard.**
  Australian Nursery growers are well equipped to mitigate natural disaster risks with an implementable Action Plan. This Action Plan will enable levy payers to identify risks, enact preparedness plans, improve recovery time and enhance business resilience. The Action Plan template enables key support agencies to readily identify key actions to be implemented by levy payers to ensure risk mitigation and increased preparedness for natural disasters.

  The project delivered resources to equip nursery operators with the tools to prepare for and risk assess natural hazards. Placement of some resources into the Australian Plant Protection Standard enables the resources to be applied and embedded into continuous improvement activities.
- **A shared understanding of common terminology used in natural hazard management.**
  A glossary of key terms used within the risk, recovery and resilience sector to inform the understanding of potential impacts of natural disasters on the Australian Nursery Industry.
- **NGIs and GIA better equipped with tools to engage with government agencies in the response phase of a natural disaster.**
  The Action Plan includes an engagement strategy that elevates the industry bodies into the decision-making processes of natural disaster policy and first response.
- **Contributing to outcomes of the Nursery Strategic Investment Plan (2017 – 21).**
  The project delivered outputs and resources to meet the Nursery Strategic Investment Plan (SIP), Outcome No. 4***: Productivity.*** *Improved productivity, profitability and professionalism through the creation of opportunities through innovation and adoption of industry best management practices.*
  The Business Continuity and Action Plan template provides nursery operators with a simple, yet comprehensive, template that can guide in risk assessment and preparation activities for a nursery site. Integration of the template and concepts into Ecohort, enables the process of embedding business continuity management into nursery best practices.

  There is future potential for the project outputs to be applied to the SIP Outcome No. 5: **Careers.** *Better career development*. If training in continuity and resilience practices can be included in existing training courses, such as the Masterclass for Horticultural Business, the next generation of nursery owners and managers will have a broad business understanding of managing risk.

Monitoring and evaluation

The project delivered a diverse and comprehensive range of outputs and met the objective of determining the potential for natural disasters to impact the Australian production nursery industry and produced a series of resources to equip levy payers improve business preparedness, response, recovery and resilience.

The identified Relevant Outcome for the Strategic Investment Plan was delivered (Program Logic MS102), being to "Equip the nursery industry to mitigate natural disaster risks through adoption of industry best management practices".

The End-of-project Outcomes identified in the Program Logic were met:

- There is a clear understanding of potential impacts of natural disasters on the Australian Nursery Industry by growers and industry bodies.
- There is adoption of Business Continuity Action Plans to aid preparedness for natural hazards. Embedding Action Plans and a broader business continuity management framework will require additional time and commitment by nursery operators to apply good practice to their business and production processes. The process-driven nature of nursery production lends itself well to adoption and embedding continuity practices.
- Practices have been built into the industry's EcoHort BMP for application in the next stage of audit.
- The project has delivered resources to aid in increased Nursery Industry natural disaster preparedness and capacity to recover from a natural disaster.

The Key Evaluation Questions (KEQs) determined at the start of the project are outlined here:

KEQ	**Project-specific questions**
Effectiveness	*To what extent has the project improved response, recovery and resilience to natural disasters?* • Outputs delivered in the project focus on preparedness as a key to improving response, recovery and resilience to natural disasters. *To what extent has the project identified the type of natural disaster risks to the nursery industry?* • Applying data in the Nursery Industry Spatial Mapping Portal has enabled industry to identify its priority hazards impacting the industry, and allows individual nursery sites to identify and rank their risk to specific natural hazards. *To what extent has the project delivered a mapping tool showing natural disaster risks to the nursery industry?* • The project has delivered the Nursery Industry Spatial Mapping Portal. https://ngiq.cohga.com/weave/hip.html
Relevance	*To what extent has the project improved awareness of business continuity recovery plans to levy payers?* • The concept of a business continuity management plan is now top of mind for managing disruption to nursery operations. While this project has focused on natural

	hazards, during the project, disruption caused by the covid-19 response has escalated the concept of continuity planning. The delivery team also managed the levy funded project, NY18010 *Ensuring Business Continuity during a biosecurity incursion; Social and Economic research learnings for the production nursery industry*. In this project, concepts and outputs delivered in this project were applied to the biosecurity risk. *To what extent has the risk map component enabled NGIs and levy payers to engage with mapping technology to inform them of natural disaster risks?* • The Nursery Industry Spatial Mapping Portal is available to NGIs and levy payers. The project developed instructional videos to aid in the use and application of the Portal, however, due to its complexity, use has been limited to the project team, the Project Reference Group, Greenlife Industry Australia biosecurity team, and a couple of levy payers.
Process appropriateness	*To what extent were levy payers engaged with the project?* • Levy payers were represented on the Project Reference Group; 22 levy payers were part of the initial engagement and testing of the Recovery Action Plan, and the various communication activities including the GIA National Conference (2020) have exposed levy payers to the project activity. *Have regular project updates been provided through linkage with the industry communication project?* • Yes, regular project updates have been provided through the industry email and website links – YourLevy@Work; GIA enewsletter, state NGI magazines. Refer to Project Outputs for list of communication activities.
Efficiency	*What efforts did the project make to improve efficiency in response and preparedness to natural disaster risk mitigation?* • The project outputs focus on improving efficiency in preparedness and response. The key outputs of Nursery Preparation Checklists for each hazard; Spatial Mapping Portal; and the Business Continuity Template and Action Plan provide nursery operators with resources to improve preparations and response to an impact.

Recommendations

The intention of this project is to assess the production nursery industry's vulnerability to natural hazards and provide practical, actionable, preparation processes to mitigate the risk of a hazard.

Here is a list of five priority recommendations and explanatory comments -

Embedding Business Continuity Practices in the Nursery Industry

During the project it became clear that nursery operators have limited time and resources to prepare a detailed written business continuity management plan. In all cases, nursery operators who had previously experienced an adverse impact of a natural hazard were highly engaged with the project. This experience made them more aware of the need for a written continuity management plan and the importance of preparation and risk mitigation. The process-driven functionality of a production nursery lends itself well to integrating continuity practices, this needs to be encouraged and makes a good fit within existing production processes.

Recommendation #1:

Continued engagement is needed with nursery operators to implement continuity management plans and embed preparation processes into production practices. Continuing to encourage nurseries to use the resources developed in this project, driving participation in the Australian Plant Protection Standard (APPS) as best management practices needs to occur.

Integrating business continuity management into horticultural training

There may be scope in industry training to include a Business Continuity module in the Masterclass for Horticultural Business, conducted by the University of Tasmania in partnership with some of the world's leading names in horticulture, including Lincoln University (NZ), the Wageningen Research Academy (Netherlands) and Hort Innovation. https://www.horticulture.com.au/hort-innovation/news-events/the-masterclass-in-horticultural-business-is-now-open-for-2022-intakes/

Recommendation #2:

Include a business continuity training module into The Masterclass for Horticultural Business and introducing the concepts into regular staff training to encourage application and embedding of continuity practices.

Integrating the Spatial Portal Risk Map into nursery industry

The Spatial Portal Risk Map is an innovative and industry specific data sets of high value to the Nursery Industry and individual nursery sites, due to the scope of data sets available in the one portal. Specifically, the long-term benefits of the Spatial Portal Risk Map can include:

- Provides a broadbrush visual overview of the Australian production nursery industry and its relationship to designated natural disaster zones.
- Assists with identification of high risk zones at a state, regional and individual farm level.
- Provides an overlay of declared biosecurity zones, enabling key stakeholders and NGIs to readily identify and communicate with known production nurseries in declared zones.
- Highlights the impact of development and planning regulations on peri-urban agriculture.
- Identifies variables in a new nursery site selection, such as topography, location to key transport and infrastructure, location in relation to other nursery sites.
- Provides a reliable platform that can be used well into the future
- Provides real time data from Bureau of Meteorology

- Provides scope for individual nursery operators to access the Portal to obtain valuable site data and plan production cycles. Enable individual levy payers to plan site improvements, mitigate risks and create production efficiencies.

Recommendation #3:

Continue development and funding support of the Spatial Portal Risk Map. Use the instructional videos to educate industry and growers on the application and value to individual nursery sites. There is the potential for commercial opportunities or a fee for service by individual businesses wanting access to the Address-based Natural Hazards Risk Ratings and visual tools available in the Portal.

Drought Management Plans for Nursery Industry

With a focus by the Australian Government on drought mitigation in agriculture, through the Future Drought Fund, there is scope for additional industry research and development in regions which experience drought or insufficient rainfall.

In 2018, the Council of Australian Governments agreed and signed a new National Drought Agreement (NDA). The NDA sets out a joint approach to drought preparedness, response and recovery, with a focus on accountability and transparency. The agreement recognises the need to support farming businesses and farming communities to manage and prepare for climate change and variability. It focusses measures across all jurisdictions on bolstering risk management practices and enhancing long-term preparedness and resilience.

R&D by the Nursery Industry of the impact of insufficient rainfall and drought conditions could focus on interruption to production cycles, the need to adjust chemical applications during dry periods, or the impact of increased input costs of water use.

Recommendation #4:

Undertake research and development into the specific effects of drought or insufficient rainfall on the industry; assess current drought policy for Nursery Industry.

Informing plant selection in high risk bushfire and cyclone regions

There is scope for future research on sustainable landscaping solutions in high risk natural hazard zones. During the project, the team identified the nursery industry is well positioned to ensure integrity in plant selection decisions made by Local Government Authorities, developers, landscapers and consumers in high risk natural hazard zones, such as bushfire zones or tropical cyclone zones. However, there appears to have been limited formal consultation by individual local government authorities with the production nursery industry to inform plant selection. There is the potential for increased collaboration between the Nursery Industry and Local Government Authorities to inform appropriate plant selection in high risk hazard zones.

Research and development work funded by Hort Innovation in partnership with the New South Wales Department of Primary Industries, for the project, *Developing management strategies to enhance the recovery of horticulture from bushfires* can provide valuable information about fire damage to tree crops and ensure preparation is at the basis of recovery and a return to production continuity. https://www.horticulture.com.au/hort-innovation/news-events/Horticulture-research-to-boost-bushfire-recovery/

We also note the Recommendations to the Hort Innovation funded project (TU17008) *Conveying the benefits of living turf – a bushfire retardant* conducted by GHD for the Turf Industry, where this "fire wise" approach could also be considered by the Nursery Industry:

The turf industry could consider developing a landscaping for bushfire protection guide that focuses on turf as a material that slows fire spread and supports suppression activities. This could cover southern Australia and include turf types and maintenance appropriate to numerous jurisdictions where turf can be an important part of bushfire protection planning. (Final Report, *Conveying the benefits of living turf – a bushfire retardant,* p 13)

Similarly, there is scope for future research for regions vulnerable to tropical cyclones or severe wind events, where home owners and local authorities may work with the Nursery Industry to inform appropriate plant selection. https://www.jcu.edu.au/discover-nature-at-jcu/plants/choosing-plants-for-areas-prone-to-cyclones/some-guidelines-if-planting-for-cyclones

Recommendation #5: The Nursery Industry to communicate with local government authorities, natural resource groups and community to ensure horticultural integrity of plant species selection in high risk natural hazard zones; collaboration with fellow industry bodies and research institutions to enhance plant selection research and development.

Refereed scientific publications

Nil

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Intellectual property, commercialisation and confidentiality

No project IP, project outputs, commercialisation or confidentiality issues to report.

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Appendices

Appendix 1: Nursery Business Continuity and Recovery Plan Template

Appendix 2: Ecohort Industry Best Management Practices Audit Template

Appendix 3: Glossary of Key Terminology in Natural Disaster Risk Mitigation and Business Continuity Management

Appendix 4: Damage Assessment Form

Appendix 5: Nursery Preparation Checklists