Greater Sydney Peri urban Biosecurity Social Research Project

Final report

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Executive Summary

The aim of this research project was to gather information to enable DPI and LLS staff and other stakeholders to improve smallholder engagement in biosecurity management in the Greater Sydney peri-urban area. In addressing this aim, the project sought to investigate peri-urban landholders' current biosecurity knowledge and practices, including communication networks, and particularly their understanding of the notion of 'shared responsibility', and to identify the social and institutional factors that influence peri-urban landholders' adoption of recommended biosecurity practices. Data were collected and analysed in three specific phases. The first phase, conducted in consultation with NSW DPI and LLS staff, involved identification of key stakeholders and selection of two case study regions – Leppington/Camden/Wollondilly and Hawkesbury. The second phase involved a stakeholder analysis in which semi-structured interviews were conducted with 14 stakeholders from government, industry and the private sector to ascertain their issues of concern relevant to peri-urban biosecurity, and their perspectives on how to improve biosecurity engagement of smallholder peri-urban producers. A subsequent third phase of data collection was conducted involving semi-structured interviews with 21 peri-urban smallholders in the two case study regions. Challenges in accessing smallholders during this phase of the research meant a smaller than anticipated number of participants and the recruitment of smallholders likely to be more knowledgeable on, and engaged with, biosecurity.

The findings from the stakeholder analysis indicate that smallholders are perceived to pose a significant potential biosecurity risk due to lack of understanding or knowledge of requirements, limited contact with veterinarians, and undocumented movement of livestock. At the same time, stakeholders reported that while they are motivated to work with smallholders in improving biosecurity engagement, the reduction in face-to-face extension services and lack of a comprehensive database on smallholders pose difficulties for engagement in practice. In contrast to stakeholder reports, analysis of the smallholder interviews suggest that smallholders who participated in this study have a high awareness of their responsibilities to manage plant/animal health, place a high priority on plant/animal health compared to other priorities, and are engaged in a wide range of practices for managing biosecurity risk. Similar to stakeholders, smallholders favoured face-to-face methods for the dissemination of biosecurity information, but believed that the decline of public extension posed challenges for effectively reaching and engaging with smallholders. Despite evidence of engagement with biosecurity in the interviews, smallholders interpreted the meaning of biosecurity in different ways, with some having limited understanding of the term. Some smallholders also believed that biosecurity was less relevant to them or they had made the conscious decision of not implementing

specific biosecurity practices due to conflicts with existing values and beliefs regarding good stock and land management.

On the basis of the findings, five recommendations are made that enable the NSW DPI and LLS to improve the *extent as well as quality* of biosecurity engagement with peri-urban smallholders

Recommendation 1

Convene a working party to review and revise the language and terminology used to communicate biosecurity to smallholders, considering the new NSW Biosecurity Act 2015, and the consistency of the key messages delivered by different stakeholders. The review should be led by the DPI with representation of LLS, key peri-urban stakeholders, and a cross-section of peri-urban smallholders.

Recommendation 2

Conduct a review of current methods for dissemination of biosecurity information and develop an extension campaign focused on informing smallholders about the services provided by organisations such as the Local Land Services. This extension campaign could be implemented using local radio, television and newspapers.

Recommendation 3

Develop and implement a series of smallholder forums in which smallholders are given the opportunity to discuss what 'good' animal/plant health means to them, why they practise animal/plant health, and how they do so. Such fora, convened by the DPI and led by trained facilitators, would be aimed at engaging with smallholders' biosecurity knowledge and practices in a more participatory and meaningful way than current compliance-oriented approaches, in which smallholders are often assumed to have a knowledge deficit. It would also be aimed at developing biosecurity policy and programs that more effectively take into account, and work with, smallholders' existing knowledge, practices and priorities.

Recommendation 4

Establish a program that trains trusted smallholder 'knowledge brokers' – stakeholders who are trusted by landholders, such as private veterinarians, contractors or saleyards. These knowledge brokers, who should be already known to the LLS, would be trained in extension, including the communication of biosecurity information to smallholders. Convene regular workshops for these knowledge brokers to (a) provide updates on changes in legislation and programs – particularly those relevant to biosecurity – and (b) continually improve their confidence and skills to engage with

smallholders. The training program should be developed by the DPI and LLS in consultation with other relevant stakeholders and smallholder representatives and should complement current training activities.

Recommendation 5

Review current LLS registration requirements in relation to land size and consider if a minimum land size of 10ha is appropriate for the Greater Sydney peri-urban area, given the characteristics of landholders located in this area.

1. Project schedule

Nominated services

The following services were required to be delivered:

	Services	Performance Timeframe
Name	**Description of Milestones/Deliverables**	
Signing of the Contract	Contract signed	15th May 2016
Commencement of Phase 1	Initial workshop with LLS and DPI staff is completed to identify case study regions	18th May 2016
Completion of phase 1	Initial project workshop (Phase 1) completed Human ethics approval obtained Stakeholder analysis completed Case study areas/groups identified Progress report submitted	15th October 2016
Completion of phase 2	Interviews at the case study areas/groups completed (Phase 2) Survey for Phase 3 designed Progress report submitted	31st March 2017
Completion of Phase 3	Analysis of interviews completed Phase 3 survey and data analysis completed Progress report submitted	31st August 2017 – *Postponed to 31st October 2017*
Completion of Phase 4	Final project meeting (Phase 4) completed Final report completed	31st October 2017 – *Postponed to 22nd of December 2017*

Period of agreement

Commencement date 15th May 2016

Completion date 31st October 2017 – Postponed to 22nd of December 2017

2. Project objectives

Overall aim:

The overall aim of the project was to gather information to enable DPI and LLS staff and other stakeholders to improve community engagement in biosecurity management in the Greater Sydney peri-urban area.

Specific aims:

The specific aims were to:

1. Investigate peri-urban landholders' current biosecurity knowledge and practices, including communication networks, and particularly their understanding of the notion of 'shared responsibility'.
2. Identify the social and institutional factors that influence peri-urban landholders' adoption of recommended biosecurity practices.
3. Develop a set of priorities and recommendations that DPI and LLS can use to promote change in peri-urban landholders' biosecurity knowledge and practices.

3. Project activities - Methodology and results

3.1. Project scoping and selection of case study regions

The first project meeting was held on the 17th of May 2016 with the aims of outlining the project plan and scope, discussing the main biosecurity risks in the Greater Sydney area and identifying key stakeholders and the two case study areas for conducting the landholder interviews.

The meeting was attended by the research team and DPI and LLS staff members. A presentation was prepared by the research team outlining the plan of the project and a discussion followed in relation to biosecurity risks and the most appropriate case study regions to focus on. The two regions identified as the most appropriate for data collection, due to the diversity of landholders present, were Leppington and the Hawkesbury. Groups of landholders identified as posing generally higher biosecurity risks were those smallholders keeping multispecies of livestock and those landholders with a non-English speaking background. Non-specific biosecurity risks were identified, with introduction and spread of diseases and low engagement with biosecurity requirements being the general biosecurity concern.

Involvement and contribution of DPI and LLS staff members with project activities was discussed, with LLS staff members being able to support the research team with the landholder interviews when required and all meeting participants agreeing on participating in the stakeholder analysis process.

As a result of the meeting, a list of key stakeholders was created by Sarah Britton and shared with the research team as the initial list to be used for the stakeholder analysis (see Stakeholder analysis section Table 1). In addition, Paras Acharya prepared maps of the Leppington (Figure 1) and Hawkesbury (Figure 2) areas to support the research team with project activities.

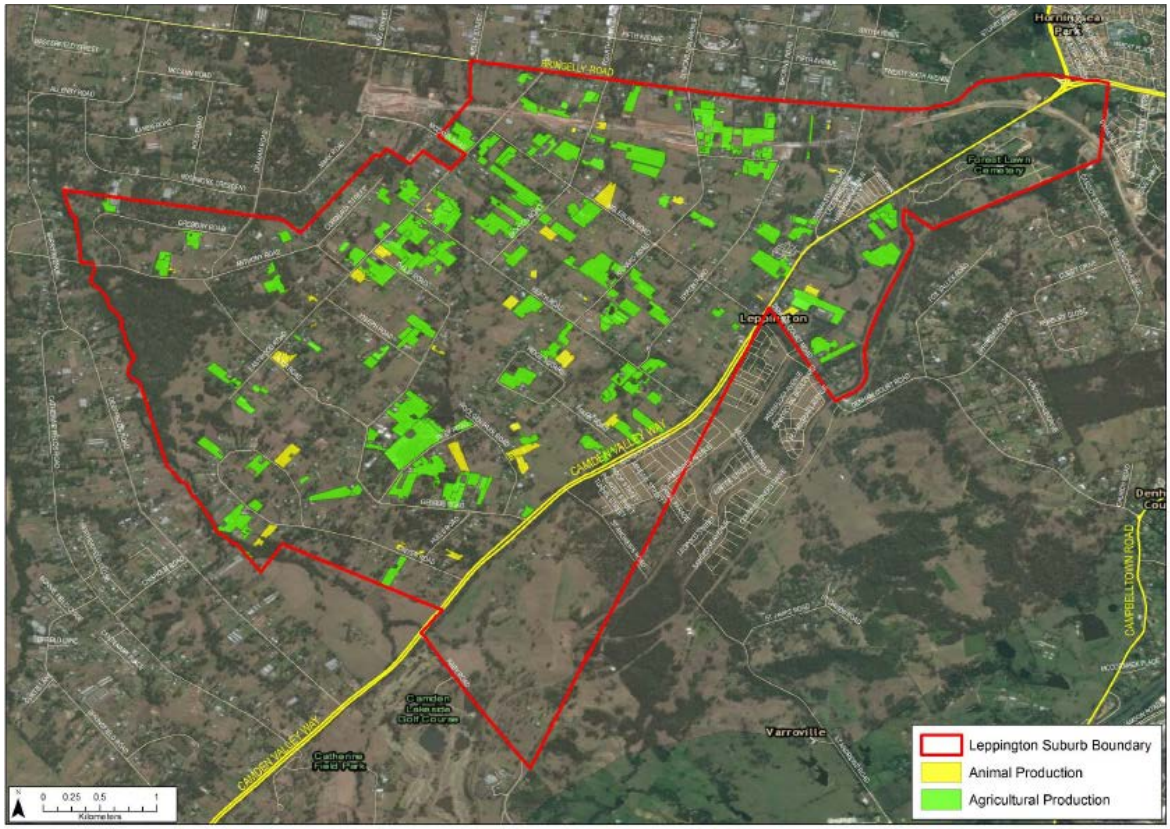

Figure 1. Map of the Leppington area identifying properties registered within the Local Land Services with animal or agriculture production.

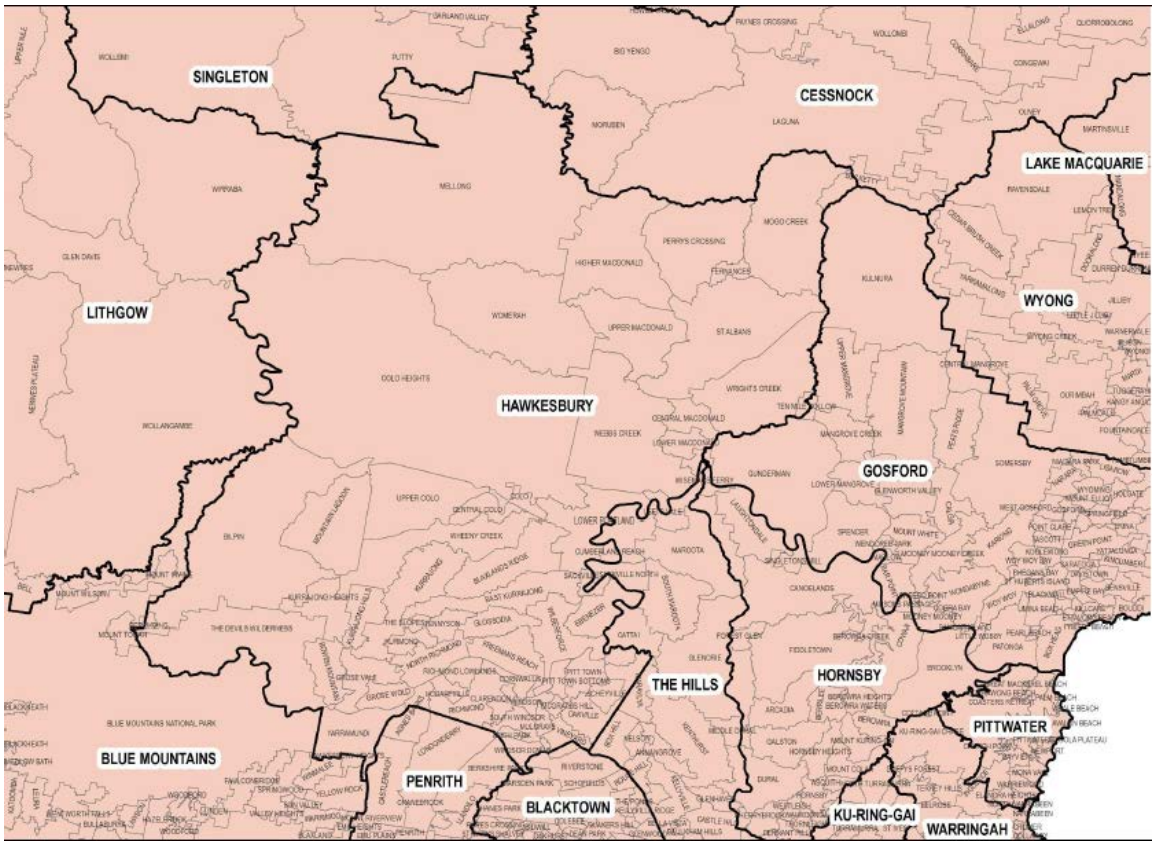

Figure 2. Map of the Hawkesbury area.

3.2. Visits to the two case study regions

A visit to each of the case study areas was conducted in July – August 2016. On the 11th of July 2016, Rob Woodgate conducted a reconnaissance/observational visit to the Leppington /Austral area. On the 23rd of August 2016, Rob Woodgate and Mel Taylor visited the Hawkesbury area with the Local Land Services. The overall aim of these visits was to gain an overall knowledge about the type of landholders and stakeholders present in the case study areas and the factors to consider for the selection and recruitment process for the landholder interviews. A description of these visits follows.

a. Visit to Leppington/Austral area:

Rob Woodgate conducted a driving reconnaissance concentrating on the general area including parts of Cowpasture Road, Bringelly Road, Edmondson Avenue and several associated roads, streets and avenues. Smallholder presence was evident. Along Cowpasture Road alone (after turning off Camden Valley Way) several animal operations were observed, and animals seen included sheep, cattle and poultry, with some goats and some geese roaming alongside the road.

Other key general findings were:

- There is a large amount of land redevelopment (townhouses etc) in the region in general.
- There are several larger scale poultry enterprises (including in 11th Avenue).
- There are several reasonable scale commercial horticulture operations. Some potential large scale commercial horticulture contacts, with local relevance, include Leppington Speedy Seedlings, Barden Produce and Charlcon Seeds.
- Sheep manure, garden compost etc private sales were offered.
- Leppington Farm, Pet and Hardware Supplies was a visible local CRT reseller.
- Other producer support operations included Farm Machinery, Truck and Tractor Mechanical Repairs workshop.
- Bringelly Pork and Bacon was a local pig meat outlet.
- Renbury Farm Animal Shelter is a local facility for domestic animal boarding and housing (further research indicated that this shelter is ceasing operation in 2017).
- There is a small local shopping centre, including a pharmacy and post office, and the area is also close to Carnes Hill Market Place major shopping centre.
- There is evidence of several ethnic groups within the area, for example Sikh Mission Centre and Czechoslovakian Country Club.
- Unity Grammar College is a major local school.
- There is a Leppington train station.

Subsequent internet searching highlighted other potentially relevant stakeholder contacts:

- Leppington Veterinary Clinic
- Rossmore Vet Hospital
- Leppington Valley Farm
- A-28 Aus Import and Export Pty Ltd (Halal Meat Supplier)
- Campisi's Continental Butchery, Grocery Shops, Restaurants
- Austral Nursery
- Al Boustani Greenhouses and Seeds, Austral
- Greenhouse Supplies and Services, Kemps Creek
- Greenhouses Online
- There also appears reasonable horticulture (e.g. plant sales, landscape gardening supplies and services) and livestock and poultry sales on Gumtree.

b. Visit to Hawkesbury area:

On the 23rd of August 2016, Rob Woodgate and Mel Taylor visited the Local Land Services Demonstration Farm in Richmond and met with Rob Bowman (NSW DPI), Peter Conasch (Greater Sydney LLS), Matthew Plunkett (Greater Sydney LLS) and Nicole Schembri (Greater Sydney LLS), to discuss potential industries of interest in the Hawkesbury area to be included in the study. The potential industries (and organizations) discussed to be of interest in the Hawkesbury area include:

- Turf production (NSW Turf)
- Floriculture (cut flowers; field or igloo based enterprises; some Chinese producers)
- Nursery plant production (Nursery and Garden Industry Association)
- Fruit production (some orchards, visitor picking, farm stays)
- Vegetable production (current National Vegetable Extension Network involving NSW; range of major producers and other relevant groups and associations)
- Mushroom production (Mushroom Growers Association)
- Vineyards
- Horses
- Poultry (NSW DPI Poultry Meat Development Officer)
- Livestock smallholders (variety of properties and stock and supporting businesses (e.g. stock feed suppliers); mobile butchers)
- Bees

In this area, there could be a range of sizes of enterprises of interest – hobby, semi-commercial and large scale commercial. It was also identified that in this area there are a range of farmer's markets

including the Hawkesbury Harvest network. At this meeting feral animal populations were identified as a significant biosecurity risk to be considered.

For both case study areas, a range of local news and marketing publications were identified, which should be considered when designing any targeted extension strategies for landholders and biosecurity. Another consideration is the diversity of cultural groups in both areas and the potential for a significant generational influence on the population (e.g. older generations very interested and experienced in traditional stock and horticulture production, some proportions of the younger generations less so).

3.3. Stakeholder analysis

Stakeholder analysis is an approach for gaining an overall understanding of how a system works, identifying key stakeholders and assessing stakeholders' interests in the system and how these stakeholders can influence characteristics and functioning of the system. The overall purpose of a stakeholder analysis is to: 1) Provide access to knowledge and information; 2) Understand values and positions; 3) Understand networks of influence; and 4) Build support for decision-making. As such, using a stakeholder analysis approach in the current project provided valuable information on stakeholders' issues of concern relevant to peri-urban biosecurity, and their perspectives on how to improve biosecurity engagement of smallholder peri-urban producers.

The aims of the stakeholder analysis in the current project were to:

1. identify and map key biosecurity stakeholders in the two case study areas;
2. identify stakeholders' issues of concern in relation to peri-urban biosecurity; and
3. identify current communication networks of stakeholders with peri-urban landholders.

The main steps in conducting a stakeholder analysis were:
Step 1. Identifying stakeholders and issues of concern
Step 2. Mapping stakeholder influence and interest on the issues of concern
Step 3: Analysing the stakeholders' interests and influences, and stakeholder relationships

To achieve the aims of the stakeholder analysis in this project, the following preliminary activities were conducted:

- Review of the report of the Greater Sydney Biosecurity Forum 2016 to identify stakeholders and priority biosecurity threats.

- Human ethics application was obtained through Charles Sturt University Faculty of Science Low Risk Human Research Ethics Committee on 18th of August 2016 and Macquarie University Human Ethics Committee on 17th of October 2016 (approvals letters in *Appendix 1 and 2*).

- Project workshop on the 24th August 2016 involving the research team and DPI and LLS staff to:
  - Gather information for the stakeholder analysis process – identification of stakeholders
  - Discuss the two case study areas in terms of 'who is there', priority areas and preliminary stakeholder contacts.

- *Initial stakeholder lists and maps:* During the project workshop and subsequent discussions two stakeholder maps were created, representing livestock (Figure 3) and horticulture (Figure 4) small landholders. It was decided to use the type of landholder (livestock vs. horticulture) instead of the region (Leppington vs. Hawkesbury) for the stakeholder analysis, given the differences identified between livestock and horticulture stakeholders.

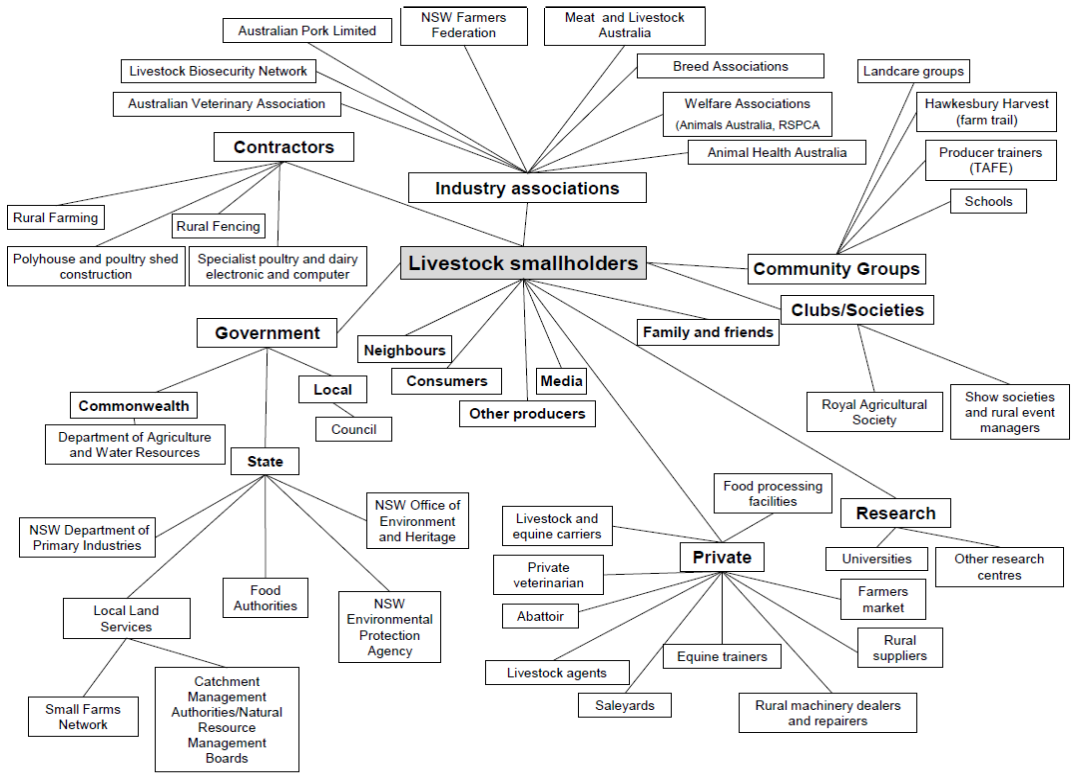

Figure 3. Stakeholder identification map representing stakeholders having an interest in and/or influence on livestock smallholders and biosecurity in the Greater Sydney peri-urban area.

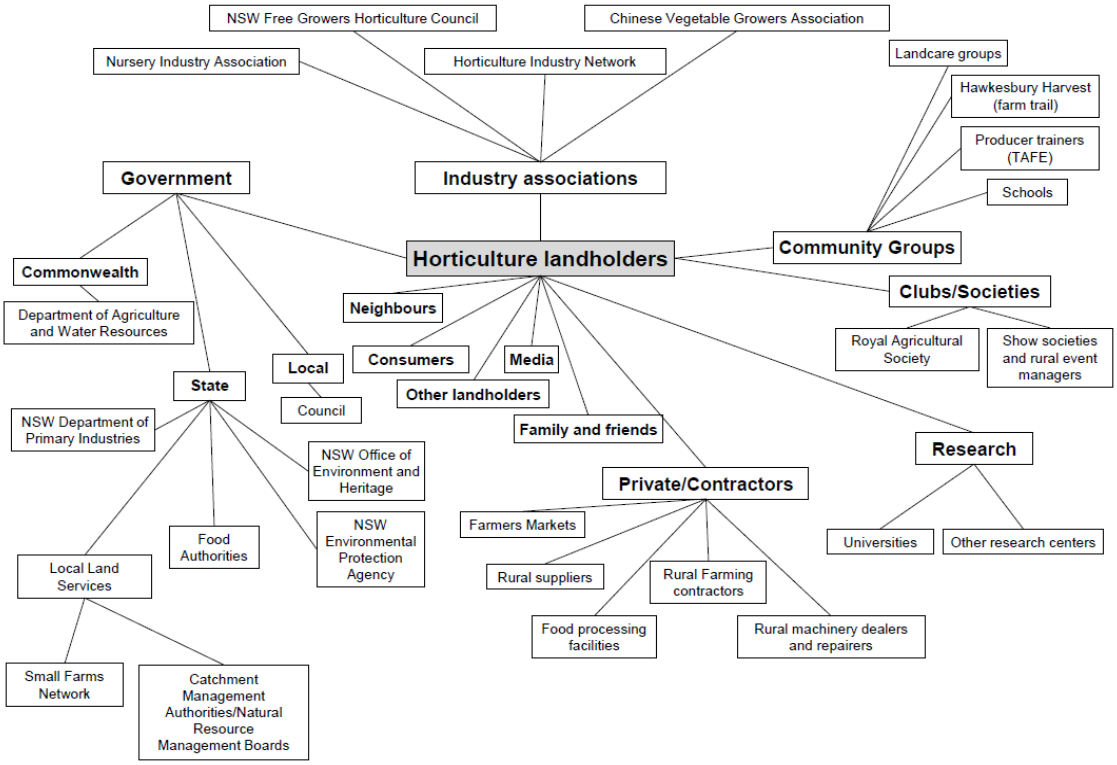

Figure 4. Stakeholder identification map representing stakeholders having an interest in and/or influence on horticulture landholders and biosecurity in the Greater Sydney peri-urban area.

- *Attendance at the AUSVEG Grower Biosecurity Workshop:* On the afternoon of Wednesday 21st September Dr Taylor attended the AUSVEG Grower Biosecurity Workshop held at the LLS Demonstration Farm in Richmond. Speakers included representatives from AUSVEG, NSW DPI, Quantal Bioscience and Applied Horticulture Research (see Figure 5). This workshop provided an excellent opportunity for networking with, typically larger, local producers and other professionals in the area. It was also helpful for the acquisition of subject-matter knowledge for the researcher; specifically plant pests and diseases of note in the local Hawkesbury region and recommended practices and approaches for managing these. In addition, through listening to questions and subsequent discussions, it was possible to identify some understanding of local landholder awareness, concerns, and limitations with regards to managing these pest and diseases. Dr Taylor was also able to meet one of the stakeholders identified for the stakeholder mapping interviews and gain advance agreement for an interview.

Figure 5. Brochure of the AUSVEG Grower Biosecurity Workshop conducted at the Local Land Services Demonstration Farm in Richmond on the 21st of September 2016.

The preliminary activities provided sufficient background information to commence the stakeholder interview process as described below:

a. Recruitment of stakeholders: From the initial stakeholder lists and maps a cohort of key stakeholders, shown in Table 1, was developed. Twenty-two individuals were identified, representing twenty stakeholder organizations.

b. Development of semi-structured interviews for stakeholder consultation: A semi-structured interview schedule was developed to gather information on stakeholder involvement with livestock and/or horticulture small landholders, their perceptions on the biosecurity issues relevant to landholders, their interest and influence on practices of these landholders and their connection with other stakeholders. The interviews also investigated stakeholders' perspectives in relation to the 'shared responsibility' principle. The interview questions are shown in *Appendix 3*.

c. Conducting stakeholder interviews: Interviews were conducted by phone or face-to-face, according to stakeholder preferences and time availability.

3.3.1 Stakeholder interviews

Fourteen of the 22 individuals initially listed as potential stakeholders, participated in the stakeholder interviews, as indicated in Table 1. The stakeholder interviews conducted included representatives of all categories included in the initial list. The reasons for non-participation were the lack of response from the individuals after several attempts of contact by the researchers or the cancellation of the interviews due to workload. Most interviews were conducted by phone with three interviews conducted face-to-face, during the period from November 2016 to March 2017.

Table 1. Stakeholders included in the stakeholder identification and interview process of the project.

Category	Code	Organization	Role	Livestock / Horticulture	Interviews
Government	G1	NSW Department of Primary Industries- Biosecurity and Food Safety Compliance Unit	Senior Inspector	Both	YES
	G2	NSW Department of Primary Industries	Greenhouse and ornamentals industry leader – Plant pathologist	Horticulture - Green house production	YES
	G3	Local Land services	Biosecurity Officer Veterinarian	Livestock	YES
	G4	Local Land services	Senior Land Services Officer (Horticulture)	Horticulture	YES
	G5	Camden Council	Acting Team Leader – Noxious Weeds Officer	Both	YES
		Hawkesbury Council	Regulatory Officer /General Manager	Both	NO
Community group	CG1	LLS – NRM (environment) and regional Landcare Facilitator	Regional Landcare Facilitator	Both - more livestock	YES
	CG2	Hawkesbury Harvest (Farm trail)	Treasurer	Both	YES
Industry	I1	NSW Farmers' Association	Director of Cropping and Horticulture	Livestock	YES
	I2	Nursery and Garden Industry Association	Development officer	Horticulture	YES
		Chinese Vegetable Grower's Association	President		NO
Private- saleyards	P-S	Saleyards	Manager	Livestock	YES
Private - Vets	P-V1	Private Veterinarian (Leppington)	Veterinarian	Livestock	YES
	P-V2	Private Veterinarian (Hawkesbury)	Veterinarian	Livestock	YES
		Private veterinarian(Leppington)	Veterinarian	Livestock	NO
Private - Rural suppliers		Rural supplier (Leppington)	Representative	Livestock	NO
		Rural supplier (Hawkesbury)	Representative	Livestock	NO
	P-RS	Rural supplier Horticulture (Leppington)	Seed Manager		YES
Other producers	OP	Other producers	Two livestock producers	Livestock	YES (1pig)
			Two horticulture producers	Horticulture	NO

3.3.2 Analysis of stakeholder interviews

A thematic analysis of issues was conducted on the qualitative data gathered from the stakeholder interviews. This analysis was conducted using the four key categories/themes covered in the semi-structured interview schedule *(Appendix 4),* these being:

1. General information: This category included responses to question 1 to 8 of the semi-structured interview, which focused on the level and type of involvement of the stakeholder with peri-urban smallholder landholders, the information on these landholders held by the stakeholder and the registration requirements.
2. Communication methods and extension programs: This category included questions 9 to 13 of the semi-structured interview, which aimed to gather information on the level of communication of the stakeholders with peri-urban landholders, the communication methods used, the current extension programs for these landholders and the perceived effectiveness of these programs.
3. Biosecurity risks: This category included responses to question 14, in relation to the key biosecurity issues and risks involving peri-urban smallholder and affecting animal and/or plant health.
4. Interest and influence on peri-urban smallholders: This category included questions 15 to 17 of the semi-structured interview. These questions aimed to investigate the level of interest that stakeholders had on peri-urban smallholders and their perceived influence on their practices. In addition, the reasons driving the interest and influence levels were also investigated.

Initially stakeholder interviews were transcribed and responses from participants were allocated to each of these categories (Individual summaries are provided in *Appendix 4)*. Data in relation to category one for each individual stakeholder was summarized and is presented below. For information in relation to key categories 2 to 4, and within each category, data was analysed thematically using principles of grounded theory. In summary, data was read and re-read and open and axial coding were used to identify common descriptors and themes and their interrelationships (Corbin & Strauss, 1990; Miles & Huberman, 1994). A summary of the emerging themes for each category with supporting stakeholder quotes is outlined below.

General information

- ***Level of involvement with peri-urban smallholders:***

The type of involvement with peri-urban smallholders differed according to the category of stakeholder, with the most common purposes reported being:

For government agencies:

- Monitoring of compliance, investigations and enforcement of regulations
- Landholder training on land management and on-farm best practice

For service providers (private):

- Provision of preventative (frequently over the phone) and emergency animal health services
- Provision of advice
- Supplying agricultural products
- Trading animal services

For industry or producer organizations:

- Provision of advice on technical aspects and industry linkages.
- Landholder training on best practice programs
- Establish alternative market channels

The proportion of the stakeholder business that was devoted to peri-urban smallholders also differed by organization and the specific role within each organization; however, overall the proportion represented by peri-urban smallholders was significant, with most stakeholders reporting this proportion to account for over half of their business. In relation to livestock, the district veterinarian from the Local Land Services reported smallholders to represent approximately 60% of their callouts, with the local saleyard reporting a similar proportion of clients in their database being smallholders. The rural supplier interviews indicated that 95% of their 6,000 to 7,000 clients would have less than 10 ha. The private veterinarian in the Hawkesbury area reported a third of their clients to be smallholders with 1 to 5 acre plots, with the frequency of service being very diverse, from monthly to twice every year; however, the visit could be for their pets and not for the livestock. The organization least directly involved with peri-urban smallholders was the NSW Farmers Association.

- ***Description of peri-urban smallholders:***

In general, the key characteristics identified by stakeholders that could define peri-urban smallholders were:

- Small land size (1-5 acre lots)
- Lifestylers and hobby farmers
- For livestock:
    - Mixed livestock species with low number of animals (sheep, goats, pigs, poultry, cattle, horses)
    - Home consumption, low frequency of animal trade
    - High proportion of properties with horses
    - According to the private veterinarians the proportion of properties with pigs is declining

- Diverse cultural background
  - Livestock: mainly Maltese, Italian, Greek
  - Horticulture: Chinese (vegetables), Maltese (vegetables), Lebanese (vegetables) Cambodian (flowers and vegetables), Vietnamese (vegetables), Korean, Arabic, Italian (flower growers)
- Most reside on the property
- A proportion would not have a Property Identification Code (PIC)

- ***Registration requirements:***

  - The only official registration is the one with the Local Land Services. This registration is based on the Property Identification Code and on those who are ratepayers.
    - Rates are paid by those owning land larger than the minimum rating area. The minimum rating area differs by region (generally 10 ha in coastal and tablelands areas and is larger (40 ha in the Western Region and 20 ha in some parts of Murray and Riverina Regions) in more western regions; www.lls.ndw.gov.au).
    - For horticulture smallholders, most have a land size under the minimum rating area
  - No register with the Local Councils
  - No register with NSW Department of Primary Industry
  - NSW Farmers Association has a recently created Small farmer membership
  - Hawkesbury Harvest collect information on Farm Gate members

Biosecurity risks

The main theme identified in relation to biosecurity risks posed by peri-urban smallholders was the lack of understanding or knowledge of requirements in terms of land management or animal management. This risk was perceived to be similar for livestock and horticulture smallholders.

> *They don't know what they don't know.* (CG1)

> *It can be* [lack of knowledge of high risk practices], *particularly - and it comes down to the demographic you're dealing with.* (G1)

> *Those people in a peri-urban area, they are not real farmers. As I mentioned before they are actually hobby farmers, and they have very little knowledge of animal management.* (G3)

Some don't know about requirements. They have the land and they see sheep at a local market. Animals usually end up with gastro bug and half will die. (PV2)

In addition, other biosecurity risks identified, which are all linked to this perceived lack of understanding and knowledge of land and animal management, were:

Low adoption of biosecurity practices: Among stakeholders interviewed there was a general perception that the level of adoption of biosecurity practices was low. Several reasons were mentioned for this low adoption, such as the low awareness of requirements, the conscious decision of not implementing biosecurity, due to not perceiving any return to investment, or the insecurity about land and development for some landholders.

They usually adopt it [biosecurity] *if they've got a large vet bill. That seems to be a good motivator for adopting it next time.* (PV2)

I think there'd be obviously people that know that they're doing it wrong, that they're selling and not getting any NLIS transfers or anything like that. They're a little bit blasé with the systems and procedures in place. I suppose it's like anything, there's always an element in any industry that you'll always get people like that, that are trying to press the boundaries, I suppose, with everything. (PS)

The biggest issue I come across is just getting the message out there, getting people to understand the importance of biosecurity. There's not a lot of emphasis put on it by a lot of the peri-urban landholders. You see the larger landholders contribute because it's in their best interests and it contributes to their bottom line and it helps them remain profitable, but the smaller ones, they're just not carrying it in a high regard that it's offering any great return for good biosecurity outcomes. (G5)

Yeah and because of all the insecurity around what will happen in the next 25 years in terms of what land is converted, lots of those landholders aren't interested investing, aren't interested in building a business and probably are not conducting their stewardship as they would and even in the context of biosecurity simply because they're holding out for the day when they'll just liquidate it and move out. (CG2)

Low veterinary contact: In relation to livestock smallholders, stakeholders believed a biosecurity risk is the low veterinary contact among this demographic of producers. Stakeholders perceived the costs to be a driver of this low contact, with the private veterinarians indicating that most contact occurs initially for their pets instead of the livestock and this contact is likely to be over the phone.

> *Many just sell sick stock rather than call a vet.* (PV1)

> *We've probably got five or six that we would see every month. They're our high maintenance hobby farmers. Then some of our others we probably see them at least twice or three times a year. But it will be for a variety of pets. Because a lot of them also have their dog and cat. So they'll often talk to us about their livestock when they come in and they'll bring us photographs to show us and things like that. So we do a lot of preventative stuff on photographs unfortunately. Because not a lot of them want to pay the house call fee to get us out and we don't always have the staff to run out.* (PV2)

> *I mean we're quite happy to give the advice on the phone. Because there's no one else who will actually give them the advice and a lot of farmers are every grateful for that advice.* (PV2)

> *No, I doubt very much whether they would take them to the vet or get a vet out for them because once again, that's a very, very cheap lean operation… So I'd say if their pig was sick, they would probably just shoot it and bury it or they would eat it.* (OP)

Lack of Property Identification Code: According to stakeholders, it seems there is a high proportion of peri-urban landholders who do not have a PIC for their property, with the lack of awareness and the unwillingness of being registered, as the reasons for this non-compliance issue. An additional issue impacting registration of smallholders is the lack of requirement of registration with the Local Land Service for those properties with a land size of less than 10ha.

> *Only I can tell you if I find from our system the PIC number, who has the PIC number. Then that will be the only case we can give you, but this is not a real number….. Probably not even 50 per cent I believe….if someone doesn't want to do the right thing, they're not going to apply for a PIC.* (G3)

> *Movement's huge to follow though because we learnt that a lot of our clients don't have PIC*

numbers. So we've been working with the DPI and local vets to give out PIC forms to the clients and information about it to try and get them to get a PIC number. (PV2)

So there have been some attempts, but it's still - I don't think there's a complete proper census of who's there and where they are and how big they are and all that sort of thing. As I said, it's quite dynamic. It changes. It is changing all the time. (G2)

Lack of understanding of swill feeding: Another biosecurity risk identified was the lack of understanding of swill feeding, which applies for those smallholders keeping pigs. The quotes below show two of the reasons suggested for this lack of understanding, these being feeding scraps as a family tradition linked to ethnic background and the lack of effective extension and education strategies for those people keeping pigs as pets.

My concern around these guys is all about the [swill] feeding. They all - none of them are really keen on buying pellets, like they don't buy a pre-prepared feed. They're very much into feeding scraps. Those scraps are - can be quite legitimate, like bakery waste and vegetable waste and like a [biscuit] meal or something like that that they pick up. But - and some of them I'm sure are legit in what they do and they care for what they do but I just know how things go and I know that some of them don't care. ….They come from an ethnic background that they're used to feeding their pigs anything they like and I dare say they do the same thing here.(OP)

Pigs, pigs are becoming trendy these days as pets, which is rather unfortunate because from a compliance perspective, because you've got to look at mechanisms to get information out to those people and what they can and can't feed their pigs primarily.(G1)

Online trading: Trading animals online was also identified as a biosecurity risk, jeopardizing the ability to trace animal movements, which would be crucial in the event of an emergency animal disease outbreak.

Yeah. I went to one place the other day and she had 10 baby lambs and goats that she'd picked up from Gumtree online, the side of the road in the back of a truck. (PV2)

They bought their sheep from Gumtree. So that's why we could not track those animals, where they're from, because those people - they couldn't tell us where they're from or who was the owner, or something like that. So this is a major issue for - especially in Sydney or urban, peri-urban areas, to lose their traceability. If something - an emergency disease happened, it would be a nightmare. (G3)

The ethnic diversity of peri-urban smallholders, including those from a non-English speaking background (NESB): The ethnic diversity among peri-urban smallholders in the Greater Sydney area was seen as a significant biosecurity risk. Some stakeholders believed that family traditions in the country of origin, the limited English proficiency and the low education level are associated with non-English speaking backgrounds, which impact on the practices conducted on-farm and their engagement with government and industry stakeholders.

> *But they don't care because they have already a practice learned from their previous country, or from the other country. That's why they don't feel that it should change to a new management system. When this is the case, we feel it's a bit tricky.* (G3)

> *A lot of them can't read the label. That's been a big issue, because legally pesticide labels have to be written in English, and a lot of these people can't read English. A lot of them can't do the mathematics to work out how much product they need to use, so you can get under-dosing, so the biosecurity issue is still an issue.* (G4)

In addition, the following specific practices or situations, which are linked to the lack of management of land, were also identified as significant biosecurity risks:

The spread of weeds: The presence and spread of weeds were identified as issues posing a biosecurity risk. The lack of understanding of the risk of spread when travelling or the lack of weed management when changing land ownership were seen as potential issues contributing to the spread of weeds.

> *But then within the country itself seems to be a little bit less understanding or a little bit less prevalence of communication about travelling through borders. Travelling through regions and how the disease and pests that we already have can spread or that may be coming through this one tiny crack and then end up spreading because there wasn't that understanding on the inside.* (CG2)

> *We've been getting large areas of land purchased by developers, and they just let it sit and do nothing. Sometimes it's very hard dealing with such large corporations that really aren't interested in controlling weeds. They're just waiting for the green light for the bulldozer to go through and lay the concrete.* (G5)

Neglected orchards and areas: The presence of neglected orchards was seen as a biosecurity issue by stakeholders involved in horticulture, as these would contribute to the spread of pests, disease and

weeds.

> *From a broader perspective, definitely production agriculture or production horticulture in the Sydney basin faces real problems with people managing backyard orchards - or more to the point not managing backyard orchards. Or people that have had production orchards in the past that are no longer undertaking production therefore they neglect their trees and they become havens for pests, disease and weeds.* (I1)

> *It all comes down to how you talk to people and relate to people and communicate with them. If you just walk in there with a big stick and say, well I'm going to give you an order under the Act to remove this orchard and if you don't, we'll take you to court and charge you the fee and all that sort of stuff, that's available to you if you need it, but if you work through the process…and achieve an outcome with that person going away saying, what the government did for me in this stage, they resolved their problem and I've got a better result as well and I wish I'd done it years ago.* (G1)

Other biosecurity risks identified by some stakeholders were the trade of animals between properties, the introduction of seeds from overseas and the lack of public knowledge on biosecurity risks.

Communication methods and extension programs

Participant stakeholders reported a wide range of communication methods used when communicating with landholders, from traditional methods, such as newsletters and workshops to new methods of communication, such as email, Facebook, YouTube and other social media tools; and reported their willingness to engage with smallholders.

> *Collectively they do own an awful lot of land in our region. Cumulatively they're a group of landholders who could have a very big impact on how that land is managed so we want to engage with them.* (CG1)

Each of the organizations represented by the stakeholders interviewed used several communication methods for disseminating messages. Table 2 provides a summary of methods of communication and extension programs used by stakeholders for disseminating messages and communicating with smallholders. Although several methods of communication were used, most stakeholders reported not having any extension program in place targeted to peri-urban smallholders, with activities conducted and messages delivered being for a broader range of landholders.

Most of our extension programs are generalised. But sometimes we do involve the smallholders. But in our case actually we normally don't separate them as a smallholder…- because, technically we are working for the ratepayer. (G3)

Effectiveness

Overall, there was an agreement among stakeholders of face-to-face communication methods, such as one-on-one discussions, field days and workshops, being the most efficient methods for increasing engagement of stakeholders and their awareness of specific topics or practices. All agreed that programs are effective for those producers who are engaged.

The nice thing about that demographic is once you turn the light on they're really keen to learn. I guess time constraint is a big thing too because they're all busy and working… (CG1)

There is a high level of communication, and I find that that's probably the best - the face-to-face, on-farm - I call it on-farm education is my best way of getting I call it voluntary compliance, for them to actually comply with their legal requirements under the Act. (G5)

However, the level of engagement of peri-urban smallholder producers was perceived as somewhat limited, despite stakeholders using several methods of information delivery for increasing smallholder engagement.

I mean the question around that is whether they're actually linked into the networks that industry normally links into. That's the well-documented barrier to these peri-urban landholders actually being engaged or understanding the risks from advisory perspective that someone in production horticulture or agriculture feels because they have a cost associated with it. That's dead animals or animals that they can't sell, slower growth rates, those sorts of things. How do you actually reach them is the key challenge… (I1)

There was a general perception that contact from smallholders increases after communication campaigns, through government and industry organizations and using traditional or electronic and social media delivery methods. However, some stakeholders believed that the effectiveness of electronic platforms is still difficult to be evaluated or measured given these methods have only been used for a short period of time in comparison to other methods.

But definitely through social media is an effective way to communicate to people I believe. That's why we started this social media platform, to communicate to the small landholders, and we

believe everyone has a mobile phone now. (G3)

Table 2. Information on communication methods and extension programs used by participant stakeholders for communicating with peri-urban smallholders.

Organization	Communication methods	Extension programs
LLS – Natural Resource Management / Landcare	• Using existing networks: Equine Landcare network, Landcare networks, Fox control program. • Email, local paper	Equine Landcare network Small Farm Network (planning stages) Fox control program
LLS – District Veterinarian	• Increasing awareness of requirements • Electronic: newsletter, website, Facebook, Twitter, LinkedIn, YouTube. • Distribution of information through: • - Landcare, NRM groups, council, grower and ethnic associations • - Saleyards and private veterinarians (printed materials)	Programs support ratepayers – most work is generalised. Information is produced in different languages
LLS – Horticulture – Land service officer	• Face-to-face (declining) • Demonstration farm et Richmond – Farmer groups based on language/ethnicity (e.g. best practice on irrigation, soil management and biosecurity) • Delivery methods: paper based (fact sheets, pamphlets, posters), DVDs, electronic (SMS, YouTube, Podcasts)	Regional capacity building
Local Council	• Face-to-face communication/inspection (risk based selection of properties) • Website • Mail-outs with rate notice	No specific programs for smallholders Weeds Action Project (State Government funded)
NSW DPI (Biosecurity and Food Safety Compliance Unit)	• Communication are for monitoring compliance • Through industry organisations and media unit • Methods: one-on-one, verbally and written communication	No specific programs
NSW DPI (Plant Pathology)	• Education and training • Internal DPI workshops (offering lunch) and through LLS and at grower meetings (targeted to specific growers) • Newsletters, fact sheets, twitter, etc	No specific programs
Saleyard / Livestock Agent	• Communication about the sales: Webpage, Facebook • On-farm inspections of livestock	No specific programs
Rural Supplier	• Phone • Monthly newsletter • Occasional farm visit	No specific programs
Private veterinarian	• Face-to-face during consults • Newsletters, Facebook	No specific programs
Nursery and Garden Industry Association	• Magazine and email • Website and Facebook	No specific programs
NSW Farmers Association	• Monthly newsletter • Weekly update for production agriculture	Asian gardeners – extension on chemical safety (in the past) No specific programs

Challenges

The overall challenge identified by stakeholders was their lack of engagement with peri-urban smallholders. The challenges discussed aligned with the biosecurity risks identified and previously

presented. The following three main themes in relation to factors driving this lack of engagement were identified:

1. Lack of a comprehensive and up to date register of peri-urban smallholders

Stakeholders identified the difficulties in reaching peri-urban smallholders using current government registers (Local Land Services), given a proportion of them would not have a PIC or have a land size smaller than the minimum rateable area. Similar concerns were reported in relation to industry networks and registers, with a significant proportion of smallholders not being part of industry organizations. In addition, stakeholders identified the lack of contact emails for smallholders to be an important challenge, given the increased use of electronic methods of information delivery.

> *We make a list and we send a letter to the people who don't have any PIC. So we have a list but it's not a perfect list. It's only an outdated list.* (G3)

> *They're not rateable land, either, because they're all under that 10 hectare size, so they're not – there's no accountability for them to be in communication with the Local Land Services to regulate any of that side of things with the stock diseases and the plant health and the like.* (G5)

2. Characteristics of peri-urban smallholders

Socio-demographic characteristics of some groups within peri-urban smallholder producers in the Greater Sydney area were identified as posing a challenge for effective communication between stakeholders and landholders. The main factors contributing to this challenge were the diverse cultural and ethnic background of smallholders, including those with non-English speaking backgrounds. Some stakeholders reported using different languages when delivering messages; however, this was identified as a significant challenge by all stakeholders.

Literacy and education levels were also identified as a challenge in some groups of the peri-urban smallholder sector, with the delivery of clear, easy to understand messages being crucial for improving the effectiveness of any communication used.

> *The fact that they may be able to speak English, they may not be able to read or write it. So what information they're getting and how they're getting it can impact on their knowledge. But generally, you will find that there is more issues that relate to cultural influences than anything else and it's how you deal with those from our perspective, to get the right result, but not compromise the integrity of the biosecurity management system.* (G1)

Some stakeholders believed there are smallholders with low interest in learning, who do not want to

be part of the industry and do not engage with any education or training activities or industry events.

> *…there's a lot of people that don't go - they don't go to the different DPI events or they're not interested in different industry events. They're not really industry engaged because they're not part of the industry. They do it – it's just something that they do in their own backyards*. (OP)

This poses a challenge as these smallholders are perceived to be those with poorer biosecurity practices and to whom the communication activities should be targeted. These smallholders are also perceived to be those with a low level of trust towards government authorities. In addition, the lack of time of producers was also identified as a potential challenge.

> *Between us we're doing, putting a lot of content out. I often think that am I actually hitting anything? Is anybody out there? But then something will go out in one of our newsletters and then I will get response from somebody I thought was just not paying any attention whatsoever. So they sit in the background. They let (identifier removed) do things on their behalf and they very rarely actually engage. Because they're too busy doing what they have to do.* (CG2)

3. Limited resources available in government and industry organisations.

The decline in funding in government resources for education and extension activities was reported to lead to a decreased and inconsistent delivery of these activities.

> *We've got processes. We've got all these things in place, but we don't have a lot of people on the ground understanding and working with growers on biosecurity.* (G2)

This decline in funding has reduced the number of field staff, which has a significant impact on the ability of government agencies to develop and implement specific programs for smallholders. Similarly, for industry organizations, given activities are funded by levy payers, who are mainly mainstream/commercial producers, the focus of these activities are not smallholders.

A potential strategy for maximizing resources available is for different agencies to integrate their activities.

> *It's, yeah, it's Band-Aid solutions without good, long strategic investment and that's the key thing if they're serious about shared responsibility. You've got to get people to sort of start understanding it, valuing it and committing. Then you'll start to see some serious change where people won't just be so focused on transport, health, education and the cost of living. It'll start*

to come down to the environment industry and biosecurity and what can they actually do to help and make a difference. (I2)

The DPI stakeholders reported a significant network and collaborations with other agencies, such as LLS and industry groups, to improve engagement with smallholders. Private veterinarians reported limited involvement with education or information sessions with smallholders, due to these activities not being part of their business and the fact that other organizations have not requested their engagement with these activities.

Interest in and influence on peri-urban smallholders

Figure 6 is an interest – influence grid of the stakeholders' reported level of interest in practices of peri-urban smallholders and their perceived level of influence on the practices of these landholders. Stakeholders representing Local Land Services, Landcare and the NSW DPI, including district veterinarians and horticulture services, all reported a high level of interest in the practices of peri-urban smallholders. However, the perceived level of influence varied from *Low-Moderate* to *High*. The high level of interest was due to the smallholders being perceived as a high biosecurity risk and also the willingness to support smallholders improving their knowledge and understanding of land and animal management. Interestingly, the LLS-Landcare representative indicated that for those who are engaged with LLS activities, the influence is high; however, overall the influence would be moderate given the number of landholders compared to those that actually engage with the activities conducted. The LLS district veterinarian reported that their influence is due to their involvement and relationship with the saleyard operators and livestock agents and the private veterinarians. Their perceived influence is in relation to animal movement practices and recognition of diseases. One of the NSW DPI representatives indicated that to raise the level of influence the relationship with other stakeholders, such as LLS and industry groups, needs to be strengthened.

Saleyard or livestock agents and rural suppliers are the stakeholders that consider themselves *players* in relation to peri-urban smallholder producers. *Players* are those stakeholders with high levels of interest in an issue and high capacity to influence the issue. The perceived high level of influence of livestock agents was due to the fact that it is very common for smallholder producers to request livestock agents to inspect their animals before the sale. This practice suggests that there is a high level of trust by producers with livestock agents. Livestock agents also reported an indirect influence when biosecurity and welfare issues are identified, as these are notified to the LLS and RSPCA, respectively.

Similarly, veterinarians have a *Moderate* to *High* interest and influence. Although some of the issues identified were the lack of veterinary contact with these producers and the fact that some consultations are actually done over the phone instead of on-farm, veterinarians believe they are very influential to these producers' practices. A private veterinarian in the Hawkesbury area reported an increase in smallholder consultation, due to word of mouth, with initial advice provided over the phone, which in some cases was followed up with discussions at the clinic or on-farm. This suggests that smallholders trust veterinarians and follow their advice.

The local council, with their main involvement with peri-urban smallholders being for compliance and audit purposes, reported having a *Low* to *Moderate* interest but *High* influence on smallholder practices. The reason for the low level of interest was the lack of resources and specific programs targeted to smallholders; however, the influence on those smallholders that they engage with was perceived to be high due to the compliance nature of the interaction. Industry groups reported only a *Moderate* interest and a *Low* influence on smallholder practices given their members are mainly commercial operations and the limited resources available for targeting smallholders.

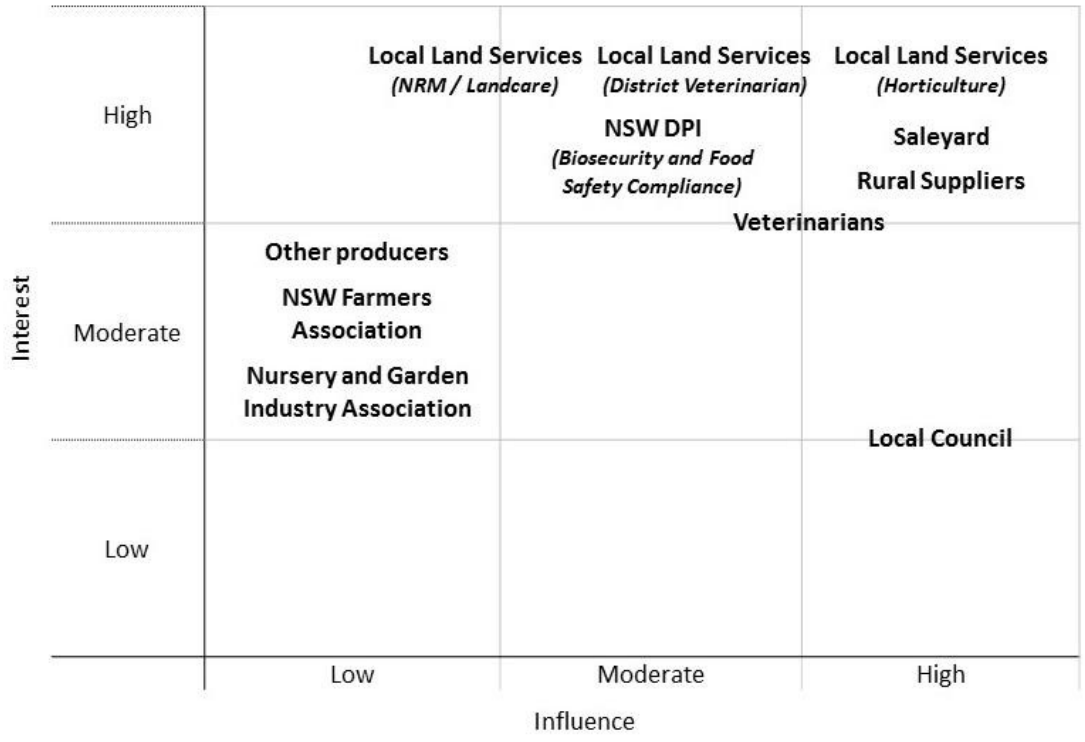

Figure 6. Stakeholder interest and perceived influence on peri-urban smallholder practices in the Greater Sydney area.

3.3.3 Stakeholder interviews – summary of key findings

The key findings in relation to the stakeholder interviews conducted in the project are summarized below.

Theme	Key findings
Biosecurity risk	Stakeholders participating in this study: • Consider low adoption of biosecurity practices such as livestock and property identification, to be considerable biosecurity risk factors. The undocumented movement of livestock via informal means such as Gumtree and between properties, can increase the risk of disease introduction and spread. • Suggest that the key biosecurity risk posed by peri-urban smallholders is in relation to a lack of understanding or knowledge of requirements in terms of land management or animal management. • Indicated that contact with veterinarians was limited, however when smallholders were engaged with veterinary services, this could have a positive flow on effect for engaging other smallholders. • Report that there are smallholders who lack knowledge and have the potential to change and others for whom practices are culturally entrenched and are unlikely to be influenced. • Identified that future land development can result in issues in current land management, particularly in relation to weed spread.
Communication methods and extension programs	Stakeholders participating in this study: • Acknowledge that a reduction in face to face extension services has made it more difficult to engage with smallholders. However, when group based activities are provided they are highly successful in providing education and tools to assist smallholders in managing their properties. • Are generally motivated to work with smallholders and employ a variety of communication strategies to improve engagement. • Consider that the lack of a comprehensive database of smallholders to be a major factor limiting opportunities for engagement. • Suggest that a long term strategic investment involving shared responsibility is required.

3.4 Landholder interviews

3.4.1 Interviews with livestock and horticulture smallholders in the Greater Sydney peri-urban region

The second phase of the project aimed to conduct qualitative semi-structured interviews with 15 to 20 landholders in each of the two case study areas. Participants were to be purposively selected in consultation with the DPI and LLS, during the stakeholder consultation process and using a snowballing approach. Landholders were to be selected so there was a representation of the diversity of livestock and horticulture landholders in the Leppington and Hawkesbury areas.

Human ethics clearance was obtained through the Macquarie University Human Ethics Committee on 19th December 2016 and the Charles Sturt University Human Research Ethics Committee on 27th January 2017 (Approval letters in *Appendix 5 and 6*).

Prior to the interviews, the project research assistant (Annalise McGavin) developed detailed Landholder Biosecurity Management Resource Sheets *(Appendix 7)* for livestock owners, horticulture producers and landholders with both, to be provided to landholders interviewed.

Interviews gathered information on current biosecurity knowledge and practice implementation, attitudes towards biosecurity management and 'shared responsibility', communication networks and values, beliefs and social norms driving these practices. The semi-structured interview schedule with topics and indicative questions is shown in *Appendix 8*. Interviews were planned to be conducted face-to-face.

Challenges encountered:

Significant difficulties in the recruitment of landholders to participate in the interviews were encountered, despite using several recruitment methods and offering $50 gift vouchers to all participants. Initially, some landholder contacts were provided by the LLS representatives, however, due to the low number of contacts available and limited willingness of landholders to participate in the study, this approach was then followed up with letterbox drops, advertisements at agricultural shows and attendance at workshops. In addition, due to concerns about the low number of potential participants in the Leppington area, a decision was made to extend the study area to include the Camden and Wollondilly areas, and all landholders were offered the option to conduct the interview over the phone. For those landholders showing an initial interest in participating to the interviews, numerous attempts were made for arranging an interview time.

More specifically, the following activities were conducted to support recruitment:

- A letterbox drop to 250 mailboxes in the study areas
- Advertisements were placed in local newspapers (The District Reporter, Camden-Narellan Advertiser and Liverpool Champion)
- A project Facebook page was created
- Advertisement and information statements on the project were available at the LLS stand of the Hawkesbury show, and,
- A member of the research team was represented at an LLS field day conducted at the Greater Sydney Demonstration Farm, and study invites with information about the study were provided to attendees.

Materials associated with these activities are provided in *Appendix 9.*

The aforementioned activities did not result in any increase in the number of smallholders agreeing to participate. Efforts were therefore made to recontact those stakeholders that had given an earlier indication that they may be in a position to assist in identifying smallholders, and also those that had not responded to initial contact attempts. The aim of this activity was to request that stakeholders provide an "introduction" to the research team to any identified potential participants.

This activity resulted in potential names of contacts being obtained, all of which were followed up by a member of the research team. Snowball sampling was also employed whereby any individuals contacted were asked if they could forward the research invitation to other suitable smallholders. These activities resulted in an additional five smallholder interviews being completed.

During a research team meeting on the 24th August 2017 in Canberra, with telephone link up with Sarah Britton and Julia Harvey (NSW DPI) and Graham Wilson (LLS), difficulties in recruitment were discussed. The decision was taken to undertake the following activities over a two-week period and then cease further recruitment attempts.

- Identify mobile butchers/small flock shearers in the study areas.
  Outcome: An internet search was undertaken, however, due to the mobile nature of the suppliers of these services, it was not possible to immediately identify those who operated in the target regions. Due to the limited timeframe available to undertake this activity, and the fact that the butchers/shearers were not the actual target but rather the conduit to their clients, no further

action was taken.

- Attend the Farm Biosecurity Planning Workshop in Camden with the aim of recruiting smallholders in attendance.

  Outcome: The workshop was attended by Lynne Hayes. Individual attendees were approached and provided with information on the project and given flyers for both themselves and if requested, any persons that they may know who fit the criteria for inclusion. In addition, flyers were available on the LLS resource table. A brief introduction to the project was presented to the group, with attendees asked to approach Lynne Hayes at the completion of the event should they be interested in participating. The vast majority of attendees did not fit the criteria for inclusion. Two attendees were interested, however despite numerous follow up attempts, neither of these resulted in an interview.

- Advertise via LLS and DPI social media channels.

  Outcomes: The timing of our request for advertising did not coincide with the distribution of the LLS ratepayer newsletter and as such, the invitation to participate was made available through social media. The post reached 210 people, however this did not result in any interviews. The placement of the request for participation on the NSW DPI Biosecurity Facebook page, reached 2424 people, with 55 post clicks. Again, this did not result in any landholders contacting the researchers to participate in an interview.

The research team believes that those who agreed to participate in the research are likely to be those who are more knowledgeable on, and engaged with, biosecurity issues. The data obtained through the completed interviews indicated that saturation had been achieved, with similar themes emerging within the interviews conducted. As such, the sample size was considered to be adequate for a detailed analysis.

The final number of smallholder interviews completed was 21 and comprised the following:

- 6 Hawkesbury Livestock-Only Owners
  - 2 alpaca owners
  - 1 horse owner
  - 1 fattening cattle (‘feed cattle’) owner
  - 1 horses and cattle
  - 1 cattle (horses and chickens)
- 4 Hawkesbury Horticulture-only growers
  - 1 vegetables, fruit and nuts grower
  - 1 pome fruits grower

- 1 fruit and potatoes grower
- 1 turf grower

- 4 Hawkesbury Livestock & Horticulture owners
  - 1 fruit, oats, lucerne, hay, sheep, alpaca and cow grower/owner
  - 1 vegetable, limes, chickens, and alpaca grower/owner
  - 1 fruit, olives, pecans, and beef cattle grower/owner
  - 1 vegetable, fruit and quail grower/owner
- 3 Leppington/Camden/Wollondilly Livestock-only owners
  - 1 pigs/pork owner
  - 1 horse owner
  - 1 cattle, horse, and chicken owner
- 4 Leppington/Camden/Wollondilly Horticulture-only growers
  - 1 tomatoes and snow peas grower
  - 1 tomatoes and cucumber grower
  - 1 stone fruit grower
  - 1 persimmon grower

To ensure anonymity in the analysis of interviews that follows, we refer to the quotes from Hawkesbury smallholder participants as 'NWS' while quotes from Leppington/Camden/Wollondilly smallholders are referred to as 'SWS'. Each quote is assigned a further identifier of 'M' or 'F' to indicate the gender of the participant. This was deemed important as some interviews involved both husband and wife participants.

3.4.2 Analysis of landholder interviews

Similar to the stakeholder interviews, landholder interviews were transcribed and data from transcripts was analysed thematically, during which data was read and re-read and open and axial coding was used to identify common descriptors and themes and their interrelationships (Corbin & Strauss, 1990; Miles & Huberman, 1994). A number of key themes emerged from the interviews conducted with smallholders. In summary, these themes encompass the following broad issues.

1. Animal and/or plant health and disease – smallholder awareness and engagement

- *Awareness of responsibilities to protect plant/animal health*
- *Priority of animal/plant health compared to other priorities*

- *Main perceived biosecurity risks*
- *Practices to prevent or manage the impact of these risks on animal and/or plant health*

2. Communication channels and support to smallholders

- *Sources of advice about biosecurity and plant/animal health*
- *Trust*
- *Adequacy of current communication channels and support*
- *Preferred format for information on biosecurity*

3. Challenges engaging smallholders in biosecurity

- *Meaning of biosecurity to smallholders*
- *Relevance of biosecurity to property*
- *Relationship between recommended practices and smallholders' understandings of risk and 'good' care*
- *Factors perceived as beyond smallholders' control in managing pest/disease risks*

Each of these themes is discussed in more detail below.

<u>Animal and/or plant health and disease – smallholder awareness and engagement</u>

- ***Awareness of responsibilities to protect plant/animal health***

From the interview data, it was evident that among smallholders interviewed across both the Northwest and Southwest peri-urban regions of Sydney there is a generally high awareness of animal and plant health responsibilities. The smallholders we interviewed provided a number of reasons to explain their high awareness, and why such awareness was important, including the practical knowledge involved with farming, and membership of breeding associations:

> *I think that people that work in nature, whether it be physically or the physical aspect of working in nature gives you an insight. I think it's probably a little bit more profound than the average person or even the average academic in that sense…. I would say that farmers in general are a lot more aware of what's going on.* (NWS 7 M)

> *Because we are a member of the Alpaca Association we know about these things and have to do them. (NWS 1 F)…. In that sense, I suppose we're a bit more careful about trying to do the right thing.* (NWS 1 M)

Other smallholders emphasised that their high awareness was an important part of being a 'responsible' landowner and protecting their reputation.

In this district, we're acutely aware of our responsibility because we would be one of the last surviving orchards in the district, which means that even just the residential or lifestyle properties in the area have to be educated and brought up to speed on why it's not appropriate practice to have neglected trees. Neglected fruit trees are a large problem because of the capacity to breed disease and fly and so on. So we take a leading role in that education as far as we possibly can. (NWS 10 M)

I want to grow safe food…. I want my family safe and the others safe…. The neighbourhood like me. I don't have any complaints for 29 years and I produce safe tomatoes everybody likes. (SWS 2 M)

- ***Priority of animal/plant health compared to other priorities***

Smallholders across both regions also reported that they place a high priority on animal and/or plant health (depending on the enterprise type) in comparison to other priorities, indicating that their practices are based on an 'ethic of case'. For these smallholders, placing a high priority on animal/plant health was essential in terms of maintaining farm productivity and profit, and in meeting their responsibilities to ensure the good health and care of their livestock.

<u>Farm productivity and profit</u>

It's part of the whole integrated system. If the plant is unhealthy then we're not making money. It's a case of everything is interrelated. (NWS 8 M)

Animal health is the most important because to get peak production out of your animals you need them to be in the best health. (SWS 1 M)

Without healthy trees you don't get production. Plant health is paramount. Maintaining it is the challenge. Everybody strives to have their plants as healthy as they can. (SWS 5 M)

If you don't vaccinate, if you don't walk around the fence line and check things, if you're not keeping on top of things 100 per cent, you're going to lose money or the animal's going to die. (NWS 12 M)

<u>Good care for livestock</u>

I'm really passionate about the health and well-being of the animals. How they're handled and how you don't have to be a big man to get in there and be able to get an alpaca to do what you

would like it to do. So I'm veering that way now. That gives me a lot of interest. (NWS 4 F)

The bottom line is I want my animals healthy…. We work as hard for the animals' wellbeing because we want a [healthy herd]. It's like adopting kids, you have to look after them and you have an order here, it's alpacas first, grandchildren second, dogs third, cats fourth…. [Animal health is a] top priority, if I don't manage it correctly I'm not going to have a healthy animal. (NWS 5 F)

Healthy, happy horses is what I'm on about…. I'm entirely responsible for how they live their lives so that's a fairly big responsibility that I take very seriously. (NWS 6 F)

Of the 21 interviews conducted, only one smallholder viewed animal/plant health as a low priority, and this was justified due to 'slackness' rather than lack of willingness to make it a high priority.

We're a little bit slack sometimes…. Sometimes we might think we should have injected them a few weeks ago and whatever, we can be a bit slack with that. But having said that, we haven't lost or had a sick animal for years really. (NWS 1 F)

- ***Main perceived biosecurity risks***

In addition to having a high awareness of, and placing a high priority on, their animal/plant health responsibilities, smallholders in both regions demonstrated a detailed knowledge of the biosecurity risks they believe to be most relevant to their business. Endemic plant and animal diseases and endemic pests were identified as the most serious sources of risk. However, although producers were aware of the potential risks, there showed gaps on their knowledge on specific diseases.

<u>Endemic plant and animal diseases</u>

The major [potential] problems [are] Johne's Disease, there's Barber's Pole worms, and I think Liver Fluke is another one which we vaccinate for as well. Even though there hasn't been a case of Johnes here in New South Wales … if it gets out, it's sort of an alpaca version of foot and mouth or something, it's pretty virulent and not very nice. (NWS 1 M)

The biggest problem is … Black's Disease or Black Leg, which is a very, very bad disease…. Another thing that we do get sometimes, which is bad to the cattle … is three-day sickness. That's travelled by mosquitos and normally starts up the coast, like around Maitland and up that area there. Generally, gets down to about the Hawkesbury River Bridge and most of the time it doesn't come down any further than that. They try to contain it up there. We haven't had a bad

outbreak for a long, long time but last year everyone had a touch of it, the Hawkesbury area, the Camden area, saleyards. Three-day sickness was rapid. (NWS 12 M)

From a disease point of view the primary challenge is management of brown-rot…. That's probably because we're farming in a fairly wet, humid area. We have challenges for fungal diseases. A recent addition to the list of diseases is a thing called trametes which is a fungal disease and is now becoming difficult to control. (SWS 5 M)

Endemic pests

The biggest threat to the health of the herd is rodents, rats and mice that would bring disease in or birds. Birds are easier to manage. Rats and mice, we use an enormous amount of rat poison to keep things out. So rats and mice are the greatest threat of disease to us. (SWS 1 M)

The primary vermin problem is lorikeets. They've taken over from flying foxes. So they've become the prevalent problem and they are difficult to control because … you can't exterminate them without special consideration and special permits. So there is no protection for the fruit other than netting. (NWS 10 M)

The worst pest I suppose is Queensland Fruit Fly, closely followed by some vertebrate pests like grey-headed flying fox and the proliferation of say rainbow lorikeets and other bird species that predate on crops. (SWS 5 M)

However, weeds were also identified as an ongoing problem in terms of the work involved in controlling them and the impacts on animal health.

I think the weeds are a problem. Because we have to buy feed in, you don't know what's coming in in the feed. Look whether it's noxious or not noxious, what you're doing is actually bringing in weeds from another area…. Around the feed areas I'm seeing a lot of different types of weeds come up. I'm seeing Bathurst Burr, and we don't have Bathurst Burr here. (NWS 4 F)

I suppose really just maintaining weeds [is the challenge]. Just the weeds have taken over your garden bed. That's the problem I have. The grass stopped. Well, I haven't been doing in-ground garden because it's just too much work keeping the weeds out. (NWS 11 F)

I've had horses with liver damage from time to time from eating weeds. So for example when you spray Paterson's Curse in particular it apparently sweetens it up. So you will have the odd horse that will eat Paterson's dying, or poisoned Paterson's curse and then that damages their liver…. Then there's another species that's absolutely rampant out there and the council seems

to have zero interest in controlling it, so you will see it all up and down the sides of the roads and that's African lovegrass. African lovegrass is a problem for horses because they don't prefer it but when better feed runs out they will eat it but it's got zero nutritional value. So the horses will fill up on it and lose condition. (NWS 13 M)

- ***Practices to prevent or manage the impact of these risks on animal and/or plant health***

Smallholders interviewed in the Northwest and Southwest peri-urban regions of Sydney engage in a number of prevention and surveillance practices to reduce the risk pest and disease incursions. For livestock producers, the most common practices reported in the interviews were vaccination and drenching, regular observation of livestock, and quarantine/separation of livestock.

<u>Vaccination and drenching</u>

The animals I drench for worms … I give them 5-in-1. I give them vitamins and minerals as well just to keep them in top condition…. I do use a little bit of organic drenches as well for the animals. But I try and vary it a bit, because if you stick to the one drench they can build up a resistance. So I do use chemical drenches, but I try and stagger them so they're not the same drench every drench all the time, which seems to work fine. (NWS 2 M)

As soon as [the cattle] come off the truck either that afternoon or that morning, whenever they come from the saleyards, we vaccinate them with what they call a 5-in-1. We give them a B12 complex and we give them A, D and E. So, it's all the vitamins and minerals and vaccinations. Then within three weeks to four weeks' time we do the same process again. The only thing we do different then is we drench them. (NWS 12 M)

You have to ensure your livestock are kept healthy with regular worming and health programs. Then I guess you need to look at your soil and pasture and things that affect them. (SWS 3 F)

<u>Regular observation of livestock</u>

It's observation of how they're behaving and do they look healthy (NWS 1 M)…. They all come running when I go down there with food. I always think well that ticks the box doesn't it, they're obviously feeling pretty good. (NWS 1 F)

With alpacas, because they're in full fleece they're quite often hard to see if they're under condition or anything. So most of the time I'll keep a pretty good eye on them just to get my eye in on what they look like. Then I'll bring them up and I'll do a bit of a body score on them. If they

feel alright, have a look in their eyes. Make sure that they're not pale in their gums. (NWS 4 F)

Being a small unit here I know them all [cattle] by name and they can come by name. So on that basis I can check very quickly when they seem to be not right. I can see when their mood is different than what it was before. So the females might be coming on season or something like that. You can sometimes tell, they're different in some way…. It's all visual more than anything else. (SWS 7 M)

Quarantine/separation of livestock

If any animals do come I have a quarantine area that I put the animals in and they stay there for probably a week. Then I clean that out after they've been there, get rid of all the manure … and then I rest it…. So then I'll leave that rest for … 12 months or 6 months or whatever. So I just have a certain area that no animals go. I just mow the grass all the time and I have these foldaway panels and I can just put them up. They can stay there for a week and I drench them of course and then they go into the paddocks. (NWS 2 M)

We buy the cattle from the saleyards in stall condition. Then we bring them back from the saleyards to our property. Then we hold them a yard separate from the other cattle up to three weeks. (NWS 12 M)

Strict quarantine. There's virtually only me and my brother that go up and a couple of family members that look after the pigs and other than that nobody goes up and sees the pigs…. Our vet … who died a couple of years ago, only visited the animals once. Other than that, he never visited the farm because he, being a specialist pig vet, was a risk to it…. So if you come into contact with other pigs you don't come back and wander around the farm … until you've had a shower and wear different clothes up on the farm. A moderate sort of quarantining process. (SWS 1 M)

Horticulture producers, in contrast, rely heavily on pesticides and herbicides as well as physical barriers/devices to control pests and avoid disease.

Pesticides, herbicides and sprays

We've got issues like African black beetle grubs. They can be a problem but that would be a preventative measure there that we use [Acelepryn] as a preventative measure. We normally use that in around about October and that gives us a six-month residual. That's a reasonably

new product to us but it's been good, you don't have to spray so often. In the past, it would have been something like a [Chlorpyrifos] which is not a nice chemical and more regular so it cuts down the amount of time that you have to spend exposed to high risk chemicals. (NWS 9 M)

In the morning I have to clean up, do some herbicides within the blocks, from block to block. Between row to rows, when I do the herbicide we have to get up very early, say 5 o'clock in the morning until now 9 o'clock we stop. That's my routine every day. So I have to use 200 litres of herbicide. If you don't clean the farm the disease starts easily. (SWS 2 M)

When you get an incursion of large numbers of spores and stuff and the right weather conditions; rainy, humid weather the fungus grows. The only way you can kill it is chemical control. As much as you'd like to be able to think organic and all that stuff, it just doesn't work commercially anyway. (SWS 5 M)

<u>Physical barriers/devices</u>

Everything we're planting is on trellis. We're using trellis, six wire, vertical trellis to grow the trees on, for various reasons. One is that they bear much faster and you can get more consistent colour and in terms of disease management because they're flat open trees it's much easier to control, particularly fungal diseases. So you can minimise chemical inputs. (NWS 8 M)

I've managed to overcome [lorikeets] through netting the place, but if anybody was un-netted - well 30 years ago you could farm in the Sydney basin, in the orchard industry without netting, but now it is impossible. You need to have the orchard netted against vertebrate flying pests. (SWS 5 M)

For some livestock and horticulture producers, farm and machinery hygiene was also considered crucial in protecting against the unwanted entry of diseases. However, this was not a widely reported practice among interview participants.

Sometimes I offend people, they want a lend of my float and I won't allow machinery or equipment to be used by someone else. Because I'm on what they call a Q program here which means I have no Johnes here, but hypothetically if someone wants to borrow a piece of equipment I have to deny them because I'm protecting my animals' interests that I deny them that. (NWS 5 F)

We do have open days here. So when we have open days I put mats across the entrance and

soak them in, I was going to say antiseptic stuff you know what I mean. Biosecurity stuff that you've got a walk on, for people to walk through before they come into our property and walk around. Because I don't know where else they've been. (NWS 4 F)

We just try to keep the farm clean. We don't let visitors come often. All employees change their clothes. Everyone washes their hands, wear gloves. All our machinery gets disinfected weekly. (SWS 4 F)

Communication channels and support to smallholders

- ***Sources of advice about biosecurity and plant/animal health***

From the interview data, it was clear that smallholders obtain advice and information about animal/plant health and biosecurity issues from a diversity of sources. The three most common sources mentioned by smallholders were: (a) industry sources/publications; (b) Local Land Services, and (c) other farmers. Discussion with other farmers was considered in many cases an important way to compare notes on animal/plant health issues, or issues of concern, prior to seeking advice from 'official' sources.

Industry sources/publications

I think WormBoss is pretty much the only one I know of and probably the best one for worming. But of course it's all for sheep [rather than alpacas]. I mean at least that gives you an indication of what drenches are out there and it does advocate for doing faecal tests. (NWS 4 F)

The pig farmer magazine [is useful]. If there was to be some management revolution in that industry it would appear quite quickly in one of those journals and then we would be able to pick it up. But we haven't seen any of those revolutions in the pig industry in a long time. (SWS 1 M)

Local Land Services

I have a pile of books and I have a lot of flyers and we have a lot of pictures [of diseased plants]…. Some of them I don't know. I say, look I don't know this one I have to call the expert, like [local LLS representative]. Look, [local LLS representative], this is for me new but for you it's old. Tell me what it is. (SWS 2 M)

I'm the public officer for the Australian [identity removed] Growers Association, and basically, I am the one that spreads whatever I get from [local LLS representative] towards my growers. So

if you spoke to another grower, they would say they get the advice from myself. Within our community, they would get it from me, but I would get it from [LLS representative], or I do my own readings. (SWS 4 F)

Other farmers

If one grower's already applied something, some practice and has feedback in real times, it's going to be far better than having a scientist and an agronomist say, oh you should use this…. So they'll be a good contact as well but there's nothing quite like another grower saying, hey I've done this and I've put it on and this is the result. You should experience the same thing or similar. (NWS 10 M)

I do have a network of close friends who also work within the equine industry, so they just see quite a few horses on a daily basis that are there and working and managing those. So I'd say, have you ever seen anything like this? Or the horse has had a runny eye for a few days and medication hasn't cleaned it up, what would you suggest? So I guess it's just general chitter-chatter to try and see if anyone has had [similar] experiences … general little things that you may not think are a major worry, but you need to know if anyone has experience with that, instead of talking to the vet, before it becomes a major problem. (SWS 3 F)

Other sources of advice and information mentioned by smallholders include farm suppliers, veterinarians and breeder associations.

Farm suppliers

You might go to the local farm hardware supplier … like over in Windsor, there's a farm supplies. In amongst all that, you have guys that are quite astute with whatever products that you need. If you need like a drench, what do you recommend, that sort of thing. (NWS 3 M)

[I seek advice from] our friendly people at Elders, they've got a good program happening there. Our stock and station agent. That's about it really … they're probably really all that you would ask for advice. (NWS 12 M)

Veterinarians

Mainly just working with [the local vet] really. I mean animal health, we used to be more into when we were on the Alpaca Map program. But to be quite honest I guess I haven't had to look any further into it. I just manage my own little holding here. I go right okay well I'm not doing

that, and I'm not doing that, but I'm doing that. (NWS 4 F)

I get a lot of advice from my vets. I have a very close relationship with my vets. Horses are particularly good at coming up with new ways to test your ability to manage them and your ability to afford them. (NWS 6 F)

Breeders and breeder associations

When we first acquired alpacas, the first thing we did was to join the Australian Alpaca Association, and we joined that and then we met breeders and obviously went around and saw what they did. (NWS 1 M)

We all talk amongst ourselves, all the breeders. My trainer is also a breeder. There's a lot of Facebook interaction. Not so much biosecurity but certainly like semen choice and quality that sort of stuff because we're breeding international frozen semen horses. (NWS 6 F)

- ***Trust***

While there was limited discussion by smallholders on trusted sources of advice, those who did view it as an issue regarded veterinarians as being most trustworthy. This was primarily due to the close relationship of livestock producers who were interviewed with their local vet.

The vets [are the most trusted source of advice]…. I think that because I have such a close relationship with my vet I get pretty well informed about stuff through them…. If I have an issue I can either take a photo of something and send it to my vet and she'll go – 'I think I need to see that or I'll just do this or that'. (NWS 6 F)

Obviously a vet, a good vet. But you need to find at vet that's probably in his fifties or sixties. Because they've seen everything and done everything…. They're generally pretty right…. Why I say a vet that's 50s or 60s is because he's done his paperwork trail and he's hands on as well. A lot of the younger fellas, they're sort of like, oh hang on a minute mate, I'll just look up in the book and see what it says. Well that's no good to me. (NWS 12 M)

Well definitely veterinarians [are most trusted] because I'm sure they're the first ones to know about any new disease risk and what the management of that would be if something new makes it way to your property, such as the equine influenza. It didn't make my property, but it was in the neighbouring property, so the vet was giving advice in regards to how to possibly reduce the

risk. (SWS 3 F)

For the majority of smallholders, there were few sources of advice that they did not view as trustworthy. Among these, farm suppliers and corporate agribusiness firms were mentioned by some as being less trustworthy due to their commercial interests in selling farm inputs.

> *I'm a bit of an anarchist I guess but organisations in a lot of sense would be fairly low on where I would go…. In the markets obviously it's very targeted there and like I say, [seed companies are] just as cunning as the agents there that are trying to drive prices down. That's where I'd guess most farmers would go, where I wouldn't or I would go to see what not to do sort of thing. Then farmer supply shops too; essentially anyone that has a financial incentive to not make me sustainable that would be who I'd least likely go to.* (NWS 7 M)

> *Probably like fertiliser companies [you have to be wary of] because they all want you to buy their own product not someone else's. It's the same with weeds…. They want to sell you this or that and it might not work and so they just want to sell you stuff you know…. You've just got to have your wits about you.* (NWS 2 M)

> *Some of our suppliers, like, say, take coco peat, for example, and in our hydroponics, we had four or five suppliers with different coco peats, and everyone was talking down everyone else's coco peat. In the end, they're all the same. They're all trying to make money…. So I don't really trust wholesalers trying to push a product.* (SWS 4 F)

- ***Adequacy of current communication channels and support***

Smallholders expressed mixed views on the adequacy of current support and channels for communicating information on animal/plant health and biosecurity. Those who reported that support and current communication channels are adequate argued that a plethora of information exists and smallholders can easily find this information if they are actively seeking it.

> *Look it's probably adequate. It probably could be more, but if I wanted more I could probably find it. Because I think the internet, you can pretty much find anything on there that you need. If it was one of the, whether it's NLIS or whatever it is, you could get on to the website and then if you didn't know, I'm sure you could find someone on there that you could ask*. (NWS 4 F)

> *I'd say anyone that's up to date with it and are doing the job properly, I'd say it's 90 per cent [adequate]. There's a lot of people out there that are uneducated and I think that they're*

uneducated because that's just the way they want to be. There's plenty of places that you can find out things about livestock…. If you don't learn about livestock or agriculture these days, it's because you don't want to learn. There's plenty of places to learn, especially with Google and Facebook and all this sort of stuff these days. You can find out anything you want to find out I suppose. (NWS 12 M)

Look, I think the support is there if people seek it and people are aware that they may seek advice. Once again, I'll come back to Local Land Services. I find them great in the Greater Sydney Local Land Services, they're always putting out information and having support groups and field days, stuff like that on how to manage things. So I think support would be there if people knew they could seek it, seek advice easily. (SWS 3 F)

For those smallholders who reported support and communication channels as inadequate, the decline in publicly funded agricultural research and extension in NSW was viewed as a key cause of the problem.

[The information is] probably never adequate enough. But I don't know how you resolve that. I mean we're not going to go back to the dark ages where there were 27 District Horticulturists in New South Wales. You could ring one of them up and they'd come out and talk to you and he could tell you where the expertise was and whatever, or do some research for you. It's interesting, there's a lot of stuff that we're having done in Victoria simply because we don't know whether there's anybody in New South Wales who is capable of doing it. There may be but the resources aren't there to tell you and it's something that should be done by Department of Primary Industries or through their research things. (NWS 8 M)

In the past we used to [obtain information from the DPI]. Then we found that DPI was ringing us for information…. I guess we got to the stage where we've perhaps got more knowledge than they do. (SWS 6 M)

We had in the old days Department of Agriculture or now DPI staff available. They are no longer available. The LLS is a non-event as far as I'm concerned. I've never seen one and there are no specialists there anymore. They seem, in this area anyway, to be more interested in bush regeneration activities and conservation rather than agriculture. There is no expertise left in the department. The only sources open to me now are the internet, Google, Dr Google and the chemical resellers, the so-called agronomists employed by chemical resellers…. As far as farming body, New South Wales Farmers is a dead loss again, for the same reason. It's not interested in

agriculture close to Sydney or small family farming. It's more interested in your larger, broad acre stuff west of the Divide. (SWS 5 M)

However, of note, one smallholder argued that support from industry can also be less than adequate.

I wanted some technical stuff on [effluent re-use and manure] and the [industry representative] guy that's sitting in the office in Canberra … knows jack shit about pig shit and he said, 'look, I'm busy. You Google it'. So of the 104 pig producers that there are in New South Wales, when you phone up the organisation that says they provide you with everything … why would I waste my time phoning them back again about something? (SWS 1 M)

- ***Preferred format for information on biosecurity***

In general, smallholders favoured one-on-one extension as the preferred format for providing information on plant/animal health and biosecurity.

You've got [local LLS representative] at Local Land Services who has quite an interest in the turf industry but he's not just totally turf like they used to be before. So I guess if he has time [we'd prefer him] a bit more just to do the turf and go around and visit growers more regularly or more consistently. That would probably work pretty well. Or if you had a biosecurity issue you could say well listen, [local LLS representative], we're going to take you off doing this, this and this and just concentrate on going to see all the growers about this particular biosecurity issue. I think that would be the best way to do it…. Or if there's a major problem you'd have a workshop. (NWS 9 M)

We need to go back to where there were people employed as extension officers by the departments of agriculture and biosecurity and all those sorts of things. Their job was to come along and provide resources for people; hold meetings, face to face stuff. If you had a research project that was on a particular topic that was relevant in a particular area the researcher went there and he had a meeting. We had a meeting in the evening, a cup of tea or what have you and he presented his research and took questions. (SWS 5 M)

However, research summaries and newsletters in hard copy as well as glove-box guides were viewed as an accessible and easy to understand format for communicating information.

I guess if there was an organisation like say LLS that had responsibility for garnishing all that

*information [on tree health and biosecurity] and then delivering it in one document on a regular basis, that would be good. (*NWS 10 M)

Newsletters are good because they give you a good summary. But, even if it was in that type of format, it'd be good to then have a reference, like, okay, your library has more information. We can't send you out a book but, if you go to your library, this is where you can find further details, further information. So I think it's good to resource libraries in that way because they're a good public service that everyone can access, even if you don't have internet. (NWS 11 F)

When we're doing research and development in industry, we have these massive reports that come to us of 500 pages and things, and we've got to get all of that down into a glove box little manual that the farmer can take around, he can have in his glovebox and say hey, [in the ute it's like] this is a problem, then you can open that up and have a quick look and get some ideas about what it is, and then he can go further and investigate. (SWS 6 M)

Few smallholders mentioned electronic sources as the preferred format for delivery of information on plant/animal health and biosecurity. Those who did, favoured an electronic format due to ease of access, no or low cost delivery, and ability to easily assess the relevance of the information.

I think email is always the easiest. Telephone calls you forget that, but an email or a quarterly newsletter or something with key points on there, sent out by email or some sort of publication like that, would be handy. So, that everybody in the industry is getting exactly the same message, not one lot. (NWS 1 M)

General information is always good because at the end of the day, it's not cost any money to receive that in your inbox and you can always just delete if it's not relevant about you. (SWS 3 F)

Challenges engaging smallholders in biosecurity

- ***Meaning of biosecurity to smallholders***

Interviews with smallholders revealed two main interpretations of the meaning of biosecurity. Over one quarter of smallholders interviewed referred to biosecurity as activities aimed at preventing the incursion of pests and diseases at different spatial scales.

Biosecurity is ensuring that you minimise the chance of bringing some disease or insect at the first level onto your property, which is going to have a dramatic impact on what you do. The second thing is to ensure that at another level is that you don't bring into the country, by sneaking in a bit of plant material or bringing stuff in that might have an impact on what you do. (NWS 8 M)

I understand [biosecurity] to … be almost any transfer of pest and disease or the prevention of any pest and disease transfer [including] pest management and local disease control. (NWS 10 M)

Biosecurity to me means we are basically trying to prevent disease – pests and disease incursions, both domestically and internationally. (SWS 5 M)

Other smallholders interpreted the meaning of biosecurity more narrowly as the exercise of vigilance and good care for one's livestock and/or plants.

I see that the best security of the farm is to ensure a healthy, resilient farm that manages its own diseases…. Vigilance and understanding of what's going on. That's biosecurity to me. (NWS 7 M)

To me biosecurity would be whether … we have any notifiable disease, with the animals or weeds. That's the extreme side of it. Then the other biosecurity side of it I look at as just monitoring and making sure that I can look after the animals and the property here the best that I am able. (NWS 4 F)

I think it means disease management, disease control, where you want to, say, stop disease coming into your farm, also stop disease coming out of your farm as well. (SWS 4 F)

Despite over half of smallholders being able to articulate clearly what biosecurity meant to them, a number of participants were unclear on its exact meaning. Indeed, during the interviews some participants sought clarity from the interviewer on whether their interpretation of biosecurity was 'correct'.

My understanding of that would be that biosecurity say of your property and anything you consider to be your livestock. So first thing would be not letting any people or vehicles onto your land if there is an outbreak…. Just management, I guess, of managing your land and your animals I guess and not letting anything penetrate that boundary. Oh that's a hard question to

answer. (SWS 3 F)

From what I understand is that it's a system or program put in place to just keep things running right I suppose. To stop diseases and other things that could come in that'd be harmful to the property and to the livestock. Is that what biosecurity is? (NWS 12 M)

I regard it as being prevention of infection or infestation of diseases in my enterprise. Is that the right answer? (NWS 13 M)

One smallholder judged that biosecurity had limited meaning and relevance to many smallholders since it was not aligned in a clear way with producers' existing priorities and practices relating to plant and animal health.

I think it means a sign on a government department. That's what it means; a sign on a government department. Biosecurity is a misnomer…. If you're talking farmer speak rather than bureaucrat speak it would be how do you protect the health of the animals? So this is where the confusion starts, is that it is an unclear starting place. If you were to talk to farmers whose level of education is usually moderate to low, terms like biosecurity are no aid at all. If we talk about health of the animals and how to prevent disease spread farmers will understand that. Biosecurity is un-understandable for farmers. (SWS 1 M)

- ***Relevance of biosecurity to property***

Despite the ambiguity surrounding smallholder interpretations of biosecurity, the vast majority were able to articulate in detail how biosecurity was relevant to the management of their enterprise. Smallholders viewed biosecurity as essential in protecting farm viability and as a means of avoiding the potentially disruptive financial effects of a pest or disease outbreak.

Suppose I have some source of alien disease come to my farm, my farm could be shut down. Other people have to realise as well not come here, I don't want them…. We don't want it, we have to be safe. We have to say to protect our farm. …. Because my income relies on this farm … I wouldn't muck around. (SWS 2 M)

It's massively relevant because … the costs of controlling [a disease] are significant and disruptive. So I'd be surprised if it wasn't [cheaper to] prevent the infestation or infection than to treat, if you like but it might be my presumption. I don't know the answer to that but I would think it would be cheaper to prevent than to treat, certainly in terms of not just the cost of

treatment but also the disruption. (NWS 13 M)

It's relevant, because there is a [need to reduce] these pests. Say, quarantine, everyone's asking why Australia's quarantine's so strict. It's strict because they're trying to protect their farms. If you get a new disease in, you might not be able to control that and it might destroy your whole crop. So that's why controlling the health of the plant is top priority on the farm. It's because it comes before anything, like it comes before profits sometimes. Profits will drop if your plants aren't healthy, so we don't consider spending money to control the disease is a loss of profit. (SWS 4 F)

Some smallholders also viewed biosecurity as central to everyday good farm management and the exercise of due diligence.

It's relevant in that I don't want to introduce anything that's a problem. So I'm very careful about sourcing things like hay. I quarantine any new horses that come to the property. I am aware of instances that may threaten the biosecurity like even just going to a competition or a rally day or something, how that might impact on the health of the horses. (NWS 6 F)

We follow everything that we should do. We get the MLA to come out on a regular basis and just check our systems. We've got a paper trail and we write everything down. We write down what beast got vaccinated, when they got vaccinated and all the rest of it. I could take you down there in the middle of a mob of cattle at the moment and I could tell you where they all come from and how much they were and what they weighed and stuff like that. It's sort of all up in there [in my head]. But in case one day I get dementia or something like that, we do have a paper trail. (NWS 12 M)

I always source my trees from reputable wholesale nurseries and hopefully they're virus tested and all those things so you're not introducing pathogens into the area. As far as what I personally can do about it, other than buying trees from reputable sources, there's not a hell of a lot I can do. I can't virus test or check the disease status of any new trees that I buy. I've got to rely on the supplier. (SWS 5 M)

- ***Relationship between recommended practices and smallholders' understandings of risk and 'good' care***

While there was widespread agreement amongst most smallholders on the importance and relevance of biosecurity, not all agreed that their farm posed a biosecurity risk.

I think we're fortunate…. We don't have the same difficulties that say livestock would have with stock being a mobile product. You know it can effectively move around, the trees don't. Obviously we're aware of people not bringing things into properties from other properties, especially overseas and so on. It's important and you've got to maintain that. That's part of the backbone of Australian agriculture is to quarantine or protect from things being imported nationally or internationally that can be harmful to industry. But we're not really in a high risk category I guess I would say as far as we don't have a lot of visitation to the property from people who would have been on other farms and so on. There's not much that transfers that way, you know, on your feet or clothing. (NWS 10 M)

We're probably one of the most quarantined piggeries in Australia and the uniqueness of that and working with our vet early in the century means that we're a minimal disease, specific pathogen-free herd…. Our concerns are all pig diseases because as far as we're concerned we're free of all pig diseases. But being in the city we're quarantined. We don't have another farm down the road with pigs and things like that. The closest commercial piggery to us would be Sydney University's little one at Camden. So we're a long way from some bird landing there and transferring disease. (SWS 1 M)

[Biosecurity is relevant] clearly for the health of the animals, but we don't imagine it affects us quite as much as others who are transporting animals for matings. Because our animals are not leaving the property and we haven't got animals coming in [biosecurity is not as relevant] (NWS 1 M)…. But then, isn't biosecurity what you're doing, so we're not causing any problem to anybody else…. I mean that we're not causing any spread of anything as far as we know we're not. (NWS 1 F)

For other smallholders, certain recommended biosecurity practices were regarded as conflicting with their personal values, practices and experiences relating to good care of their livestock and plants. This suggests that what smallholders see as good care for plant/animal health is not necessarily compatible with official guidelines and recommended practices.

If we're talking about Hendra vaccination, no, I will never continue with that. I did initially have the initial injections and boosters. That was when it first sort of was released but I did not continue with that, given what was coming through from Randwick colleagues of adverse reactions. So it was something about willingness to keep up with vaccinations that are (a) in our area I feel unnecessary and (b) the general population which is guinea pigs, no, I won't be

keeping up with that sort of thing. (SWS 3 F)

Some of the recommendations put it that way, about collecting fallen fruit … that's just completely off the planet. It's impossible and I don't know of any commercial orchard anywhere in Australia or probably the world that can afford to send people into an orchard and pick up every piece of fallen fruit, put it into a plastic bag and leave it out in the sun. It's just totally impractical. The most practical commercial way of doing it is mulching. We run a mulcher after we harvest every block. All the fruit that's on the ground we mulch and pulverise basically with a mulcher. That's a practical way of killing the larvae that may be present. (SWS 5 M)

- ***Factors perceived as beyond smallholders' control in managing pest/disease risks***

Smallholders cited a range of challenges perceived as largely beyond their control in their efforts to prevent and/or manage pest and diseases. The cost associated with prevention of pests and diseases, and the expense involved participating in industry herd health assurance programs were viewed as a particular challenge.

Probably access to equipment and physical things. Price of good quality pest management equipment – so price and accessibility. (NWS 7 M)

We dropped out, nearly everybody else has dropped out of the Johnes Disease program, so Q-Alpaca and MAP. But we've nearly all dropped out of it. It became so onerous because you had to get all sorts of reports done, and every animal that died on your property, no matter what, you had to have an autopsy done…. That's expensive, you've got $200 for an autopsy, even if it was a dog attack, and your animal didn't die of Johne's Disease, or didn't have an affected liver, you had to get an autopsy done. Even if the vet said, I can see it's a dog attack, but if you're in this program, you have to have this autopsy done to satisfy the requirements of the program. A lot of us said this is crazy, we're not paying $200 for it. (NWS 1 M)

Lack of time and the variability of the weather were also reported as significant challenges in achieving the higher level of on-farm biosecurity implementation that smallholders would prefer.

I would say that I'm aware of a lot of things that I would love to put into practice, just can't. I don't have time. (NWS 7 M)

I think the main pressures are still the unknown elements. The weather, like the environment. This year, for example, we've only narrowly escaped the full brunt of hail activity which would

be a comprehensive wipe out. The netted trees are protected to some extent from hail as well. So we have no control over the elements. So every year is an unknown…. If the climate produces overly humid conditions or so on, we'll get a flare up of something that was previously under control. The rest of it we can put protocols in place to have some sort of control. (NWS 10 M)

3.4.3 Landholder interviews – summary of key findings

The key findings in relation to the landholder interviews are summarized below. As previously indicated, these findings represent the perspectives of participating landholders who, given their willingness to be interviewed, are likely to already be knowledgeable on and more engaged with biosecurity. Accordingly, there are qualifications in using these findings to explain biosecurity engagement by the broader smallholder population in the Greater Sydney Peri-urban area. However, this study provides a detailed perspective of a sub-set of peri-urban landholders.

Theme	***Key findings***
Animal and/or plant health and disease – smallholder awareness and engagement	*Smallholders participating in this study:* • Report a high awareness of their responsibilities to protect animal/plant health. • Place a high priority on animal/plant health compared to other priorities due to: (a) the potential effects of an outbreak on their farm productivity and profitability, and (b) personal concern for the good health and care of their livestock. • View endemic plant and animal diseases, endemic pests, and weeds as the most important biosecurity risks. Smallholders are focused primarily on these risks since they fall within their direct experience. • Are engaged in a range of practices to prevent or manage the impact of pests and diseases on animal/plant health, including vaccination, regular observation of livestock, quarantine, farm and machinery hygiene, physical devices, and pesticides/sprays.

Communication channels and support to smallholders	*Smallholders participating in this study:* • Use a range of sources of advice on animal/plant health and biosecurity. Local veterinarians are the most trusted source and farm suppliers and manufacturers are less trusted sources of information and advice. • Provide mixed views on the adequacy of communication channels and support available. Findings from the interview data on this issue are inconclusive.
Challenges engaging smallholders in biosecurity	*Smallholders participating in this study:* • Interpret biosecurity in different ways, with some producers having limited understanding of what biosecurity means. • Are able to describe in detail the ways in which biosecurity is relevant to their enterprise, despite ambiguous interpretations of what biosecurity means. • In a limited number of cases believe that biosecurity is less relevant to them or they make the conscious decision of not implementing specific practices due to conflict with objectives of good care for their stock and farm. • Report that issues such as cost, lack of time, and the variability of weather pose challenges for their capacity to effectively implement biosecurity practices.

3.5 Cross-sectional biosecurity survey among targeted groups of landholders in the two case study areas.

The aim of this phase of the study was to provide a tool to the NSW DPI and LLS to gather quantitative information on biosecurity from a broader group of landholders within the Greater Sydney peri-urban area. The stakeholder analysis identified smallholders with different cultural and ethnic background as those less engaged with government and industry organisations and those activities conducted to increase awareness of animal and plant health management practices. There seems to be a range of messages delivered through different methods; however, some groups of smallholders are not registered or part of any industry network, which makes it difficult for the message to reach the target. The use of traditional and cost-effective methods for reaching these smallholders and the use of a generic biosecurity questionnaire, are unlikely to be effective for

both unregistered smallholders and those from diverse cultural background. Questionnaires written only in English, with biosecurity as the main topic of questionnaire and distributed by post or online by a government agency, are unlikely to result in high participation. As such, some aspects to consider if a questionnaire based data collection process is conducted are:

- The surveys need to be targeted for each industry and focused on on-farm practices and not on biosecurity.
- For NESB smallholders, surveys need to be delivered in the appropriate language in addition to English and through a trusted source.
- Private veterinarians, rural suppliers and livestock agents could be used as delivery platforms, given they are highly influential on smallholder practices, the large number of clients and the large proportion of these clients being smallholders.
- Distribution of a survey could be done:
    - Through industry associations for some industries, such as the Australian Alpaca Association
    - At field days, distributed in conjunction with an information package or similar
    - At workshops held at the Field Vegetable Demonstration Farm at Richmond
    - At Grower Community meetings (e.g. Cambodian Grower Community Meetings)
    - At Camden saleyards
    - At Greater Sydney NSW Horse Shows (Given significant proportion of smallholders keeping horses, according to stakeholders interviewed)
    - At Greater Sydney Agricultural Shows
    - At the Hawkesbury Earthcare Centre

During a meeting held on the 24th of August 2017 with the research team, and attended by Graham Wilson (LLS) and Sarah Britton (DPI), plans for the survey were discussed. The research team was of the opinion that the usefulness and effectiveness of a generic survey tool to gather quantitative information to support the achievement of the project aims was limited. The challenges encountered during Phase 2 of the project in relation to the recruitment of landholders shows the difficulties accessing these landholders, not just by the research team but also by all the relevant government and industry stakeholders. In light of this, it would be expected that a survey would result in a very low response rate and biased outcomes, and as such, representativeness would be limited. The decision was taken to not proceed with this aspect of the project.

4. Conclusions

This research project sought to address two specific aims, which are listed below accompanied by key conclusions drawn from the data. The third aim was to develop a set of priorities and recommendations that the NSW DPI and LLS could implement to promote change in peri-urban smallholders' biosecurity engagement and practices. This specific aim is detailed in the Recommendations section of this report.

Research aim 1: Investigate peri-urban landholders' current biosecurity knowledge and practices, including communication networks, and particularly their understanding of the notion of 'shared responsibility'.

- ***High awareness among smallholders of their responsibilities to protect animal/plant health***

The interviewed smallholders overwhelmingly reported a high awareness of their responsibilities to protect animal/plant health. A number of reasons were provided to explain their high awareness including, the practical knowledge involved with farming and being a 'good' farmer, membership of breeding associations, and part of being a 'responsible' landowner. This contrasts with stakeholder interviews in which smallholders were reported as lacking understanding and knowledge of land and animal management requirements.

- ***Animal/plant health a priority – smallholders motivated by an 'ethic of care'***

Smallholders considered biosecurity to be a high priority as it had the potential to impact their operations. For both commercial and non-commercial landholders, motivations to engage with biosecurity practices were closely aligned with ensuring good care for the health and welfare of livestock and plants. There were some conflicts in terms of the biosecurity practices recommended by stakeholders and the reality of implementing these at a farm level, however these conflicts were far surpassed by the level of adequate biosecurity practices that landholders reported.

- ***Ambiguity among smallholders over the meaning of 'biosecurity'***

There was significant ambiguity among smallholders regarding the meaning of biosecurity. Some viewed biosecurity as activities aimed at preventing pest and disease incursions at different spatial scales. Others viewed biosecurity as exercising good care and vigilance for one's animal and/or plant health. Some smallholders asked the interviewer for confirmation or assistance on the 'correct' definition. However, despite this ambiguity, smallholders were able to describe in detail the different

ways in which biosecurity was relevant to their farm and their implementation of biosecurity in practice.

- ***Diversity of sources of smallholder advice***

Smallholders use a diversity of sources of advice on animal/plant health and biosecurity, especially industry sources/publications, LLS, and other smallholders. Face-to-face extension, research summaries, and newsletters are the preferred format for delivery of biosecurity information. Veterinarians were the most trusted source of advice and farm suppliers and corporate agribusiness firms the least trusted. For most smallholders, however, there were few sources of advice that they did not trust.

Research aim 2: Identify the social and institutional factors that influence peri-urban landholders' adoption of recommended biosecurity practices.

- ***Accessing peri-urban smallholders***

This research project identified a diverse level of involvement of stakeholders with peri-urban smallholders, with stakeholders devoting a significant proportion of their business to these landholders. However, the only official registration is with the Local Land Services and is based on the Property Identification Code and on those who are ratepayers, with only those properties over 10ha being rateable. This poses a significant challenge for reaching landholders and improving their engagement.

- **Government engagement with smallholders based primarily on compliance monitoring**

Stakeholders viewed smallholders as a significant source of biosecurity risk due to lack of understanding or knowledge of their responsibilities for animal and/or land management, the conscious decision not to implement biosecurity, and low veterinary contact. Such views are based on a deficit model of knowledge that prioritises compliance with a fixed notion of what 'good' biosecurity should look like. This overlooks the diversity and richness, as is evident in this research, of what smallholders are already doing to care for animal and/or plant health. Furthermore, it reinforces one of the challenges that stakeholders face in working with smallholders. There are distinct variations in the motivations, experience, knowledge and socio-demographic characteristics of those on small landholdings and as such, the generic approach that is adopted is not reaching those who pose the highest risk.

- **Limited resources for extension**

Stakeholders and smallholders viewed face-to-face communication methods as the most effective for increasing engagement of smallholders and improving their awareness of specific topics or practices. However, the decline of publically-funded extension means that there are fewer resources available through which to fund one-on-one extension. For some landholders, other producers have filled the role, and while this is viewed as positive from the perspective of the landholder, for stakeholders it creates a new set of challenges with questions over the accuracy of the information provided.

- **No extension targeted specifically at peri-urban smallholders**

It is clear that, for the most part, biosecurity information is not targeted specifically to small landholders. Many of the organizations contacted were membership-based or reliant on rates and as such, prioritized these groups over "non-financial" producers. Given the identified difficulties in knowing where small landholders are located and the activities that they are undertaking, it is obvious that a large sector of this group are not in contact with any stakeholders. This is where the existing networks of landholders come into play, with the value of "word of mouth" being emphasized by landholders and stakeholders alike.

- **Veterinarians as influential stakeholders**

Veterinarians consider themselves to be an influential stakeholder, a position echoed from the landholder's perspective. Much of this is dependent on the relationships that are developed over time and whilst veterinarians see the value of increased engagement, commercial considerations impact the extent to which veterinarians can provide value-added services such as education. At the same time, the cost to smallholders associated with on-farm visits further limits the capacity of veterinarians to take on such a role.

5. Recommendations

Based on the major findings discussed in Sections 3.3, 3.4 and 3.5 of this report, a set of recommendations has been developed for the NSW DPI and LLS to consider for improving engagement with peri-urban smallholders and promote uptake of recommended biosecurity practices.

Recommendation 1

It is clear that there is a significant disconnection between government and smallholder definitions/understandings of biosecurity. This poses challenges for the effective communication of biosecurity messages, and subsequent uptake of recommended biosecurity practices.

Convene a working party to review and revise the language and terminology used to communicate biosecurity to smallholders, considering the new NSW Biosecurity Act 2015, and the consistency of the key messages delivered by different stakeholders. The review should be led by the DPI with representation of LLS, key peri-urban stakeholders, and a cross-section of peri-urban smallholders.

Recommendation 2

Although smallholders identified face-to-face communication as the most effective way of engaging with biosecurity information, this approach is only effective among those landholders who engage with these activities. The lack of engagement could be due to lack of awareness of the existence of activities or the organisations responsible for these activities.

Conduct a review of current methods for dissemination of biosecurity information and develop an extension campaign focused on informing smallholders about the services provided by organisations such as the Local Land Services. This extension campaign could be implemented using local radio, television and newspapers.

Recommendation 3

Current government approaches to biosecurity are based on a compliance model. However, as the findings from this research project show, smallholder approaches to animal/plant health are based on an 'ethic of care' in which motives such as passion for one's animals, animal welfare, vigilance against

pests and weeds, and farm productivity and profit are the driving factors for smallholders to engage with and practise biosecurity.

Develop and implement a series of smallholder forums in which smallholders are given the opportunity to discuss what 'good' animal/plant health means to them, why they practise animal/plant health, and how they do so. Such fora, convened by the DPI and led by trained facilitators, would be aimed at engaging with smallholders' biosecurity knowledge and practices in a more participatory and meaningful way than current compliance-oriented approaches, in which smallholders are often assumed to have a knowledge deficit. It would also be aimed at developing biosecurity policy and programs that more effectively take into account, and work with, smallholders' existing knowledge, practices and priorities. The involvement of stakeholders trusted by landholders, such as private veterinarians, could improve attendance and engagement. The research team of the current project would be available to provide input into the process of developing the suggested forums.

To improve engagement of specific sectors of the peri-urban landholders in the Greater Sydney area, such as those from diverse cultural backgrounds and non-English speaking backgrounds, such suggested forums should be hosted by a landholder who is a known member of the community or specific landholder group.

Recommendation 4

Currently there are no extension programs targeted specifically at peri-urban smallholders. This represents a major gap in the provision of biosecurity information and in engaging smallholders more extensively in biosecurity. However, the decline of publicly-funded extension means that agencies such as the LLS are limited in the staff and funding they can invest in such programs.

Establish a program that trains trusted smallholder 'knowledge brokers' – stakeholders who are trusted by landholders, such as private veterinarians, contractors or saleyards. These knowledge brokers, who should be already known to the LLS, would be trained in extension, including the communication of biosecurity information to smallholders.

Convene regular workshops for these knowledge brokers to (a) provide updates on changes in legislation and programs – particularly those relevant to biosecurity – and (b) continually improve their confidence and skills to engage with smallholders. The training program should be developed by the DPI and LLS in consultation with other relevant stakeholders and smallholder representatives and should complement current training activities. In addition, biosecurity extension resources with

industry-specific information could be provided to the knowledge brokers, including resources in relevant languages.

Recommendation 5

The lack of a comprehensive register of smallholders, due to a proportion of them not having a PIC or having a land size smaller than the minimum rateable area poses a challenge for reaching peri-urban landholders and improving their engagement with biosecurity.

Review current LLS registration requirements in relation to land size and consider if a minimum land size of 10ha is appropriate for the Greater Sydney peri-urban area, given the characteristics of landholders located in this area.

APPENDIX 1. Charles Sturt University Faculty of Science Human ethics approval letter- Stakeholders

Charles Sturt University

FACULTY of Science
HUMAN ETHICS LOW RISK COMMITTEE

C/ School of Exercise Science
Allen House, Building 1431
Bathurst NSW 2795
AUSTRALIA
Tel: +61 2 6338 6168

Dr Marta Hernandez-Jover

SAVS
Locked Bag 588
Wagga Wagga
NSW 2678

18th August 2016

Dear Marta,

The Faculty of Science Ethics in Human Research Committee has reviewed your proposal **"Greater Sydney Peri Urban Social Research Project"** and has approved your proposal for a twelve month period starting from 18th August 2016.

The protocol number issued with respect to this project is **400/2016/24**. Please quote this number in future correspondence with the Committee in regards to this study.

Please note the following conditions of approval:

- All consent forms and information sheets are to be displayed on CSU letterhead. Students should liaise with their Supervisor to arrange to have these documents printed where necessary.
- You must notify the Committee immediately in writing should your research differ in any way from that proposed;
- You must notify the Committee immediately if any serious or unexpected adverse event or outcomes occur associated with your research, that might affect the participants and therefore ethical acceptability of the project;
- Amendments to the research design must be reviewed and approved by the Faculty Human Ethics Committee or if no longer minimal risk research referred to the University Human Research Ethics Committee before commencement.
- **You are required to submit a final report by 18 August 2017**;
- If an extension of the approval period is required, a request form must be submitted to the Faculty Human Ethics Committee prior to the above date;
- Reporting Forms are available at the HREC website Human Ethics Forms

You are reminded that an approval letter from the Faculty of Science FHEC constitutes **ethical approval only.** If your research involves the use of radiation, biological materials or chemicals then a separate approval is required from the appropriate University Committee.

APPENDIX 2. Macquarie University Human ethics approval letter- Stakeholders

Office of the Deputy Vice-Chancellor
(Research)

Research Office
Research Hub, Building C5C East
Macquarie University
NSW 2109 Australia
T: +61 (2) 9850 4459
http://www.research.mq.edu.au/
ABN 90 952 801 237

MACQUARIE University
SYDNEY·AUSTRALIA

17 October 2016

Dear Dr Taylor

Reference No: 5201600666

Title: *Greater Sydney Peri Urban Social Research Project (Phase 1)*

Thank you for submitting the above application for ethical and scientific review. Your application was considered by the Macquarie University Human Research Ethics Committee (HREC (Human Sciences & Humanities)).

I am pleased to advise that ethical and scientific approval has been granted for this project to be conducted by:

- Macquarie University

This research meets the requirements set out in the *National Statement on Ethical Conduct in Human Research* (2007 – Updated May 2015) (the *National Statement*).

Standard Conditions of Approval:

1. Continuing compliance with the requirements of the *National Statement*, which is available at the following website:

http://www.nhmrc.gov.au/book/national-statement-ethical-conduct-human-research

2. This approval is valid for five (5) years, subject to the submission of annual reports. Please submit your reports on the anniversary of the approval for this protocol.

3. All adverse events, including events which might affect the continued ethical and scientific acceptability of the project, must be reported to the HREC within 72 hours.

4. Proposed changes to the protocol and associated documents must be submitted to the Committee for approval before implementation.

It is the responsibility of the Chief investigator to retain a copy of all documentation related to this project and to forward a copy of this approval letter to all personnel listed on the project.

Should you have any queries regarding your project, please contact the Ethics Secretariat on 9850 4194 or by email ethics.secretariat@mq.edu.au

The HREC (Human Sciences and Humanities) Terms of Reference and Standard Operating Procedures are available from the Research Office website at:

http://www.research.mq.edu.au/for/researchers/how_to_obtain_ethics_approval/human_research_ethics

The HREC (Human Sciences and Humanities) wishes you every success in your research.

Yours sincerely

Dr Karolyn White
Director, Research Ethics & Integrity,
Chair, Human Research Ethics Committee (Human Sciences and Humanities)

This HREC is constituted and operates in accordance with the National Health and Medical Research Council's (NHMRC) *National Statement on Ethical Conduct in Human Research* (2007) and the *CPMP/ICH Note for Guidance on Good Clinical Practice.*

APPENDIX 3. Semi-structured interview for stakeholder consultation:

1. Nature of the service and or involvement of your organization with peri-urban smallholder (<10ha) landholders
2. What proportion of your business is devoted to peri-urban smallholders?
3. Which type of peri-urban smallholders are you involved with (livestock and/or plant / subsistence, hobby farmer, lifestyle, others) (*This question is relevant for agribusiness services and private vets)*
4. Do you have basic demographic information on these peri-urban landholders, such as animal species, number of animals kept, and type of agriculture/horticulture production?
5. How many people within your organization work and/or are involved with peri-urban smallholders? What is the role/duties of each person involved?
6. Can you please provide an estimate of the number of peri-urban smallholders in your jurisdiction?
7. Does your organization keep a register/list of clients of peri-urban smallholders (relevant to your organization)?
8. What is the legal requirement regarding registration of peri-urban smallholders within your organization? *(only relevant for LLS, DPI and Council)*
9. Do you communicate with peri-urban smallholders? Why do you communicate with them (purpose)?
10. What methods of communication do you use? Why do you use these methods?
11. What do you think about the effectiveness of these methods of communication? What are the challenges of communication with these smallholders?
12. Do you have any specific extension program targeted to peri-urban smallholders? If yes, please describe.
13. How effective do you think these programs are?
14. What do you think the key biosecurity (animal and/or plant health) issues and risks are in relation to peri-urban smallholders?
15. What is the level of interest of your organization on practices of peri-urban smallholders? Please, rank as low, medium or high. Why is your organization interested in practices of peri-urban smallholders?
16. What do you think is the level influence of your organization on practices of peri-urban smallholders? Please, rank as low, medium or high and provide a justification of this level of influence. What are the challenges in relation to this level of influence?
17. Which practices do you think your organization influences the most?

Please refer to the stakeholder list/map provided (livestock or plant)

18. Which of the stakeholders in the map do you have formal and/or information collaborations with? Could you please describe these collaborations?

APPENDIX 4. Summary of stakeholder responses by the four sections/categories of the semi-structured interview.

NSW Periurban Biosecurity project

Stakeholder analysis

General information

1. Nature of the service and or involvement of your organization with peri-urban smallholder (<10ha) landholders
2. What proportion of your business is devoted to peri-urban smallholders?
3. Which type of peri-urban smallholders are you involved with (livestock and/or plant / subsistence, hobby farmer, lifestyle, others) (*This question is relevant for agribusiness services and private vets)*
4. Do you have basic demographic information on these peri-urban landholders, such as animal species, number of animals kept, and type of agriculture/horticulture production?
5. How many people within your organization work and/or are involved with peri-urban smallholders? What is the role/duties of each person involved?
6. Can you please provide an estimate of the number of peri-urban smallholders in your jurisdiction?
7. Does your organization keep a register/list of clients of peri-urban smallholders (relevant to your organization)?
8. What is the legal requirement regarding registration of peri-urban smallholders within your organization? *(only relevant for LLS, DPI and Council)*

Region/ Organization / region	**General information**
LLS – NRM (environment) and regional Landcare Facilitator	• Engage with people to improve land management. From an NRM perspective will engage with people on less than 10 hectares to help them improve the environmental values of their land. • Regional Landcare Facilitator to work with Landcare groups. • Run landholder training. (VK deals mostly with the lifestylers). Deals with community engagement. Other staff will deal with smallholders in one-on-one site visits to talk about their property, organise a funding agreement with them to fence off their creek line etc. • Half of the groups that work on private land would be involved with smallholders. • Central coast- mainly lifestyle, a lot of horses, with horticulture being undertaken on slightly larger properties. • Hawkesbury- Lifestylers who may / may not have stock. Cattle, goats and horses. • Usually will have a main job off farm. Some absentee but most reside on property. • Local food movement is creeping in – boutique and delivering to restaurants.

	• Estimated 6-10 000 smallholders. Defined in their reports as 2-10 hectares. • Have a database of those with a PIC and those who are ratepayers- provided. • Blocks are being subdivided for smaller house blocks so the area is changing.
Camden council – Noxious Weeds Officer	• Enforce the Noxious Weeds Act on lands within the Camden local government area. • My involvement with peri-urban land holders is fairly extensive, because we have a large proportion of our local government area which is occupied by small, five-acre lots, which are a range of hobbyists to some people even using them for commercial purposes, so for horticulture and the like, but the bulk of them would be the lifestyle hobby type block. With the lifestyle ones- couple of horses or one or two head of cattle or a handful of sheep or goats. • 50% of individual role is dealing with smallholders. Overall council- some areas of planning section and on site sewerage management would be 100% dealing with smallholders. • A lot of practices are permissible without consent under planning law so council do not keep registers.
NSW DPI – Biosecurity and Food Safety Compliance Unit	• Department of Primary Industries-Biosecurity and Food Safety Compliance Unit-compliance monitoring or surveillance, audit, incidence response and investigation and providing biosecurity advice and education. • Sheep, cattle, horses, goats, pigs, camels, alpacas, through to bee keepers, people with small and large, retail level nurseries through to the large commercial production nurseries, orchardists, flower growers from time to time, beekeepers, specialist animals, from exotic species to private exotic keepers to exhibited animal keepers, specialist industry such as industrial hemp growers. • Motivation- sometimes it's cultural, sometimes it's just a particular interest. • If they are not interested in commercial production they might have a couple and a variety of animals. For those using it as a secondary or full income stream, higher number of animals. Most are kept for slaughter, some as pets. • No specific focus smallholders. Part of previous services now undertaken by LLS. They work closely with LLS. • Information will come in from LLS, public, surveillance in key high risk areas (ad hoc and specific programs), police and rural crimes unit, food manufacturers, industry associations. • Would suggest that compliance with the PIC system would be at 90%. There could be some within this who are using neighbours PIC. • Also have bee registration, non-Indigenous animals keepers have to be licensed, exhibited animals people have to be licensed. • Horticulture- legislation called the Horticultural, Stock and Nurseries Act which was repealed. That Act was primarily there as a source of funding for horticultural research and the government decided that if industry

	wants to get funds for research, the industry can go and get it themselves, impose levies and not have government impose the levy and collect the money and hand it back to them.
Saleyard	• Demographic of saleyard in relation to the Sydney basin, probably 70 - 75 per cent of business is dealing with small stakeholders that are within that area, obviously owning two acres, four acres, 10 acres. Bring stock into the market for sale, also then purchasing out of either fat sales or store sales, so they have that opportunity to buy other restocking cattle. • Species- cattle mainly. Some sheep and goats. Horse sale twice a month. Few pigs- have a pig sale every week but of 100 pigs, 75% would be from out of the area. The Sydney basin area, that once had properties with pigs have now been taken up by residential developments. Doesn't see pigs on properties. • Types of smallholders- weekend properties (might have a farm manager), small time farmers of ethics (Maltese, Italian, some Greek)) background. A lot have 5 acres and this supplements their income. Some will have a small intensive feedlot- purchase grain by product. • Lots are usually 1-2 animals per lot. Not big numbers but they add to a lot. • No one deals specifically with smallholders. • They have 5000 clients on their database of which 3000 would be smallholders.
NSW Farmers (Director of Cropping and Horticulture)	• Farming organisation across New South Wales. 6500 to 7000 members. 100 horticulturalists in Sydney basin that are our members Broad primary-industries focus. • Deal with smallholders through the biosecurity committee. That committee has representatives that are livestock holders. They represent livestock committees, including intensive committees. Livestock and horticulture. • A lot of the issues are the same across all sectors of farming. Peri-urban horticulture has had a lot of work put into it. Haven't dealt so much with broad acre livestock but more with intensive livestock- swill feeding. • No process to get members to report on what amount their holding is. Have a more recent category of membership, small farmer membership. This was based on commercial producers suggesting a need due to potential of smallholders creating additional risk and also through their work with smallholders indicating that they have a desire to understand more and feel part of the industry. However, predominantly work more with commercial farmers.
LLS (Biosecurity Officer Veterinarian)	• Investigations are a large part of the service that is provided. • Visit saleyards regularly as part of compliance activities. • Staff work with all sizes and types of operations. • Smallholders would account for 60% of callouts. Most of their service goes to non-rate payers. • Most people could be defined as hobby farmers. There are a few that have this as their primary income and there are some that have it as a secondary income.

	• Most are resident landholders. Have recently been seeing agistment as people buy land for future development. • Mainly sheep and goats, sometimes cattle. 5-20 sheep is common. • Mixed livestock – cattle, sheep, goats pigs and poultry on one property sometimes seen. • The difference of the land size. If they're five acre land then they would have at least five to 10 sheep, five cattle, probably 10 or 20 chickens, and a couple of pigs. Those are almost all of them. • Register-Cannot provide accurate details on number of smallholders. If they have a PIC, they are on the system but this would be less than 50% of those with livestock. • Legal requirement relates to PIC.
LLS (Senior Land Services Officer, Horticulture)	• Greater Sydney LLS region. Central Coast in the north down to Wollondilly in the south. • Extension and education of growers on best practice. Farm chemical training. • Smallholders would account for 80% of job. • Mostly commercial smallholder master gardeners. Property size is 1-5 acres in most cases. • LLS don't collect basic demographic data on smallholders but DPI have done so in the past (can provide this). • Most staff would work with smallholders in different ways but not specifically assigned to do so. • Numbers of smallholders- estimates • Growers- 450 Chinese growers. That's one of the bigger groups, Arabic 350 to 400. • Turf crossover - 500 or 600 Maltese, 40 to 50 Cambodian, 30 Vietnamese, 5 to 20 Korean growers. • Register- Ratepayers- this doesn't pick up most of the market gardeners because their land size is under rateable threshold. • Informal list made up from existing mailing lists e.g. Chinese growers mailing list. • There is no legal requirement to register but some councils will ask for a DA for businesses.
Pig Producer	• He is the only commercial producer in area that he knows of. The rest would be considered backyard pig keepers. • Most people are lifestyle and hobby farmers. Some people want to test the waters as a business and they will get two or three sows and realise how much work that is and not continue. • Most are permanent residents. Get the odd out of area. • Most in the area keeping pigs are keeping other livestock as well- goats, cattle. • No estimate on numbers and many would not have a PIC. •
Private veterinarian Leppington	• Veterinary Clinic. Nature of service- Some herd health, general checks if new patients. Mostly emergencies, stitch ups, down cows, calvings, castrations. Worm control a problem (lack of pasture rotation), worm egg counts. • 15% of calls would be large animals (including horses). • Most owners would be lifestyle or those keeping livestock for food. Many producers are from different cultures.

	• Many places would have 3 animals on a small block. Pigs are definitely on the decline. Chicken work has also decreased.
Rural supplier Horticulture Leppington	• Privately owned business supplies all horticulture products. Background- flowers and vegetable horticulture. Also do turf, viticulture, citrus, stone fruit, orchards. (Seeds, fertiliser soil testing, agronomy, irrigation, packaging.) 34 staff, 35+ years' experience. Stores in Sydney Markets, Campbelltown, Byron Bay, XXX. • Warehouse is in Bringelly • Depots – Molong, Canowindra, Griffith, XXX, Hunter. • They are based in NSW but do business nationally and in NZ. • Do economic budgets and farm planning. • -AO reps have rough geographic regions. • 1 rep for Hawkesbury (also national potato salesperson) • 2 reps concentrate XX of Greater Western Sydney. • 1 animal husbandry specialist (e.g. dairy beef cattle) • Campbelltown store also services commercial landscaper. • -<10 ha = 95% of their customers • Smallholders <1 ha in their mind but can also get very tiny businesses (eg 4 ha and grow 300m2 = commercial microherb business) • Leppington Pastoral Co (dairy and customer) - their biggest customer. Pastures, animal health (dairy consumables, cups etc) fertiliser. • No infrastructure. • Drenches, dips etc- AO buys at wholesale and re sells. (Not many exclusive products) • -6000 accounts in their system and another potentially 1000 + regular clients on a cash basis. Another 2-3000 talk with them occasionally and may/may not get their business. • - Geographical changes taking place. Traditional vege farmer based clients – Maltese, came out with parents after war. Now approaching retirement age and next generation not interested in farming (trades preferred). Some Italians but mostly flower growers. • Vietnamese- mainly cucumbers, tomatoes indoor and tunnels. • Cambodian- flowers and some veges. • Thai • Ethnic Chinese- some Chinese veges. • Can communicate with Cambodian grower groups (and Chinese?). Excellent way to get information out.

	• Arabic- Lebanese, Turkish etc etc. Muslims and Christians. Mainly protected cropping (under tunnels) cucumber, tomatoes, capsicum, eggplant.
Private veterinarian (Hawkesbury)	• Provide veterinary services. Only clinic in area that does house calls to anyone. Less than 10 acres -sheep, cattle, goats, alpacas. • Windsor Road at McGraths Hill, up through Richmond North Richmond, Grose Wold, Kurrajong, Kurrajong Heights. Sackville over to Wiseman's Ferry, Londonderry, Penrith, to farms - for the schools that have the livestock because they can't get any livestock vets. We go Box Hill - sometimes up the Putty Road or up past Richmond. • We do preventative -probably more a phone service. We'll ring and discuss what they should be doing, we get a lot of our clients to bring us faecal samples and do faecal egg counts. We stock drenches and people can buy individual doses - vaccines and drenches - from us rather than have to buy the whole bottle if they've only got one or two head of stock. - A lot of the stuff that we actually go on the visits and house calls for is more medical treatment. We get them to come to us or talk to them on the phone about the preventative. • 35% of business- probably looking at about 7000 or 8000 farmers. A lot of one, two to five-acre plots in area. It's changing but not quite there yet. • Five or six that we would see every month- high maintenance hobby farmers. Then some of our others we probably see them at least twice or three times a year. But it will be for a variety of pets. Because a lot of them also have their dog and cat. So they'll often talk to us about their livestock when they come in and they'll bring us photographs to show us and things like that. So we do a lot of preventative stuff on photographs unfortunately. Because not a lot of them want to pay the house call fee to get us out and we don't always have the staff to run out. • A lot between one and 10 animals. But then there's other places - one of our big farms will - has 300 head of cattle. Then a lot of the Dexter studs and that will have 50 to 100 cattle. • Hobby farmers will be most. There are still a few livestock - so we've still got a couple of studs-Dexter studs in particular. Goat dairy farmer who milks goats. A few schools. • Only five percent to eight per cent of our clients will sell livestock- the rest are pets. Can use a lot of off label stuff because they will die on the person's property. A lot of them will never enter the food chain. • Goats, sheep, alpacas followed by cattle. Mixed species. • All vets will work with all types of clients.
NSW DPI (Plant Pathology)	• Land size associated with peri urban- a lot of 5 acre blocks; market garden and farming 10-20 acres. As you get further out they tend to get bigger- 20-50 acres. Riparian, flood plain areas around Nepean River don't tend to

	have the issue of urban encroachment as they are flood prone. Large operation- The Leppington Pastoral Company, own and lease a lot of land. A lot of varied activity- dairying, fattening, chicken farming. • Nature of service- has changed over the years. Different waves of migrants, government has tried to engage with. Looking at problems that these groups may be having and how they are managing these. • Number of people working with smallholders- LLS team -6; broader network of affiliated industries. Has national projects which may have a component that are in the Sydney basin. Works with farm suppliers, seed reps, fertilizer companies, produce suppliers, growers. • Chinese, Lebanese and a Maltese growers. A lot are second generation. Dural area, still a few stone fruit orchards but mainly lifestylers (horses). There used to be a lot of cut flower producers in that area but a lot of this is now imported. • Also have protected cropping growers and hydroponic growers. • No register- very difficult to separate a lifestyler who might be growing a few veges from neighbour who may have vegetable far. Important area that is lacking at the moment. • A few years ago tried to do a census of green houses in peri urban area- controversial as they were trying to use ground truthing from aerial views. Funded by horticulture industry levy. Difficulty is that it is dynamic. • More interested in knowing who is growing what rather than how many there are overall. Nursery Industry organisation have a reasonable idea of numbers, but issue is that not everyone is a member. There are smallholders who are growing and selling vegetables in the farmer's market niche. • Registration has been talked about for years but nothing specific has been put in place.
Nursery and Garden Industry Association	• They don't have a definition of peri urban landholder, urban landholder or rural landholder. From a general perspective, a peri urban landholder is someone on the fringe between higher density housing and larger holdings. Could be doing anything – garden, small orchardist, hobby farmer etc. • It is not the land size but it is the land usage pattern that dictates whether it is urban versus rural zoning. Some properties could be multiple hundreds of hectares but they are still peri urban. It is really where you get the consistent 5 acre blocks and the proximity to high density. • Some are growing plants/produce and selling it at roadside markets or a defined market. Also larger operations distributing to Woolworths, Coles, Bunnings. • Role is one of advocacy ambassador for business operating in the association to provide the right technical support services and linkages to people either wanting to buy plants or have cared for those sorts of plants, products and services. Has been investment from levy supported activities to try to drive best practice programs from production and customer service point of view- accredited garden centres.

	• They have two elements- income that comes from members. Then there are those who get the information without wanting to contribute. Do their best to provide clear business benefits and opportunities to members. • Affiliated industry- Links with those providing containers, soil, growing medium, labels, marketing, transport, fertilisers, pest control. Within the broader sector will have commercial landscapers, arborist. The industry is large but it is poorly represented by NGINA membership in that sector. • Numbers working with peri urban- don't survey it from a structure perspective. They have the equivalent of 6 FT staff. • Will send a report with general national studies on numbers- overall there are tens of thousands of people working within Australia in different sectors in terms of nursery industry. Difficult to know what non-members are doing. • They have 250 members- 65-70% would be production based; 15-20% would be allied group and the balance would be independent retail garden centre.
Hawkesbury Harvest	• Definition – anything within the Sydney Catchment- includes the Hawkesbury Nepean River or the Sydney Basin. Runs up to the lower Hunter on the Northern side and down to Goulburn on the Southern side. • Membership is diverse- A lot of smallholdings on a few hectares, running up to 100 hectares. Don't have any broad style agricultural members. A lot of members have become unviable in that system, so looking for alternative market channels. • Consider all producers on the trails to be peri urban. Harvest was formed in 2000 to establish alternative channels to market produce. • Numbers involved – 80-90 farms – what they call Value added; Auxiliary players – cafes, galleries etc., Local government stakeholders- tourism. Categorised as general growers, general producers and resellers. Livestock and horticulture. Don't have any livestock members that have open farm gate- bird flu outbreak scared people off this. • Started with 13 members of the steering committee, now there are 5 (backgrounds -DPI, university, tourism, organics/permaculture). • There is an issue with recognition of agriculture within the Sydney basin. Mainly talking about metropolitan rural areas- a lot of land has been converted to rural lifestyle- quarantined and sterilised in terms of production. Looks rural but not farmland. Taking up prime grazing areas. • Harvest- interested in keeping productive agriculture in the basin. Possible to have all, including poultry (despite odour issues). It is important to keep smaller growers in the basin. • Register- collect information on Farm Gate members- where they are, a bit about them and their farm. Have a list of stallholders at the markets. Don't collect information about production scale.

	• Legal requirements- members must have appropriate product and public liability insurance.

Communication methods and extension programs

9. Do you communicate with peri-urban smallholders? Why do you communicate with them (purpose)?
10. What methods of communication do you use? Why do you use these methods?
11. What do you think about the effectiveness of these methods of communication? What are the challenges of communication with these smallholders?
12. Do you have any specific extension program targeted to peri-urban smallholders? If yes, please describe.
13. How effective do you think these programs are?

Organization / Position	Communication methods	Effectiveness	Challenges	Extension programs
LLS – NRM (environment) and regional Landcare Facilitator	Equine Landcare network Landcare networks (very local) Starting Small farm network Fox control program (Community-based feral animal control) Method: Email, local paper	Effectiveness is good once they are engaged	Lack of engagement – difficulties in reaching out to landholders Email – very difficult – reaching landholders – only few hundreds through the initiatives listed, among 6-10k! A lot of people haven't heard about LLS Cultural barriers / ethnic groups Decline in funding.	Equine Landcare network Small farm network (planning stages) Fox control program Landholder training
Camden council – Noxious Weeds Officer	Face-to-face communication – inspections (250-300 landholders/y) Selection of properties? Properties on high=risk pathway for weeds and neighbours / whole area Council website	Face-to-face communication helps achieving voluntary compliance Yes – from face-to-face then phone calls increase, the information flows…	Only 1 noxious weeds officer Mail-out – information is sent to owners, so does not reach tenants. Non-English speaking background	No specific extension programs targeted to smallholders – is all part of one inspection program Weeds Action Project – state government funded. Weed control activities and management activities on

	Mail-outs from time to time – for significant issues/concerns, goes with the rate notice		Developers not controlling weeds – biosecurity risk too	public and private land. For private land – face-to-face interaction / extension.
NSW DPI – Biosecurity and Food Safety Compliance Unit	Communicate through industry organisations If there is a biosecurity issue – plant biosecurity unit or animal biosecurity unit have teams of people involved with community liaison responsibilities and technical expertise Media unit Basically all communication is of compliance nature. Some degree of education and advisory components but generally compliance. Communications are one-on-one, verbally, followed by written communication to notify compliance issue	If there is communication through industry, own publications and occasional broadcast media about a biosecurity issue, then the level of reporting increases	Working on compliance mainly	
Camden Saleyard	Communication about the sales – advertise on webpage and Jim Hindmarsh Facebook page On-farm inspections requested by clients Work closely with LLS – landholders are up to speed	Seems to be effective in relation to sales / and if there is an issue, the farmer would address it before sending animals to the saleyard	Not mentioned	

	with requirements (e.g. welfare)			
NSW Farmers (Director of Cropping and Horticulture)	Small farmer membership: Newsletter (monthly). For members engaged in production agriculture – weekly update – whatever is topical – information that helps to manage the risks of the production agriculture Small farming group – meetings? North coast	Doesn't know about effectiveness	The main issue is if they are actually linked into the networks that industry normally links into – engagement / reaching them	In the past – Asian gardeners, extension on chemical safety
LLS (Biosecurity Officer Veterinarian)	Have information available in four languages. Plan to work with community groups to assist with engaging these communities. Workshops with private veterinarians- material and information then disseminated through vets. Information topics- biosecurity, PIC number, emergency disease, notifiable disease. Distribute information through saleyard- brochures and information leaflets.	No data that it is effective but belief that it is improving. Electronic platforms- Started 6mths ago so too soon to measure effectiveness. Social media is a good platform, particularly as they believe that everyone has a mobile phone.	Challenge with all methods below is obtaining current contact details. If smallholders don't have a PIC, they try to source information from other areas eg saleyard to create a list. Diverse community Language and cultural barriers.	Most of their work is generalised. Technically they are working for the ratepayer. They cannot use money levied from rates to support non ratepayers specifically.

	Distribute information through Landcare, NRM groups, councils, formal and informal growers and ethnic associations. Electronic –newsletter, website, Facebook, Twitter, LinkedIn, YouTube.			
LLS (Senior Land Services Officer, Horticulture)	Have done surveys in the past and identified that some practices are not acceptable- chemical safety chemical use. Have done programs in the past in identifying pests and diseases and reflecting the appropriate control measure (may not be chemical). Rather than just giving growers a list of products that can be used they try to give them an insight into which products are better than others or appropriate. Dose rate- education to ensure that they are aware of residue and resistance. Have done a lot of face to face historically but now they have a demonstration farm at Richmond. Will get groups in (often based	There is no silver bullet as far as methodology on communication. Try everything. Can't just post things out and hope people read it. Needs to go through a workshop etc. Most effective are the group activities-cluster groups, workshops, field days where growers can come together and liaise with each other. Non-threatening and non-biased location is important.	-Funding issue has meant that extension activities haven't been provided consistently. -Language – they are now engaging bi-lingual support. This can be to interpret at workshops. Can sometimes be difficult when very technical information is being translated. Group may not necessarily relate to what they are being told. Resellers will give growers products but no instructions on how to use it. Legally, instructions have to be written in English. Also problem, with mathematics to calculate dose. Agencies existing as silos- they need to be vertically and horizontally integrated.	Regional capacity building. Launched 6 weeks ago. Not so much in LLS- but in DPI they did a lot of work on introduction of seeds from overseas.

	around language/ethnicity) and present to them. Often have seasonal vegetable trials going on at the same time so the producers get to see better practices in irrigation, soil management and biosecurity.			
	Innovation funding has allowed them to run workshops, field days and distribute newsletters.			
	Extension tools- fact sheets or bulletins, pamphlets, posters for farm sheds or packing sheds, DVDs.			
	Electronic- SMS to inform growers of what activities are planned. YouTube clips. Currently working on a Podcast.			
Pig Producer	No official networking group. Personal networks used. Some workshops are run stalls at Ag Shows. DPI has run the odd course. Best way would be door knocking and having a face to face conversation.		The formal activities don't pick up the people that you want to pick up as they don't go to shows, etc. Not interested in learning anything or expanding because it all just to fulfil their own need. Not really industry engaged because they are not part of the industry.	No

			Suspicious of any kind of government authority.	
Private veterinarian Leppington	Communicates with smallholders individually. Would be interested in getting involved in a smallholder organisation if one was set up. Aim would be to keep social interaction and provide advice. There is a need for basic information.			No
Rural supplier Horticulture Leppington	Would receive 3 calls a day (varieties to plant, chemicals etc). Would see well under 50% of potential growers.		Newsletter goes to those with a current spend on their account. They are looking at options to try to capture customers who don't have an account but are still customers.	No
	Have a monthly newsletter.			
	Reps talk to big clients on farm weekly or fortnightly. Others are seen occasionally, some once a year.			
	Facebook page but it is not active.			
	Would like to see an email for everyone in the system and distribute newsletters to them. Information needs			

	to get to farm managers and workers, not just accounts departments.			
Private veterinarian Hawkesbury	Don't send email Newsletters currently because the system will not allow this. Getting a new system that will make sending emails and SMS's easier.		IT systems Don't do a lot of talks etc. because they are a commercial practice. They haven't had any major groups come and ask then to do talks. Would probably consider it if they were asked. Difficult because senior vets have the knowledge but not the time.	No
	Facebook. They try to add something once a month. Just starting to build on that.	Measure hits. Has increased. Have to have someone pushing this. Get calls from people after they have posted. E.g. did a snake post and had more calls about snakes. Same with post on ticks. If non English speaking the client will usually bring an English speaking child with them, so this is not a big issue for them.		
	Have a television in the waiting room that they hope to be able to use for information evenings.			
	If they have a client that they have a good			

	relationship with they might give them business cards and they then tell their neighbours about the practice. Word of mouth is huge.			
	Visits	Have provided advice on crushers and this has led to more clients having them on their properties.		
NSW DPI (Plant Pathology)	Existing LLS networks. (will be called in by LLS eg to give a talk) Growers meetings (formal and informal with individual growers). Newsletters/ fact sheets Twitter etc Contact with industry reps- if a problem identified, they can often point to various farmers having the same issue. Presentations- had a three day conference and invited growers to come to a BBQ at the end. Tends to target a group eg parley growers, and then find a few growers who will lead them to others. All about engagement and relationships.	Know that a lot of farmers use Twitter (not NESB). BBQ very successful. (100 from conference and 150 from local area)	Even if farms are run by one ethic group (eg Arabic), the workers will be mixed (Vietnam, Laos, Cambodia, Korea. Sometimes communication between the owner and the workers isnt good. Literacy/education levels. Problem with Fact sheets is that many will not be read. A lot are looking for a quick fix, rather than understanding of how to manage things in an integrated way.	No

Nursery and Garden Industry Association	Magazine- hard copy E-news, direct emails Branding through NGINA logo. Can be reactive rather than educational within the whole peri urban group- eg a land use dispute between peri urban landholder and production nursery. These types of situations are not common- if they were there might be higher level support. Web based / Facebook national program 20/2020 which aims to have 20% more plants by 2020. Not a targeted / direct approach- more general information on the benefits of plants. Program in development- Plant Sure (see Biosecurity section) – will look to increase Facebook and social media presence. Need to work out ways to better connect with government and other regulators.	Don't do a good in terms of selling the organisation- diversity of the structure. People are looking at what they want and need.	They do not have a high budget for marketing and communication. They need to empower individual businesses to work collectively within the organisation. Need to increase social media presence. Complicated part is making the message easy.	
Hawkesbury Harvest	Public information – not tailored to the producer. Their role is to communicate	Social media- Let Harvest do things on their behalf and rarely engage directly.	Markets- Harvest will set them up and then entrepreneurs come in and	No (in a sense Harvest is the extension program)

	with the wider public on behalf of producers. Website and App- allows people to see what is open and which farms they can visit. App replaces paper maps. Facebook, Instagram, Twitter. Public newsletter that is just about informing the public of what is in season. Radio – association with ABC radio- Farm Gate Roundup segment. Farmer's market- another channel to get exposure. Members- Newsletter that goes directly to members. Part of Ian's PhD was looking at the network connections that the board members made. If there is a specific issue they will run a meeting in a particular region for producers. Haven't run any specific workshops on biosecurity - thought that Biosecurity Australia might tackle this. Campaigns- apples, bird flu, equine.		take over or set up an alternative market. Harvest see the markets as a way of strengthening agriculture and becoming more collaborative- happy as long as there are more opportunities for growers. Most of the producers are very stretched in terms of time. For producers the issues are specific whereas for Harvest, it is more of a generic issue of how do you manage people going onto farms.	

Biosecurity risks

14. What do you think the key biosecurity (animal and/or plant health) issues and risks are in relation to peri-urban smallholders?

Organization / Position	Biosecurity risk
LLS – NRM (environment) and regional Landcare Facilitator	• They don't know what they don't know: e.g. buying stock online or off local noticeboard / lack of knowledge about PIC requirement, handling gear /mixing animal species /overstocking – lifestylers are a problem – they don't see themselves as land managers • Time constraints of land holders • Weeds – how to identify plants? • Pasture management • No agronomist in LLS **Other comments** Trying to localise support. Not all will contact a vet.
Camden council – Noxious Weeds Officer	• Weeds • Stock diseases: massive number of livestock is spread across lots of small holdings – thousands of animals spread across all these small properties – trade between these properties. Not rateable land (under 10 ha) – no communication with LLS? No regulation • Ethnic diversity
NSW DPI – Biosecurity and Food Safety Compliance Unit	• Monitoring, managing market access • Interstate movement of animals • Swill feeding • Lack of knowledge • NESB
Camden Saleyard	• Selling animals online (Gumtree)
NSW Farmers (Director of Cropping and Horticulture)	• FMD- swill feeding of pigs • Lack of management of backyard orchards • Transmission of pests, diseases and weeds. An example is botrytis which may have been bought in by shoes or food of hikers.
LLS (Biosecurity Officer Veterinarian)	• PIC • If someone doesn't want to do the right thing, they are not going to apply for a PIC.

	• They are trying to get a PIC application for every stock owner. • Traceability • Movement • Private purchase • Not buying or selling through proper channels. Gumtree, online. • Have 2 properties under quarantine for footrot. Sheep purchased through Gumtree. Purchasers unable to provide details of where the sheep originated from. • Lack of knowledge of management of animals • Feed- Will feed animals anything that is in their kitchen. Cost of change also a factor- having to purchase food that was previously just scrap. • Little understanding of Australian livestock and how it's run. A lot of the people are from Africa or Asia, and the structure or the management pattern of those two regions is totally different. • Three possible scenarios- 1. If they don't know something, they can learn by going online and they may then do the right thing. 2. If they know something and don't know that is wrong they will continue. 3. If they know something and know that it is wrong, but continue regardless. • Little incentive to change practice unless it has an impact on them.
LLS (Senior Land Services Officer, Horticulture)	• New exotic pests and diseases • Greater Sydney, Port Botany and Sydney Airport are entry points. Bringing back seeds and contaminated materials from overseas
Pig Producer	• Identification • Swill feeding. Don't like to purchase pellets or pre prepared food. Preference to use scraps. Some of these scraps are legitimate- bakery waste, vegetable waste but some don't care. Ethnic background where they are used to feeding scraps to pigs- A case of "we've done it for a hundred years and no one has died". For some it is just ignorance. • School groups visiting farms. A chance that the children could feed their scraps to the kids. Hasn't observed this but it is potential risk. • Backyard slaughter: Like to keep the intestines and the abattoir will not keep these so they slaughter at home. • Abattoirs (domestic) • No facility for wash down- not even for boots. NSW Food Authority has stopped wash down of trucks at the two abattoirs in the area. • Low adoption of biosecurity measures

	• Veterinary contact • More likely to shoot and bury or consume if a pig was sick. Suspicious of authority. Wouldn't seek help externally **Comment** Movement- not a big issue Most people are home consumption or backyard sales within their community.
Private veterinarian, Leppington	• Veterinary contact • Some would sell a sick animal rather than contacting a vet. • There are a lot of people in the area that are seen when driving around but that have never had contact with a vet. • Compliance
Rural supplier Horticulture Leppington	• Lack of experience • Seed -Buyers have a lot of regulations. Unsure of the level of risk associated with seeds coming in from travellers bags. • Animals -Thinks that there is more risk associated with animals than plants. • Weeds -People do transfer soil etc with disease agents. There are a lot of weeds in Australia already. • Turf -Turf tends to not cross borders-freight too high. • New varieties come in tissue culture (sterile medium). Therefore outbreak chances are very low.
Private veterinarian (Hawkesbury)	• Animals seen as pets Eg Foot rot cases already that we've been working with the DPI with and that proved difficult both for them and for us. Because they were pets, they weren't cull animals. So we had to quarantine places and get them free because they didn't want to cull their favourite pet goat. So that proved even difficult for the DPI because they're used to just culling. Suddenly we had these cases that we had to fix in order for them to keep their pet because they didn't want to under any circumstance cull. But it also meant we had like a huge outbreak in Sydney in one area of foot rot because of the movement and everything. • High worm burden • Run off • Movement and identification A lot of clients don't have PIC's. Have been working with DPI and local vets to give out PIC application forms. Buying off gumtree- side of the road on the back of a truck. • Lack of knowledge

	Some don't know about requirements. They have the land and they see sheep at a local market. Animals usually end up with gastro bug and half will die. Vets try to promote buying from a reputable source and will see that the next time these people will buy from a proper farm etc. • 50% will adopt suggestions, especially if they have received a large vet bill. That is a good motivator.
NSW DPI (Plant Pathology)	• Concerned about potato and tomato diseases; cucumber green mottle virus. There are about 90 tomato viruses that are exotic. • As an example, they assumed that petunias were being grown from seed but they were being grown vegetatively, which is a bigger disease risk. You don't always find out about the latest trends and from a biosecurity point of view, which is a concern. Generally speaking, they are quite naïve. Tend to be reactive. Good processes in place for surveillance and understanding but don't have a lot of people on the ground working with growers on biosecurity. • Some of it is serendipity- was on a farm looking for one thing and found an exotic disease. Key is going out and looking. Would like to see more farm surveys- strategic. • Horticulture industry is broad so you need to think about what is happening in all areas.
Nursery and Garden Industry Association	• Plant Sure- a project that has just been approved, looking at the benefits of going in and asking people involved in the plants questions about plant biosecurity and weed potential etc. Aim is to get messages to the consumer about the right plants, which are going to be a low risk for them to use and plant. If program is established may have a registered scheme (accreditation or certification). Would hope to have government Plant Sure- a project that has just been approved, looking at the benefits of going in and asking people involved in the plants questions about plant biosecurity and weed potential etc. Aim is to get messages to the consumer about the right plants, which are going to be a low risk for them to use and plant. If program is established may have a registered scheme (accreditation or certification). Would hope to have government start targeting those non-member businesses to put the onus and duty on those to improve the biosecurity interfacing in that sort of sector of the not engaged sectors of the industry. • Weeds, pests, insects, disease on rural subdivisions/ 5 acre blocks impacting neighbouring businesses. Due diligence is that you have a responsibility but if you don't know what your responsibilities are you can plead ignorance. A move towards the Biosecurity Act should help NGINA to encourage and facilitate landholder's obligations. It is government, industry and community that are connected. • Neglected orchards and areas. • Threat decision making process and what they do. At the end of the day does the general public care? Not as emotive and animals.

Hawkesbury Harvest	• Change of previous productive land to non-productive (mines, housing) – remove biosecurity risk and introduce the risk of contaminants. • Insecurity about land and development- a lot of landholders aren't interested in building a business and stewardship, even in the context of biosecurity-holding out to liquidate and move out. • People wanting to see food where it is produced- what comes with this are the biosecurity risks. Visitors don't see themselves as putting the farmer at risk. Need to try to get the public more informed about their role in risk. Could be a way that producers could present their public image- show that they are managing biosecurity. • A lot of those visiting the farms are overseas tourists. Has not been a risk assessment done. • Producers sometimes supplement with product from other sources and store it, handle it. This can create a potential vector or biosecurity issues. • DPI- demonstrations. Could add a biosecurity component to this. Producers may be interested if it threatens their livelihood.

Interest and Influence

15. What is the level of interest of your organization on practices of peri-urban smallholders? Please, rank as low, medium or high. Why is your organization interested in practices of peri-urban smallholders?
16. What do you think is the level influence of your organization on practices of peri-urban smallholders? Please, rank as low, medium or high and provide a justification of this level of influence. What are the challenges in relation to this level of influence?
17. Which practices do you think your organization influences the most?

Region / Organization / Region	**Interest**	**Influence**
LLS – NRM (environment) and regional Landcare Facilitator	High	Low- Moderate
	Interest level is based on them being a high biosecurity risk and also from the positive notion that they want to help them grow local food and plant trees well. Influence is low-moderate given the number of landholders compared to how many are engaged. In terms of those that are engaged they are "kicking goals". Influence peoples understanding of the value of bushland, riparian corridors, off stream watering etc. Helps people understand land management. Also influence on biosecurity and the local food movement- food security.	
Camden council – Noxious Weeds Officer	Low- Medium	High
	Interest- needs more focus. Challenge is limited programs and resources. When they do have interactions they make things happen/change. Most influence on noxious weeds and on-site sewerage management (these areas both have dedicated staff).	
NSW DPI – Biosecurity and Food Safety Compliance Unit	High	Medium
	Looking to use and strengthen stakeholder engagement, DPI, LLS, industry groups to raise the influence level to high. Some would say they have a high level of influence because that is all they do, but from an outside perspective, it could be stronger. If the person sees a benefit, you can get a better biosecurity outcome. Challenge is that they are regulatory.	
Camden Saleyard	High	High
	Influence is based on invitations to inspect stock prior to sale. Clients are guided by what they say. Hands on with 70-75% of clients. Practises influenced- Will direct to LLS if potential biosecurity problem. If animal cruelty is observed, they will contact the RSPCA. More indirect influence.	
	Medium	Low

NSW Farmers (Director of Cropping and Horticulture)		
	Not a high resource use task - watching brief providing advice and being a conduit for information out to people. Impact on members and ability to add value to agriculture. On their own influence is low but ability to integrate with other people to create integrity in the message is important. Challenge is that not all are members and some do not have the level of literacy required to understand message. Practises influenced- weed control. More so than plant or animal disease.	
LLS (Biosecurity Officer Veterinarian)	High	Medium
	So I would say it's a very strong desire to, or intention to, involve these people in our program. Challenges- LLS is a very newly established department. So this is also our - everything we're doing is just a starting point I would say. Especially some of the systems have already been in place for a long time, but especially the extension program. What we are doing is pretty much a new style or a new approach that we are trying to implement. Practices influenced- Involvement with the saleyard. Very strong relationship and involvement with the saleyard. It's enabled a focus point for involving with the smallholders. The other is the relationship with the private veterinarians. Mainly the movement and identification of diseases, and we give some education as well. A lot of the time we actually are responsive than proactive.	
LLS (Senior Land Services Officer, Horticulture)	High	High
Pig Producer	Well I've spoken to them before about different things, but unfortunately it's very ingrained. What they do is very ingrained because it's a very deep traditional cultural kind of thing.	
Private veterinarian Leppington	High	Medium - High
Rural supplier Horticulture Leppington	High	High
Private veterinarian (Hawkesbury)	Medium	Medium - High
	Practices influenced- I think we do. People are generally fairly good with us. Now that they know, in Hawkesbury word of mouth is everything. Word of mouth seems to be spreading round and we recently won the business award which has made us more prevalent and people are actually - we're getting more and more advice - phone calls for advice. I mean we're quite happy to give the advice on the phone. Because there's no one else who will actually give them the advice and a lot of farmers are every grateful for that advice. Then you might see them in another two or	

	three weeks, they'll actually come into the clinic and introduce themselves. They'll be I spoke to so and so on the phone and they gave me this. I just want to further discuss that. Then we can discuss it and give them a drenching or vaccinations or things like that or arrange a house visit. Or they bring us photographs and one or two of their animals in. So I do think they do listen - a lot of them do listen to us and value the advice.	
NSW DPI (Plant Pathology)		
	Interest- Had spent a fair part of career with peri urban but now equally looking at large corporate farms. Influence- Varies- sometimes small things can make a big difference and sometimes you can do a lot of work for no change. Hard to gauge. No difference between big and small growers. It is problem solving and sometimes you can help and sometimes you can't.	
Nursery and Garden Industry Association	Medium	Low
	Interested but not directly engaged. Interest would be more from the economics and environmental sustainability side of things. Influence- NGINA haven't got the means to do everything so it is the level of priority.	
Hawkesbury Harvest		Low (none)
	Assume that as professional growers their stewardship practices are appropriate to their farm operation. Only time they get involved is if they get a negative comment back via communication channels which is then fed back to the farmer. Other than that, Harvest is a marketing and networking hub- not influential on actual farm operations.	

APPENDIX 5. Macquarie University Human ethics approval letter- Landholders

Office of the Deputy Vice-Chancellor
(Research)

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NSW 2109 Australia
T: +61 (2) 9850 4459
http://www.research.mq.edu.au/
ABN 90 952 801 237

MACQUARIE University
SYDNEY·AUSTRALIA

19 December 2016

Dear Dr Taylor

Reference No: 5201600807

Title: *Greater Sydney Peri Urban Social Research Project -Phase 2 Interviews*

Thank you for submitting the above application for ethical and scientific review. Your application was considered by the Macquarie University Human Research Ethics Committee (HREC (Human Sciences & Humanities)).

I am pleased to advise that ethical and scientific approval has been granted for this project to be conducted by:

- Macquarie University

This research meets the requirements set out in the *National Statement on Ethical Conduct in Human Research* (2007 – Updated May 2015) (the *National Statement*).

Standard Conditions of Approval:

1. Continuing compliance with the requirements of the *National Statement*, which is available at the following website:

http://www.nhmrc.gov.au/book/national-statement-ethical-conduct-human-research

2. This approval is valid for five (5) years, subject to the submission of annual reports. Please submit your reports on the anniversary of the approval for this protocol.

3. All adverse events, including events which might affect the continued ethical and scientific acceptability of the project, must be reported to the HREC within 72 hours.

4. Proposed changes to the protocol and associated documents must be submitted to the Committee for approval before implementation.

It is the responsibility of the Chief investigator to retain a copy of all documentation related to this project and to forward a copy of this approval letter to all personnel listed on the project.

Should you have any queries regarding your project, please contact the Ethics Secretariat on 9850 4194 or by email ethics.secretariat@mq.edu.au

APPENDIX 6. Charles Sturt University Faculty of Science Human ethics approval letter- Landholders

Charles Sturt University

OFFICE OF GOVERNANCE AND CORPORATE AFFAIRS
GOVERNANCE SERVICES

Private Mail Bag 29
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Tel: +61 2 6338 4185
Fax: +61 2 6338 4194
Email: ethics@csu.edu.au
http://www.csu.edu.au/acad_sec

27 January 2017

Dr Mel Taylor
By Email: mhernandez-jover@csu.edu.au

Dear Dr Taylor,

Thank you for advising the Charles Sturt University (CSU) Human Research Ethics Committee (HREC) that your project entitled ***"DGreater Sydney Peri Urban Social Research Project - Phase 2 Interviews"*** has been approved by the Macquarie University Human Research Ethics Committee (Human Sciences & Humanities).

The CSU HREC operates in accordance with the National Health and Medical Research Council's *National Statement on Ethical Conduct in Research Involving Humans* and as such accepts other fully constituted HREC's determinations.

Consequently I am pleased to advise CSU HREC has approved your project for a twelve- month period from the date of this letter.

The protocol number issued with respect to this project is **H17006**. Please be sure to quote this number when responding to any request made by the Committee.

Please note the following conditions of approval:

- all Consent Forms and Information Sheets are to include either the CSU logo or letterhead, if possible. Students should liaise with their Supervisor to arrange to have these documents printed;
- you must notify the Committee immediately in writing should your research differ in any way from that proposed. Forms are available at http://www.csu.edu.au/__data/assets/word_doc/0012/963768/Report-on-Research-Project_20130503.doc
- you must notify the Committee immediately if any serious and or unexpected adverse events or outcomes occur associated with your research, that might affect the participants and therefore ethical acceptability of the project. An Adverse Incident form is available from the website: as above;
- amendments to the research design must be reviewed and approved by the Human Research Ethics Committee before commencement. Forms are available at the website above;
- if an extension of the approval period is required, a request must be submitted to the Human Research Ethics Committee. Forms are available at the website above;
- you are required to complete a *Report On Research Project*, which can be downloaded as above, by 17 November 2017 if your research has not been completed by that date;
- you are required to submit a final report, the form is available from the website above.

YOU ARE REMINDED THAT AN APPROVAL LETTER FROM THE CSU HREC CONSTITUTES **ETHICAL APPROVAL ONLY.**

If your research involves the use of radiation, biological materials, chemicals or animals a separate approval is required from the appropriate University Committee.

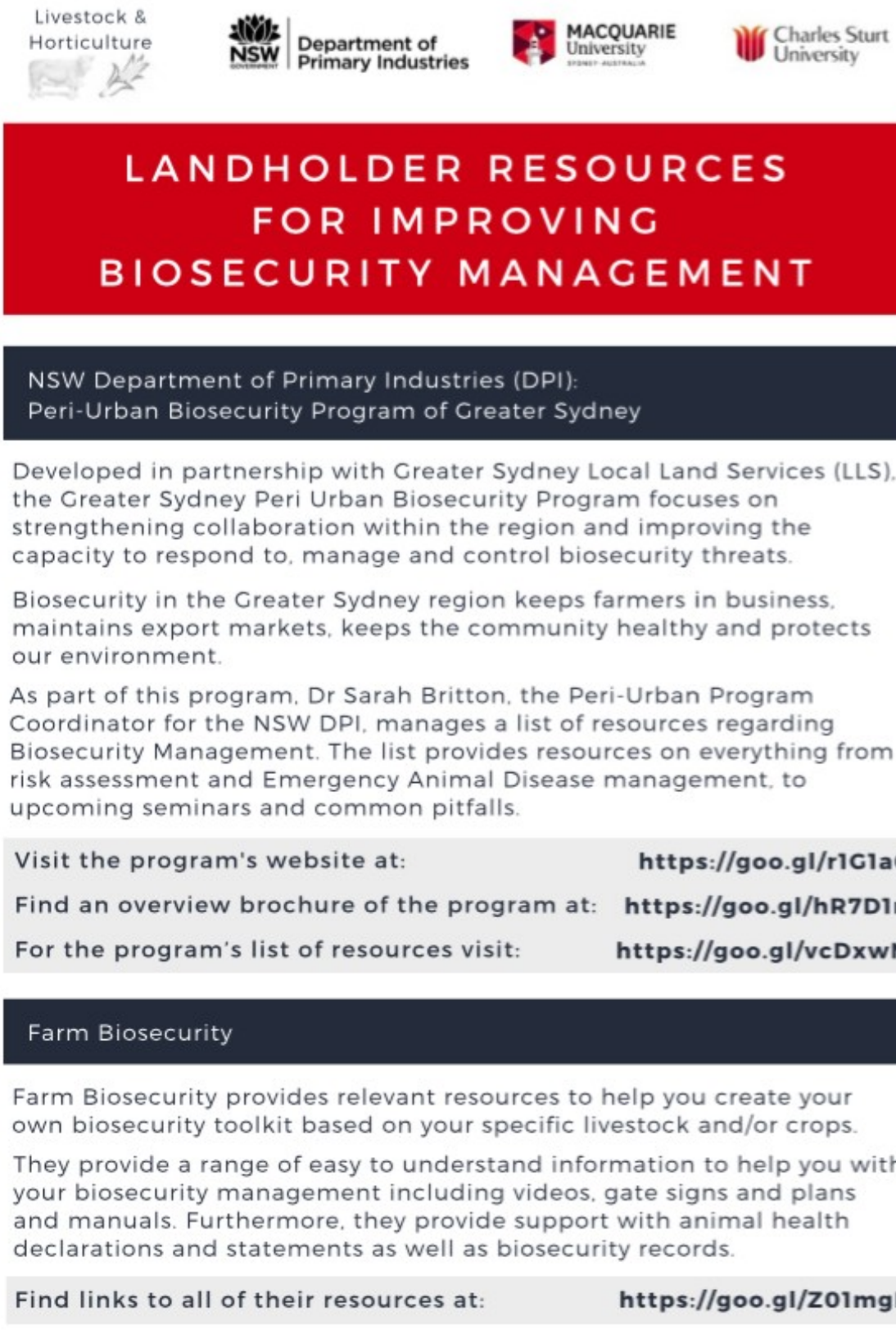
The Committee wishes you well in your research and please do not hesitate to contact the Governance Officer on telephone (02) 6338 4628 or email ethics@csu.edu.au if you have any enquiries.

Yours sincerely

Regan McIntosh
Governance Officer
Human Research Ethics Committee
Direct Telephone: (02) 6338 4628
Email: ethics@csu.ed.au

The Charles Sturt University Human Research Ethics Committee is constituted and operates in accordance with the National Health and Medical Research Council's (NHMRC) *National Statement on Ethical Conduct in Human Research* (2007)

APPENDIX 7. Landholder Biosecurity Management Resource Sheets for landholders participating in the interviews.



Livestock & Horticulture

NSW Department of Primary Industries

MACQUARIE University

Charles Sturt University

LANDHOLDER RESOURCES FOR IMPROVING BIOSECURITY MANAGEMENT

NSW Department of Primary Industries (DPI): Peri-Urban Biosecurity Program of Greater Sydney

Developed in partnership with Greater Sydney Local Land Services (LLS), the Greater Sydney Peri Urban Biosecurity Program focuses on strengthening collaboration within the region and improving the capacity to respond to, manage and control biosecurity threats.

Biosecurity in the Greater Sydney region keeps farmers in business, maintains export markets, keeps the community healthy and protects our environment.

As part of this program, Dr Sarah Britton, the Peri-Urban Program Coordinator for the NSW DPI, manages a list of resources regarding Biosecurity Management. The list provides resources on everything from risk assessment and Emergency Animal Disease management, to upcoming seminars and common pitfalls.

Visit the program's website at:	**https://goo.gl/r1G1a6**
Find an overview brochure of the program at:	**https://goo.gl/hR7D1n**
For the program's list of resources visit:	**https://goo.gl/vcDxwN**

Farm Biosecurity

Farm Biosecurity provides relevant resources to help you create your own biosecurity toolkit based on your specific livestock and/or crops.

They provide a range of easy to understand information to help you with your biosecurity management including videos, gate signs and plans and manuals. Furthermore, they provide support with animal health declarations and statements as well as biosecurity records.

Find links to all of their resources at:	**https://goo.gl/Z01mgL**

LANDHOLDER RESOURCES FOR IMPROVING BIOSECURITY MANAGEMENT

Property Identification Code (PIC)

A PIC is a unique eight-character number assigned by Local Land Services (LLS) to properties with livestock. This property registration system allows for the tracing of livestock to assist with disease and chemical residue management.

From 1 September 2012, anyone who keeps livestock in NSW is required to obtain a Property Identification Code (PIC) for the land on which the livestock are kept.

For the PIC brochure for landholders see:	**https://goo.gl/rXWzZT**
For the PIC brochure for horse owners see:	**https://goo.gl/JXQwdq**
For more information, or to obtain a PIC, visit:	**https://goo.gl/JVdkK8**

The Biosecurity Act (2015)

In 2013, the NSW Government released the NSW Biosecurity Strategy 2013 – 2021, outlining how government, industry and the community need to work together to identify, prevent, eradicate, minimise, respond to and manage biosecurity risks. The Strategy is based on the principle that biosecurity is a shared responsibility between governments, industries and individuals and highlights the importance of General Biosecurity Duty (GBD).

The Biosecurity Act complements that principle by providing a range of tools and powers that can be used to support risk based management and allow for increasing efficiency and decreasing regulation.

For an overview brochure on the act visit:	**https://goo.gl/wwNgQ6**
For an overview of GBD go to:	**https://goo.gl/euWf2n**
To read the full Biosecurity Act go to:	**https://goo.gl/FQJ3vX**

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LANDHOLDER RESOURCES FOR IMPROVING BIOSECURITY MANAGEMENT

National Livestock Identification System (NLIS)

The NLIS is Australia's system for identifying and tracing livestock. It is endorsed by Federal and State governments and by major producer, feedlot, agent, saleyard and processor bodies.

For an overview brochure about NLIS visit:	**https://goo.gl/R48UP9**
To create an account or login to NLIS go to:	**https://goo.gl/tpymTs**

Australian Pork Limited (APL)

The APL is a producer owned organisation supporting and promoting the Australian pork industry. They provide a large number of resources and publications for Aussie pig farmers including:

- Producer Notices & Alerts
- Annual Reports & Operating Plans
- Strategic Plans
- Blueprints for AUS Agriculture
- Submissions to Government
- Newsletters
- Fact Sheets
- Three-year Performance Reviews

Find links to all of their resources at:	**https://goo.gl/xks14m**
For producer notices and alerts visit:	**https://goo.gl/YPsLTe**

*Please note that all URLs are case-sensitive.

NSW Department of Primary Industries | MACQUARIE University | Charles Sturt University

Information Current as of February 2017

APPENDIX 8. Peri-urban landholder semi-structured interviews

Objectives of the landholder interviews:

Investigate current biosecurity knowledge and practice implementation, attitudes towards biosecurity management and 'shared responsibility', communication networks and values, beliefs and social norms driving these practices.

Topics / Sections

1. Introduction - the property/enterprise and husbandry/management
2. Farm practices and attitudes in relation to biosecurity and animal/plant health management
    - biosecurity knowledge
    - biosecurity practices
    - animal/plant health management practices
    - knowledge of diseases / emergency animal diseases
    - attitudes towards these diseases and their management (recognition, reporting and management)
    - perceptions of biosecurity risks
    - perceptions/attitudes on biosecurity and animal health responsibilities
3. Information and communication practices and networks of landholders
    - Information seeking behaviour
    - Sources of information / Trusted sources of information / Communication networks
    - Methods of information delivery

Questions

(L) = livestock holder questions, (H) = horticulture grower questions.

Introduction - the property/enterprise and husbandry/management

1. How would you describe your property/enterprise? *(focusing on which livestock do they keep / horticulture products)*
2. Which species of animals do you keep and how many of each species? (L)
3. How long have you had livestock on your property? (L)
   How long have you produced *horticulture products* in your property? (H)

4. What is your main reason/motivation for keeping livestock? (L)
   What is your main reason/motivation for producing horticulture products? (H)

   (primary income, secondary income, home consumption, hobby, family tradition…)

5. How would you describe your overall approach to livestock/horticulture production?

Farm practices and attitudes in relation to biosecurity and animal/plant health management

6. What do you believe are the main diseases that pose the greatest potential as well as actual risk to your farm?
7. Can you describe the practices that you use to prevent diseases from impacting on the health of your animals or plants?

8. Why do you use those practices?
9. How would you rate management of animal/plant health compared to other priorities on your farm?
10. What are the main challenges (e.g., biophysical, cultural, institutional) or pressures you face in managing the health of your animals or plants?
11. How would you describe your general awareness of your responsibilities as a landholder to manage animal/plant health and to prevent the introduction and spread of disease?
12. How would you describe your general willingness to implement recommended or prescribed animal/plant health practices?
13. Are there any animal or plant health management practices of which you are aware that you are not following? Why?
14. What do you understand is meant by the term biosecurity? In what ways do you believe it is relevant to your farm, and why?

Information and communication practices and networks of landholders

15. Have you sought advice in the past about general animal/plant health management?
16. Who do you seek advice from and what sorts of things do you seek advice about does it regard? Examples?
17. Which individuals, agencies or organisations do you trust the most/least in seeking information on disease risks and management? Why?
18. How do you receive information on animal/plant health?
19. In what ways is current communication on animal/plant health adequate?
20. Is there information that could keep you better informed about animal/plant health that you would like to receive but do not at present?
21. Do you think peri-urban landholders have adequate support to effectively prevent against adverse disease impacts?

APPENDIX 9. Advertisement for landholder recruitment – letter box drop, Hawkesbury show.

INVITATION TO PARTICIPATE

Greater Sydney Peri-urban Social Research Project

You are invited to participate in a research study about the needs of landholder producers in the peri-urban area of Sydney.

You have been handed, emailed, or posted this invitation because you are a small landholder in the Austral/Leppington or Camden area and you might be able to make a useful contribution to our study.

We are conducting a series of 30-40 interviews with small landholders in the Leppington and Hawkesbury areas. We are interested in people who own/manage acreage properties and keep livestock and/or grow horticultural produce. We are interested in understanding what your needs and concerns are in relation to animal/plant health practices, where you go to for information and how do you like the information to be delivered to you.

Interviews will take around 30-45 minutes, via phone, and will be arranged at a convenient time for you. You will also receive a $50 gift card as a small thank you for your participation.

The research study is being conducted by researchers at Macquarie University (Dr Mel Taylor) and Charles Sturt University (Dr Marta Hernandez-Jover, Dr Rob Woodgate, Assoc/Prof Vaughan Higgins) and is funded by NSW Department of Primary Industries (DPI).

If you think you might be willing to take part in an interview, please email or call me and I can provide you with additional information. Please note, if you contact me, you are under no obligation to agree to an interview and no details of our contact will be disclosed to the DPI, Local Land Services or any other party.

Many thanks for your consideration – I do hope you will consider taking part in our study.

Annaliese McGavin
Research Assistant, Macquarie University
Phone: 04 8197 3175

Email: annaliese.mcgavin@mq.edu.au

References

Corbin, J., & Strauss, A. (1990). Grounded Theory Research: Procedures, Canons and Evaluative Criteria *Zeitschrift für Soziologie* (Vol. 19, pp. 418).

Miles, M., & Huberman, A. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks: Sage.