

Consultation Round Three, Response to Submissions by Management Agency, March 2023

Contents

Overview	2
Summary of Agency decisions	3
Redrafting requirement for diagnostic laboratories to provide AFB test results	3
Single infringement fine rate for corporations and individuals	4
Consideration of submissions	4
Proposed offences and penalties	5
Proposed training requirements	8
Proposed changes to plan rules, by principal measure	9
Proposed additional powers	21
Other current plan rules	25
Cross-cutting themes	26



Overview

In June 2021 the Management Agency initiated the first of three consultation rounds designed to encourage beekeepers to express their views on the National American Foulbrood Pest Management Plan (AFB Plan).

Round One (June-July 2021) invited beekeepers to tell the AFB Agency what was missing when it comes to eliminating AFB, and how the current AFB Plan needed to change. This feedback informed the development of draft recommended changes to the AFB Plan.

Round Two (November-December 2021) communicated the draft recommended changes to the AFB Plan to beekeepers and invited beekeepers to indicate their preferences and provide feedback. This feedback provided support to move forward with the recommended changes and develop a draft detailed proposal. The Agency also met with diagnostic laboratories seeking their view about a proposed new rule that required diagnostic laboratories to provide AFB test results to the Agency.

Round Three (August-September 2022) communicated the proposed draft detailed proposal to beekeepers and invited beekeepers to indicate their preferences and provide feedback. The AFB Agency also conducted a series of consultation meetings with diagnostic laboratories (September-November 2022) seeking their views about a proposed new rule that required diagnostic laboratories to provide AFB test results to the Agency.

Overall, there was strong support for the proposed changes presented in Round Two, and for the detailed changes presented in Round Three. At the same time there were also dissenting views expressed by some beekeepers and these were considered by the AFB Agency Board when making their decision to move forward with the proposal.

For the Round Three consultation, 289 submissions were received. This report responds to the key findings from the 'Analysis of Submissions' report (see https://afb.org.nz/review-of-plan-order/). A summary of the full consultation process is provided in the 'Consultation Summary Report' (see https://afb.org.nz/review-of-plan-order/)

The Agency would like to thank submitters for their submissions on the future of the next 10 years of the AFB Plan.

Summary of Agency decisions

Having considered the submissions, the Agency has decided to strengthen the AFB Plan by proceeding with all proposed amendments except for the following changes:

- Redrafting the proposed new rule requiring diagnostic laboratories to provide AFB test results into two separate rules
- Removing the proposed higher infringement fines for corporations and changing to a single fine rate.

Redrafting requirement for diagnostic laboratories to provide AFB test results

The proposed a new rule 'that diagnostic laboratories are required to provide the management agency with all AFB testing results and contact details for the submitter and beekeeper' received 71% agreement from submitters. However diagnostic laboratories highlighted that they would face high compliance costs to meet these rule requirements. In response, and with the support of the laboratories consulted, it is now proposed that the original proposal is redrafted into two separate rules.

- 1. one rule specifying the obligations of sample submitters to identify samples submitted to laboratories for AFB testing, and
- 2. one rule specifying the requirement for laboratories to provide AFB test results to the Agency.

The proposed new rules and implications are described in Table 1 below.

Table 1: Proposed new rules for the submission of samples and provision of AFB test results.

New rules	What are the implications?	Who's affected
Requirement to identify samples submitted to laboratories for AFB testing.	 Persons submitting samples to the laboratory for AFB testing must identify samples as follows. Samples collected from a single beekeeper must be identified with their beekeeper registration number as a prefix. Composite samples from 2 or more beekeepers must be identified by a batch number. Records enabling samples to be traced to the source beekeepers(s) and apiaries must also be kept. 	Persons, including exporters and extractors, who submit samples to diagnostic laboratories for AFB testing.
Requirement for laboratories to provide AFB test results.	Persons in charge of diagnostic laboratories must supply AFB test results to the Management Agency.	Persons in charge of diagnostic laboratories.

These proposed (redrafted) rules will ensure that the Agency has access to the required AFB test results and will:

- minimise the effort required by sample submitters, particularly exporters and extractors, as they
 require sample submitters to label samples with information that is readily available to them,
 and
- minimise the impact on Laboratory Information Management Systems and sample submission forms by leveraging the sample identification fields that already exist.

Single infringement fine rate for corporations and individuals

The majority of questionnaire submissions (as shown in brackets) agreed with the imposition of infringement fines for breaches of the following plan rules:

- Prohibition on keeping bees in a place other than an apiary (60% agreement)
- Obligation to keep bees in moveable-frame beehives (65%)
- Certificate of Inspection (59% agreement)
- Annual Disease Return (57% agreement).

However, some submitters also sought clarification on the definition of a 'corporation' and the rationale for using differing fine amounts for individuals and corporations. In response to this feedback, the Agency clarified the definition of a corporation used by the Biosecurity Act 1993. On review, the Agency considered this definition was too ambiguous to consistently differentiate between corporations and individuals for the purposes of imposing a fine.

In response, the Agency now proposes that a single fine rate should be used for both individuals and corporations. The Agency is satisfied that this change will not significantly reduce its ability to deter corporations from non-compliance, as corporations will also be deterred by the Agency's ability to cancel Disease Elimination Conformity Agreements (DECAs) in response to non-compliance.

Consideration of submissions

Submissions provided strong support for the proposed changes to the AFB Plan. Dissenting views were also expressed in some submissions and these were taken into account by the AFB Agency Board in their decision-making process.

The detailed consideration of submissions is presented in tables two to seven.

- Proposed offences and penalties (Table 2).
- Submissions on proposed training requirements for DECA holders that were not specific to a proposed rule change (Table 3).
- Proposed changes to plan rules (including plan rules proposed to become an infringement offence) (Table 4).
- Proposed changes to powers (Table 5).
- Existing plan rules that the Agency did not propose amending (Table 6).
- Cross-cutting themes (Table 7).

Proposed offences and penalties

Table 2: Consideration of submissions on proposed changes to offences and penalties.

Submitter themes and subthemes	Management Agency considerations
Fines are heavy handed, ineffective, and expensive to administer. Fines won't deter the non-compliant. It's revenue collecting and will lead to under reporting of AFB. The focus should be on education not penalties. Arguments were made against some existing rules and the proposed penalties (Theme 11). Issues raised by submitters included:	Beekeepers that are not abiding by plan rules are adversely affecting beekeepers that are abiding, and the Agency requires practical and cost-effective deterrents to non-compliance to protect compliant beekeepers. It is not practical or cost effective to prosecute over 3,500 offences per year in court. The current levels of offending are as follows:
 Imposing fines is too controlling and unnecessary Administering fines and increased surveillance will add to administration costs Fines are a way of increasing revenue to pay the Management Agency costs and salaries 	 Annual Disease Return (ADR) – over 2,500 offences per year Certificate of Inspection (COI) – over 900 offences per year Apiary registration – over 150 detected offences per year. The Agency has good evidence that imposition of practical and cost-effective deterrents improves compliance. The Management Agency cancels DECAs when a
Focus should be on education and support, not penalties. There should be incentives and rewards for compliance.	DECA holder fails to submit an ADR despite receiving repeated warnings. The ADR non-compliance rate for DECA holders (late ADRs submitted by 31 July) is only 1%, whereas the ADR non-compliance for non-DECA holders, where the Agency does not have a cost-effective deterrent, is 15%.
	The Agency is proposing to implement infringement fines as part of a portfolio of interventions to improve compliance including improvements to education, information, monitoring and enforcement. The Agency's proposed approach to implementing infringement fines will focus on
	maximising the deterrence value by giving warnings to beekeepers and providing them an opportunity to correct non-compliance. Only a limited amount of infringement revenue will be generated from this approach, as effective use of fines as a deterrent is expected to result in a substantial reduction in non-

The fines structure is not weighted properly. Penalties to reflect the seriousness of the offence, the size of the beekeeping operation, and allow discretion for mitigating circumstances and history of non-compliance (Theme 12).

Issues raised by submitters included:

- Penalties should be appropriate to the seriousness of the offence. Some
 offences are more serious than others and this should be reflected in the
 penalties. Offences such as failing to destroy infected beehives should be
 subject to a greater fine for instance, than for breaching the proposed ADR
 rule.
- Penalties should be appropriate to the size of the beekeeping operation.
 Clarification of the definition of a corporation and the rationale for the differing fine amounts is needed. Some agreed corporations should pay more, while others disagreed.
- Discretion to be applied to take circumstances into account. There may be good reasons for beekeeper non-compliance such as weather conditions or no access. Actions could be escalated if beekeepers fail to act when requested and non-compliance puts other nearby beekeepers at risk.

compliance. The ADR example described above represents a 93% reduction in non-compliance using a practical and cost-effective enforcement tool.

The Agency considers that failure to destroy infected hives is a very serious offence, and as such, prosecution via the courts is a more appropriate than the use of infringement fines.

The Agency has considered the seriousness of offending when proposing the size of the fine. Therefore, the proposed fines for failing to keep beehives in movable frame beehives, register an apiary, and complete Certification of Inspection are greater than the proposed fines for failing to submit an Annual Disease Return. The proposed size of the infringement fines is at the lower end range of fines imposed by other enforcement agencies.

The Biosecurity Act 1993 uses the definition of a corporation as defined by the Corporations (Investigation and Management) Act 1989 as 'a body of persons, whether incorporated or not, and whether incorporated or established in New Zealand or elsewhere'. The Agency considers that this definition is too ambiguous to enable consistent and transparent imposition of infringement fines, and therefore proposes to impose fines at a single rate for corporations and individuals.

The Agency will continue to use its current ability to cancel DECA's in addition to imposing infringement fines and is satisfied that this will be a sufficient deterrence to non-compliance for corporations.

The Agency only proposes to impose infringement fines when the beekeeper has been given a warning and subsequently fails to correct the non-compliance.

Fines are a last resort. Education, good communication, and warnings are needed first (Theme 13).

Issues raised by submitters included:

- Education and warnings should be the first response to non-compliance. There could be leniency for first time offenders and a 'three strike' approach. Fines should be reserved as a last resort for beekeepers who repeatedly refuse to comply.
- Beekeepers need to be made aware of the rules, penalties, and their obligations, especially new beekeepers. The rules should be clearly communicated and understandable. New beekeepers should be advised to book an inspection early.

The Agency proposes to implement infringement fines according to the Ministry of Justice Policy Framework For New Infringement Schemes. This policy framework requires the Agency to provide education and warnings before imposing fines.

The Agency only proposes to impose infringement fines when the beekeeper has been given a warning and subsequently fails to correct the non-compliance.

Enforcement, complaints, and appeal process need to be clearly outlined and put in place. Enforcement of the rules must be fair and measured. Some raised concerns about conflicts of interests by enforcers (Theme 14).

Issues raised by submitters included:

- A statement of how the rules will be enforced needs to be set out, including how they will be enforced, who will be enforcing, and what happens if fines are unpaid. The rights of entry to private property need to be clarified and a complaints and appeal policy must be set out. The proposed changes will result in infringements being challenged.
- Proposals should be implemented in a fair and measured way.

The implementation of infringement penalties will be consistent with Ministry of Justice Policy Framework For New Infringement Schemes. The Agency will:

- regularly communicate with those beekeepers in breach of rules, including providing reminders of the requirement to comply with plan rules
- provide offending beekeepers with a warning that they have breached a plan rule, and give them the opportunity to rectify the offending, e.g., by registering the apiary, completing a late Certificate of Inspection or Annual Disease Return
- impose the infringement penalty when the offending beekeeper fails to rectify the offending after receiving reminders and warnings.

The Ministry of Justice Policy Framework For New Infringement Schemes sets out the required legal processes, including the defendants right to challenge the infringement fine.

Agency authorised persons already have the power to enter private property as prescribed by section 109 of the Biosecurity Act 1993.

The authority to issue infringement fines will be limited to Agency employees. AP2s will not have the authority to issue infringement fines.

Proposed training requirements

Table 3. Consideration of submissions on proposed training requirements that are not specific to a proposed rule change

Submitter themes and subthemes	Management Agency considerations
Training courses need to be better and be free, and the best training is provided in the field (Theme 4). Issues raised by submitters included: Training courses aren't good, are too easy, and aren't available often enough or in enough locations. Courses should be accessible and affordable or free The best training is in the field, including offering workshops and field days. Disease-a-thons for hobby beekeepers were valuable in the past.	The Agency has recently revised its AFB recognition and refresher courses to improve learning outcomes for participants. The Agency is offering these courses through an online learning portal. This will provide great convenience and accessibility for those who are unable to, or find it difficult to, attend our inclassroom courses. The online refresher course is available free of charge to encourage beekeepers to regularly refresh their ability to recognise AFB. The Agency agrees that field-based training is very valuable. However, it is also expensive to deliver. Field-based training can be more cost effectively delivered by employers and clubs to their employees and members. Funding the provision of 'free training' would require levies to be increased. The Agency considers that it is more equitable for course participants and not levy payers to fund the cost of providing training.
Training course attendance is an unreliable indicator of ability to detect AFB. AFB is easy to recognise. It is the ability and willingness to act when AFB is found that matters. The problem is ineffective management systems and lack of action when AFB is detected (Theme 5).	Training is necessary to ensure that all beekeepers and their employees have the knowledge to recognise and elimination AFB.

Proposed changes to plan rules, by principal measure

Table 4. Consideration of submissions on proposed changes to plan rules grouped by principal measure

	Clause	Proposed amendment	Submitter feedback	Expected scale of impacts	Management Agency decision
			All beehives are situated in a place n	otified to management agency	
15	Prohibition on keeping bees in a place other than an apiary.	Change to infringement offence.	60% of questionnaire submitters agreed with proposed change. Support from beekeepers with 51+ beehives was lower with 44% agreeing and 41% disagreeing. Refer to Table 2 for response to submitter views on proposed infringement offences.	No impact on beekeepers that comply with current apiary registration requirements. Compliance with current apiary registration requirements is expected to increase.	Proceed with proposed rule change.
19	Allocation of identification code.	Amend to allow the management agency to issue beekeeper registration number prior to registration of first apiary.	83% of questionnaire submitters agreed with the proposed change.	No impact on beekeepers. Will make it easier for beekeepers to comply with proposed new rule requiring beekeepers to notify transfers of beehives within 14 days.	Proceed with proposed rule change.
20	Marking of apiaries.	Remove redundant subclause 2(b).	Proposed technical amendment was not highlighted in consultation process.	No impact on beekeepers.	Proceed with proposed rule change.
	All beehives are inspected at least once per year by a person competent to recognise AFB				
11	Obligation to keep honey bee in moveable-frame hives.	Change to infringement offence.	65% of questionnaire submitters agreed with the proposed change. Refer to Table 2 for response to submitter views on proposed infringement offenses.	No impact on beekeepers that comply with current requirement to keep bees in moveable frame hives.	Proceed with proposed rule change.

	Clause	Proposed amendment	Submitter feedback	Expected scale of impacts	Management Agency decision	
32	Certificate of inspection.	Change to infringement offence.	59% of questionnaire submitters agreed with the proposed change. Support from beekeepers without a DECA was lower at 55%. Issues raised by submitters included: • Proposed penalty for breaching 'Certificate of Inspection' is harsh and it can be difficult to locate an inspector to obtain a COI.	Compliance with current requirement to keep bees in moveable frame hives is expected to increase. No impact on beekeepers that comply with current Certificate of Inspection requirement. Compliance with current Certificate of Inspection requirement is expected to increase.	Proceed with proposed rule change. Ensuring that all beehives are inspected at least once per year by a person competent to recognise AFB is fundamental to successful implementation of the AFB Plan. The imposition of infringement fines is expected to increase compliance with this requirement. The Agency assists beekeepers find a DECA holder to inspect their beehives by proactively publishing a list of DECA holders that are available to perform Certificate of Inspections. The Agency also provides individual assistance to beekeepers who have trouble locating a DECA holder to complete their inspection.	
All ho	All honey bees, bee products, and appliances associated with detected cases of AFB are destroyed or sterilised; and other actions to prevent the spread of AFB					
28	Obligation of beekeeper to destroy honey bees and materials.	Change to make it an offence to breach this rule.	77% of questionnaire submitters agreed with the proposed change. Refer to Table 2 for response to submitter views on proposed infringement offences.	No impact on beekeepers that comply with current requirement to destroy honeybees and materials. Compliance with current requirement to destroy honeybees and materials is expected to increase.	Proceed with proposed rule change.	

	Clause	Proposed amendment	Submitter feedback	Expected scale of impacts	Management Agency decision		
	DECA holders make a legal commitment to eliminate AFB from their beehives						
New	Training of employee beekeepers.	DECA holder employers must ensure that employee beekeepers (persons employed or contracted to undertake honey bee husbandry procedures) pass a recognised course in AFB recognition either prior to their employment or within 6 months of the initiation of their employment.	 84% of questionnaire submitters agreed with the proposed change. Support from beekeepers with 500+ beehives was lower with 50% agreeing and 44% disagreeing. Issues raised by submitters included: Employees engage in a range of tasks and are not all employees are involved in bee husbandry. Employees may work part time, seasonally, casually, and be family members. For employees not responsible for inspecting hives, AFB recognition training is not needed. Some employees may not have the English literacy skills to attend courses. Training within six months of commencing employment is too soon. Some employees may leave within a year, some will be working under supervision, and others will only undertake one function in the first season. In times of high staff turnover, this requirement is not a practical. 	The initial implementation cost of this training requirement is \$100 (inc. GST) per employee beekeeper plus one day to attend the course. Once the initial training of the employee beekeeper workforce has been completed the ongoing cost will be reduced to the percentage of new employee beekeepers entering the industry each year. Staff turnover caused by employee beekeepers transferring from one employer to another does not add to the cost on an industry basis. The impact of the proposed new employee beekeeper training requirement is variable depending upon the employer's current approach to training their staff: • Employers that already send their employee beekeepers to Agency courses will be unaffected as the proposed new legal requirement does not represent a change. • Employers that already provide good quality in-house training to their employee beekeepers will incur	Proceed with proposed rule change as it sets a minimum employee beekeeper training standard to ensure that the persons responsible for bee husbandry employed by commercial DECA holders know how to recognise and eliminate AFB. The responses to specific issues raised by submitters are addressed as follows: • The proposed definition of an employee beekeeper only includes employee's responsible for bee husbandry. • The Agency already offers AFB recognition course tests in alternative languages. • The Agency considers it is important that all employee beekeepers responsible for bee husbandry know how to recognise and eliminate AFB irrespective of their length of employment. Six months is an administratively appropriate timeframe to complete training within.		

Clause	Proposed amendment	Submitter feedback	Expected scale of impacts	Management Agency decision
		 It is an anomaly for employee beekeepers to be eligible to hold a DECA after six months when other beekeepers must wait 12 months. New beekeepers may find it a challenge to find and pay for COI inspectors during this 12-month period, when they have passed an AFB recognition course. Employers are responsible for ensuring staff are competent for the work tasks. Employer beekeepers offer better training than those provided by the Management Agency. Employer training is in the field, provided by experienced beekeepers, and occurs more frequently than proposed requirement. 	additional training costs for limited benefit. • Employers that provide no training or poor-quality training to their staff will incur additional training costs. However, these beekeepers have also made a legal commitment to eliminating AFB from their beehives, and they will be unable to deliver on this commitment unless their employee beekeepers know how to recognise and eliminate AFB.	 The Agency considers it is critical to ensure that employee beekeepers are trained to recognise AFB in times of high staff turnover. The proposed requirement for employee beekeepers to complete AFB Recognition training is not inconsistent with the rules for applying for a DECA. A DECA is a legal agreement by the beekeeper to eliminate AFB from their beehives. The proposed employee beekeeper training requirement may increase, not decrease, the availability of COI Inspectors. This is likely as potentially more employee beekeepers will be recognised as 'Persons Responsible for Disease Management' under their employers DECA. The Agency agrees that employers are responsible for training their staff. Unfortunately, too many employers fail to do this adequately and AFB is spread as a consequence. The Agency agrees that field-based training provided by employers is highly beneficial and that employees should receive training every year. The intention of the new rule is to

Clause	Proposed amendment	Submitter feedback	Expected scale of impacts	Management Agency decision
				set a minimum training standard that all DECA holders are required to comply with.
	Requires employee beekeepers (persons employed or contracted by a beekeeper who undertakes honey bee husbandry procedures) to complete refresher training every 5 years.	76% of submitters agreed with the proposed change. Support from beekeepers with 251+ beehives was lower with 48% agreeing and 38% disagreeing. No additional themes identified from analysis of beekeeper submissions in addition to those described immediately above.	The time cost of the refresher training requirement is 2 hours once every five years. There is no fee for completing the online refresher training course. (Classroom based training is \$30). This requirement is intended to represent a minimum standard to ensure that employee beekeepers can recognise and eliminate AFB. Best practice approaches to AFB elimination require staff to receive annual training.	Proceed with proposed rule change.
	Requires DECA holders to record employee beekeeper employment dates, and training, and provide this information the Management Agency if requested.	72% of questionnaire submitters agreed with the proposed change. Support from beekeepers with 251+ beehives was lower with 42% agreeing and 44% disagreeing. Issues raised by submitters included: Employee training records are private information. Keeping records is another compliance cost, and the Management Agency should already have this information from attendance records.	The cost of this requirement is minimal as keeping records of employment and training is consistent with good employment practices. Provision of this information to the Agency is required to verify that training requirements are being complied with.	Proceed with the proposed rule change as ensuring that plan rules include provisions that enable monitoring of compliance is good regulatory practice. Responses to specific issues raised by submitters are addressed as follows: Good regulatory practice requires that compliance with regulations can be monitored. The requirement to keep records assists both the employer and the Agency to monitor compliance with the proposed employee beekeeper AFB training obligations.

Clause	Proposed amendment	Submitter feedback	Expected scale of impacts	Management Agency decision
Review of Certificate of Inspection Exemption.	Change to allow Certificate of Inspection Exemption to be revoked if a DECA holder does not comply with 5 yearly AFB refresher training requirement.	 56% of questionnaire submitters supported the proposed change. Support from beekeepers with 251+ beehives was lower with 29% agreeing and 65% disagreeing. Issues raised by submitters included: Experienced beekeepers with a record of good practice should not have to attend five yearly refreshers. There is no benefit, and attendance takes a day out of work. This requirement also undermines the value of the DECA, may reduce compliance, and increases administration costs. Another view was that workshops for commercial beekeepers were seen as an important strategy for reducing AFB levels. Such workshops would be in person, not online, and cover a range of topic areas relevant to commercial operators. Suggested topics included: quality control tools, methods of tracing equipment movement, qPCR, methods of sterilisation, and area eradications. Providing refresher courses for relatively new beekeepers was a 	The time cost of the refresher training requirement is 2 hours once every five years. There is no fee to complete the online refresher training course. (Classroom based training is \$30). Refresher training is highly beneficial as most beekeepers do not see AFB on a sufficiently regular basis to maintain competence. 90% of DECA holders report zero cases of AFB each year. Commercial beekeepers would benefit from additional training and/or workshops that focussed on the challenges of eliminating AFB from commercial beekeeping operations.	 Proceed with the proposed rule change as it is important to ensure that all DECA holders have the knowledge to successfully implement their DECA agreement to eliminate AFB from their beehives. Responses to the specific issues raised by submitters are addressed as follows. Analysis of Agency records and research performed by external parties indicate that New Zealand beekeepers are only detecting 66% to 73% of the AFB cases present. This level of performance is too low to eliminate AFB. Greater investment in education is required to ensure that DECA holders and their employees have the skills and knowledge to recognise and eliminate AFB from their beehives. Most beekeepers, particularly hobbyist and small commercial beekeepers do not see AFB cases on a sufficiently regular basis to maintain competence, and refresher training is required. Completion of the new online refresher course only takes two hours and is available free of charge.

Clause	Proposed amendment	Submitter feedback	Expected scale of impacts	Management Agency decision
		suggested option, although there was also an opposite view. • The role of a DECA needs clarification. Some considered a DECA should not be cancelled and should not be used to require attendance at training courses. There was also view that a DECA should not be cancelled if a beekeeper has increased AFB due to neighbouring infections.		 The Agency agrees that the current refresher course is designed to meet the needs of hobbyists and small commercial beekeepers that do not see AFB cases on a regular basis. The Agency is proposing to develop separate refresher training and/or workshops for commercial beekeepers that focusses on the challenges of how to eliminate AFB from a large commercial beekeeping operation. A DECA is a legal agreement between a beekeeper and the Agency, where the beekeeper agrees to eliminate AFB from their beehives, using the AFB elimination procedures specified in the agreement. The Agency expects beekeepers to implement the AFB procedures specified in their DECA to eliminate AFB from their beehives. It is normal practice for a party to cancel an agreement when the other party fails to abide by the agreement.
	Change to allow Certificate of Inspection Exemption to be revoked if a DECA holder	60% of questionnaire submitters agreed with the proposed change. Support from beekeepers with 251+ beehives was lower with 38% agreeing and 56% disagreeing.	The impact of the proposed training requirements for employee beekeepers is initially \$100 (GST inclusive) per employee beekeeper, and 1 day to complete the recognition	Proceed with the proposed rule change as it is important to ensure that all employee beekeepers have the knowledge required to recognise and eliminate AFB.

	Clause	Proposed amendment	Submitter feedback	Expected scale of impacts	Management Agency decision
		employer does not comply with employee beekeeper training requirements.	Feedback relating to the requirement to train employees and DECA cancellation described above was considered.	course, then 2 hours once every 5 years to complete the refresher course. Training of employee beekeepers is required to ensure that the persons working the beehives are capable of recognising AFB.	
New	Transitional provisions for Review of Certificate of Inspection Exemption.	Provides a two-year transition period for DECA holders to comply with new training requirements.	71% of questionnaire submitters agreed with the proposed two-year transition period to comply with the new training requirements. Support from beekeepers with 251+ beehives was lower with 50% agreeing and 40% disagreeing.	There is no impact from this proposed rule as it is a technical amendment that delays the implementation of the proposed clause 39 amendment for 2 years.	Proceed with proposed rule change.
	Man	agement agency monito	rs beekeepers' compliance with their obl	igations, and undertakes enforcement ac	tions when appropriate
New	Requirement for laboratories to provide AFB test results.	New rule requiring diagnostic laboratories to provide all AFB test results.	71% of questionnaire submitters agreed with the proposed change. Support from beekeepers with 251+ beehives was lower with 44% agreeing and 50% disagreeing. Issues raised by submitters included: Test results are private commercially sensitive information. They are paid for and owned by the beekeeper. Requirement falls heavily on commercial beekeepers. Laboratories should not be required to release this information to the	The impact of this proposed new rule on beekeepers is negligible. Beekeepers would continue to be free to decide whether to submit samples to a laboratory or not, and no extra beekeeper effort is required to provide the results to the Agency. Laboratory test results have the same level of commercial sensitivity as the AFB and apiary notification information already provided to the Agency. All this information is securely managed by the Agency.	The impact of the proposed new rule as originally proposed is assessed as being too high for diagnostic laboratories. The Agency proposes to mitigate this issue by redrafting the proposed rule into two separate rules. • One specifying the obligations of sample submitters to identify samples submitted to laboratories for AFB testing, and • One specifying the requirement for laboratories to provide AFB test results to the Agency.

Clause	Proposed amendment	Submitter feedback	Expected scale of impacts	Management Agency decision
		Management Agency. There was a view that hobby beekeepers should be required to submit samples for testing as they are less likely to recognise AFB. • Test results should only be provided on a voluntary basis. There were suggestions for beekeepers, rather than laboratories, to provide results to the Management Agency. Another option was for the Management Agency to pay for test results. • Some may be discouraged from testing and non-compliant beekeepers are unlikely to submit samples for testing. • Laboratories should only be required to report positive results to the MA. This may reduce the costs that will be passed on to the beekeepers. • Lack of concern for beekeeper privacy, obtaining consents, and safeguarding information. Protections to affected parties against any exploitation by the Management Agency are not specified. There is no indication the Privacy Commissioner has been consulted about safe data storage. Systems will need to be modified to	Access to laboratory information provides the Agency with a highly costeffective mechanism for monitoring beekeeper elimination of AFB. It will enable the Agency to partially substitute more expensive monitoring approaches such as honey surveillance, and apiary inspections. The impact of the proposed new rule as originally drafted would be substantial for diagnostic laboratories. It would require modification of Laboratory Information Management Systems and additional resources and processes to manage the quality of the beekeeper information required.	Responses to other specific issues raised by submitters are addressed as follows: • The Plan Order requires the Management Agency to monitor the compliance of over 10,000 beekeepers owning 739,000 colonies on 61,000 apiary sites. This is a massive undertaking, and the Agency is actively working to find cost effective solutions to meet this requirement instead of simply raising levies to fund additional AP2 apiary inspections. The proposed access to laboratory test results will complement the new honey surveillance programme to increase monitoring of AFB elimination by beekeepers to the required levels without imposing a disproportionate increase in levy rates. • The Agency does not expect laboratory testing rates to decline because of the proposed requirement. • The Agency is seeking negative test results as well as positive test results, as negative test results identify beekeepers successfully eliminating AFB from their beehives.

Clause	Proposed amendment	Submitter feedback	Expected scale of impacts	Management Agency decision
		collect required information in a way to minimise costs to laboratories. A good option to minimise collection of personal information, and protect confidentiality, is to use the beekeeper registration number as the personal identifier on information provided to the Management Agency. Meetings held with diagnostic laboratories highlighted two issues. • The diagnostic laboratories Laboratory Information Management Systems (LIMS) do not currently have the fields required to capture the beekeeper information specified by the proposed new plan rule. • The proposed new plan rule as drafted makes diagnostic laboratories accountable for the accuracy of beekeeper information provided, but they have no ability to control the accuracy of the beekeeper information. One diagnostic laboratory was concerned that the Management Agency was not proposing to provide remuneration for the proposed provision of laboratory results.		 Discussions with diagnostic laboratories have confirmed that it is easier for them to provide all AFB test results than just the positive results. Use of laboratory test results should be viewed as part of an overall monitoring strategy. It is recognised that laboratory test results are more likely to be available from compliant commercial beekeepers. This is helpful as identifying beekeepers who are successfully eliminating AFB will enable the Agency to redirect AP2 inspection resources away from their apiaries. Instead, inspections can be more targeted towards apiaries owned by hobbyists and beekeepers that may be noncompliant with plan rules. The Agency will securely store and protect laboratory test results, as it does with apiary and AFB notification information. The Agency will work with diagnostic laboratories to agree the mechanisms to securely transfer AFB test results to the Agency.

	Clause	Proposed amendment	Submitter feedback	Expected scale of impacts	Management Agency decision
New	Notification of beehive transfer.	New rule requiring beekeepers to notify the transfer of beehives within 14 days.	73% of questionnaire submitters agreed with the proposed change. Issues raised by submitters included: • proposed rule 'beekeepers are required to notify the Management Agency of beehive transfers within 14 days of the transfer taking place' is unnecessary and the timeframe is too short. Clarity about how notification is to be given is needed.	Minimal impact on beekeepers to notify transfers of beehives within 14 days. Many beekeepers already provide this information voluntarily via HiveHub.	Proceed with proposed rule change as timely access to beehive transfer information will enable the Agency to trace AFB outbreaks. Responses to specific issues raised by submitters are addressed as follows. Notification within 14 days is required to provide timely access to beehive transfer information for AFB tracing purposes. Submission "in writing" includes submitting online.
27	Annual Disease Return.	Change to require provision of beekeeper registration numbers when beekeepers notify beehive transfers.	82% of questionnaire submitters agreed with the proposed change to include beekeeper registration numbers when notifying beehive transfers as part of an ADR. Issues raised by submitters included: • proposed rule 'to provide beekeeper registration numbers when recording beehive transfers (sales and purchases) as part of the Annual Disease Return' duplicates existing requirements or should be extended to include hive components and freely given hives.	Negligible impact on beekeepers to include beekeeper registration numbers when notifying beehive transfers as part of an ADR. Many beekeepers already provide this information voluntarily via HiveHub. The inclusion of beekeeper registration numbers will make it easier for the Agency to trace outbreaks of AFB.	Proceed with proposed rule change as Beekeeper Registration Numbers are required to make the beehive transfer data useful for tracing purposes. Responses to specific issues raised by submitters are addressed as follows. It is normal practice for traceability programmes to require both the transferee and the transferer to notify the transaction as this improves the integrity of the data. HiveHub enables beekeepers to submit beehive transfer information throughout the year. HiveHub presents this information to the beekeeper for review at the time they submit their ADR.

Clause	Proposed amendment	Submitter feedback	Expected scale of impacts	Management Agency decision
	Change to an infringement offence.	57% of questionnaire submitters agreed with the proposed change. The level of agreement was lowest in beekeepers owning 1,001+ beehives with 41% agreeing and 41% disagreeing. Issues raised by submitters included: • proposed penalty for breaching 'Annual Disease Return' is harsh as mistakes are easily made.	Changing the requirement submit an Annual Disease Return to an infringement offence will have no impact on beekeepers that comply with current Annual Disease Return requirements. Compliance with current Annual Disease Return requirements is expected to increase.	Proceed with proposed rule change as submission of the information provided in the ADR is important for implementing the Plan Order. Responses to specific issues raised by submitters are addressed as follows. • The Management Agency intends to impose fines only after it has warned the beekeeper that they are in breach of ADR requirements and if the beekeeper has failed to correct the issue.

Proposed additional powers

Table 5. Consideration of submissions on proposed additional powers

	Power	Reason why power is needed	Submitter feedback	Expected scale of impacts	Management Agency considerations
114	General powers.	To enable authorised persons to take expedient actions to eradicate or manage AFB or manage any serious risks that could lead to further spread of AFB.	 83% of questionnaire submitters supported provision of the additional power. Issues raised by submitters are summarised below: The assessment and decision-making process for destroying hives and items needs to be clearly set out and communicated. Some aspects of the proposed rule 'General Powers' need more detail and clarification. AFB infections should be confirmed by laboratory tests before hive destruction was authorised by the Management Agency. Evidence collected should be robust and hold up in court. Beehives and items for destruction must relate to identifiable beehive infections and it should be clear what needs to be destroyed. Action should be sufficient to eliminate AFB from an apiary but not more than is necessary. Decisions and actions to destroy hives have significant implications for beekeeper livelihoods. Owners must be 	Provision of General Powers will have no impact on beekeepers that are complying with their obligations to destroy AFB beehives and take measures to prevent the spread of AFB as required by rules 28, 29 and 31 of the current Plan Order. Provision of s114 General powers will enable authorised persons to destroy beehives and materials infected with AFB in circumstances where s122 Power to give directions is not effective or practical.	Proceed to confer the proposed power as successful elimination of AFB requires that AFB beehives are destroyed, and that materials contaminated with AFB are not exposed to honeybees. Conferring s114 General powers on authorised persons (AP1s) will enable non-compliance with rules 28,29 and 31 to be addressed in circumstances where s122 Power to give directions is not effective or practical. Responses to specific issues raised by submitters are addressed as follows. • The policies for the use of s114 General Powers will be set out in the Operational Plan and submitted to the Minister prior to implementation. The review of the Operational Plan by the Minister ensures that the implementation of this power (and other powers and plan rules) is consistent with the Plan Order regulations. • The conferment of s114 General Powers will be restricted to AP1s employed by the Management Agency and will not be conferred on AP2s.

Power	Reason why power is needed	Submitter feedback	Expected scale of impacts	Management Agency considerations
		 involved in the process as much as possible and informed if any action is taken to destroy their hives. Destruction is not the only answer. Commercial beekeepers value the ability to sterilise equipment to minimise loss and manage AFB risk. Authorised Persons may have too much power, may not use it appropriately, and may have conflicts of interest. There is not enough detail about the limits of the proposed new powers and lack of safeguards against the abuse of such powers. There was concern that property rights would be violated. A clear complaints and appeal policy, and legal process, needs to be set out. 		 The ability of authorised persons to use powers under the Biosecurity Act 1993, including s114 General powers is controlled by the Ministry for Primary Industries (MPI). MPI Chief Technical Officers: ensure that authorised persons have appropriate experience, technical competence, and qualifications can require that authorised persons comply with directions regarding the exercise of powers, and may cancel an authorised persons warrant for inappropriate use of powers. The Agency would consider any conduct that resulted in the MPI Chief Technical Officer removing an AP1s warrant to be serious misconduct likely to result in termination of the AP1s employment. \$114 General powers will only be used when it is not feasible or practical to direct a beekeeper to destroy beehives using \$122 to resolve beekeeper noncompliance with clauses 28, 29 or 31 of the Plan Order. The Management Agency agrees that commercial DECA holders have the ability to sterilise boxes using paraffin

	Power	Reason why power is needed	Submitter feedback	Expected scale of impacts	Management Agency considerations
					dipping. However, this permission does not entitle these beekeepers to leave infected gear outside exposed to honeybees for prolonged periods time. Agency AP1s have taken enforcement action by directing beekeepers to destroy the infected gear using s122 in these circumstances and will continue to do so.
111	Use of dogs and devices.	To future proof the AFB Plan to enable authorised persons to use detector dogs to detect AFB should the scientific community confirm that detector dogs are effective.	 78% of questionnaire submitters supported provision of the additional power. Support from beekeepers with 1,001+ beehives was lower at 47%, with 36% opposed. Issues raised by submitters are summarised below: This is an unnecessary proposal and should not be introduced without proof of concept or efficiency. Clarity about who are the scientific community is needed. Some considered dogs are unreliable, can make mistakes and give false positives. Some considered there are better detection and testing strategies. Some considered qPCR testing was at least as useful as dogs to detect AFB, or even better. 	Provision of s115 Use of dogs and devices is not expected to impact beekeepers as the Management Agency does not intend to use this power until the scientific community confirm detector dogs are effective. Provision of s115 Use of dogs and devices will enable authorised persons to use detector dogs to detect AFB should the scientific community confirm that detector dogs are effective.	Proceed with proposed power as it provides the legal ability to use detector dogs should the scientific community confirm that they are effective during the term of the Plan Order. Responses to specific issues raised by submitters are addressed as follows. • The Agency agrees that currently there is insufficient evidence that detector dogs are effective. • The Agency agrees that detector dogs should not be used on certain properties at certain times, e.g., lambing season.

Power	Reason why power is needed	Submitter feedback	Expected scale of impacts	Management Agency considerations
		 Dogs can be used as a tool to indicate the presence of AFB, but these indications are not a basis for destroying hives. There was concern that if a dog detected AFB, this could be a basis for an Authorised Person to destroy hives. Destruction of AFB hives needs to be based on visual inspection. Dogs will not be welcome on all properties and should only be used if the owner agrees. Dogs are a risk to farm livestock, and during lambing. Trained dogs may prove to be effective at detecting AFB. This proposal should include provision for both the dog and the dog handler to inspect hives. 		

Other current plan rules

Table 6. Consideration of submissions on other current plan rules

	Clause	Submitter feedback	Management Agency consideration
15	Prohibition on keeping bees in place other than apiary.	Issues raised by submitters are summarised below. • Pollinating hives should be exempt from the 'prohibition on keeping bees in a place other than an apiary' rule as it's impractical to comply. Pollination hives may be on an orchard for more than 30 days. There was also a contrary view that the registration period should be shorter.	The Agency considers that the current requirement to register apiaries within 30 days strikes the right balance between minimising the impact of the apiary registration requirement on beekeepers with pollination contracts, while ensuring accurate and up-to-date apiary registration records for disease management purposes.
28	Obligation of beekeeper to destroy honey bees and materials.	Issues raised by submitters are summarised below. • It isn't always feasible to destroy hives within seven days as required by the existing rule 'obligation of beekeeper to destroy honey bees and materials'. It can be a problem if there is a fire ban in place, or adverse weather conditions, or it's a remote site. Burning plastic hives is also a problem.	Beekeepers can apply for a fire permit when a fire ban is in place. Permits are typically granted subject to conditions sufficient to mitigate the risks.
32	Certificate of Inspection.	Issues raised by submitters are summarised below. • There is a view that an annual (Certificate of Inspection) check for AFB is not sufficient and hives should be checked more often.	The Agency agrees that inspecting beehives once per year is not sufficient to eliminate AFB. However, only 3.3% of non-DECA holders had notified cases of AFB in 2021/22, and the Agency considers that the adverse impact of requiring non-DECA holders to complete a second COI is not outweighed by the benefits of a second inspection. The Agency considers that encouraging non-DECA holders with AFB to commit to eliminating AFB from their beehives and apply for a DECA, or using its enforcement powers, are more appropriate options.

42	Compensation.	Issues raised by submitters are summarised below.	The Agency does not consider it appropriate to increase levies so that
		 Compensation for beekeeper losses due to hive destruction should be considered. There should be compensation for hives that are destroyed based on an incorrect assessment by the Management Agency. However, it was also argued that compensation never has, and still isn't, an appropriate strategy for ensuring compliance. 	compensation can be paid. Any compensation paid would represent a transfer of levy payer funds from compliant beekeepers to non-compliant beekeepers that were subject to enforcement actions.

Cross-cutting themes

Table 7. Consideration of submissions on cross-cutting themes

Submitter themes and subthemes	Management Agency considerations
AFB should be detected very quickly before it spreads, and qPCR tests are an effective tool for early detection. Too many DECA holders are failing to detect, report, and/or eliminate AFB. Non-compliant beekeepers need to be targeted. (Theme 27).	The Agency agrees that qPCR is an effective tool for detecting AFB. The current Plan Order includes provisions that enable the Agency to recognise the use of qPCR tests. The Agency would be pleased to consider modifying a beekeepers DECA to include the use of qPCR if requested by the beekeeper concerned.
 Issues raised by submitters are summarised below. AFB should be detected early, before it can spread. We need to get ahead of the outbreaks rather than just responding to them. The use of qPCR tests is an effective tool. Many DECA holders are failing to detect, report, and/or eliminate AFB. Non-compliant beekeepers operate outside the rules and should be targeted. Build strategies to find and penalise unregistered beekeepers and unregistered apiaries, rather than making things harder for those who largely do comply. 	Inspections performed correctly are also an effective method for detecting and eliminating AFB. The Agency considers that the issues raised by submitters represent failures to inspect beehives using the recommended inspection procedures with sufficient frequency, and not a failure of the clinical inspection method per se. qPCR testing is significantly more expensive than clinical inspection. Currently there is insufficient evidence that the additional benefits of qPCR testing are greater than the additional costs. Therefore, the Agency does not consider it appropriate to
	amend plan rules to impose the financial burden of compulsory qPCR testing on all beekeepers. The Agency is making changes to improve monitoring of DECA holder AFB elimination performance. This includes an expanded honey surveillance

programme and proposed changes to the Plan Order to receive AFB laboratory test results.

Proposed changes to the Plan Order increase the Management Agency's ability to enforce it. Unregistered beekeepers will be subject to infringement fines, and access to laboratory test results will enable the Management Agency to redeploy its AP2 inspection resource away from beekeepers that are doing a good job (as evidenced by their laboratory test results) towards apiaries owned by beekeepers that are more likely to engage in non-compliant behaviour.

Other beekeepers are frequently aware of non-compliant beekeeper behaviour, and they can assist the Agency to identify these beekeepers by reporting their concerns to the Agency.

Overall, the proposed changes are heavy-handed, won't work and are costly. The incidence of AFB will increase during these difficult times for the industry, and these proposals will make things harder (Theme 28).

Issues raised by submitters are summarised below.

- The proposals are heavy-handed and focus on penalties rather than education.
- The incidence of AFB will rise as the growing financial pressures on beekeepers lead to underreporting and abandoning hives. The proposed changes to the AFB PMP increase costs for beekeepers at time when the industry is already struggling.

The proposed amendments to the AFB Plan include amendments to strengthen education, monitoring, and enforcement. These amendments are designed to increase beekeeper responsibility for eliminating AFB.

The Agency is very aware of the difficult financial times beekeepers are experiencing and has taken care when developing the proposal, to minimise the additional costs imposed on beekeepers. The cost of the proposed changes for beekeepers that are already fully compliant with plan rules will be negligible for hobbyists. For commercial beekeepers costs will largely be limited to an initial cost of \$100 per employee, and the ongoing costs of training new employee beekeepers that enter the industry.

However, the cost of the proposed changes for beekeepers that are not compliant with plan rules may be substantial depending on the extent of their non-compliance – as the proposed changes will provide the Agency with better ability to detect non-compliance and use more effective enforcement tools.

Improving the Agency's ability to hold non-compliant beekeepers to account and prevent them from propagating AFB will substantially reduce the impact of AFB on all beekeepers.

Costs of the proposals fall most heavily on commercial beekeepers, but comparatively hobby beekeepers have the biggest say. Proposed changes need to recognise differences between the two groups (Theme 29).

Issues raised by submitters are summarised below.

- Commercial beekeepers make up the minority of beekeepers but are the most impacted by the proposed changes). Proposed changes increase transactional costs and risks for commercial beekeepers, and there was concern these had not been properly identified and considered.
- The market requirements for honey are a strong lever for commercial operators to eliminate AFB, however these are not incentives for hobby beekeepers.

 Different strategies may be needed to target hobby beekeepers.

The Management Agency should be representative of beekeepers and independent from ApiNZ. The levy is not well spent, and the levy structure doesn't work well (Theme 30).

Issues raised by submitters are summarised below.

- The Management Agency should be directly accountable to beekeepers and independent of ApiNZ. Some consider the Management Agency should be replaced or dismantled.
- The levy is not well spent and/or the levy structure doesn't work well.

The Agency has taken care to when developing the proposal to minimise the additional costs imposed on beekeepers. The cost of the proposed changes for commercial beekeepers that are already fully compliant with the current plan rules will be largely limited to an initial cost of \$100 per employee beekeeper, and the ongoing costs of training new employee beekeepers that enter the industry.

The Agency agrees that market requirement for honey is a strong lever for commercial operators and considers that different beekeeper segments are motivated by different factors. Irrespective of their motivations, all beekeepers have an obligation to comply with plan rules. The Agency aims to ensure that all beekeepers have the information and knowledge to eliminate AFB, monitors their AFB elimination performance and undertakes enforcement actions where necessary.

Apiculture New Zealand Inc (ApiNZ) is the designated management agency for implementing the Plan Order. ApiNZ delegated this responsibility and associated powers, to an independent Board (Management Agency Board).

The Management Agency operates independently of ApiNZ and maintains separate business systems, policies, and governance. The Management Agency Board is responsible for the prudent use of levy payer funds to implement the AFB Plan, and appointment to the Board is based on merit following a standard recruitment process. Membership of ApiNZ is not a criterion for appointment to the AFB Agency Board, apart from one Board position that is required to be held by a member of the ApiNZ Board.

Since the formation of ApiNZ in 2016, the Management Agency Board has overseen several improvements to enhance the AFB Agency's capacity and systems to implement the plan order. These improvements include:

- improved follow-up and investigation into reports of suspected non-compliant behaviour
- more effective monitoring of beekeeper elimination of AFB through doubling the number of apiaries inspected each year, and implementation of a new expanded honey surveillance programme

- increased enforcement of plan rules to ensure that non-compliant beekeepers are held to account and are not able to continue practices that create AFB spread risks
- improved quantity and quality of support provided to beekeepers through the formation of a dedicated in-house team, and
- replacement of ApiWeb with a modern fit for purpose system, HiveHub, to make it easier for beekeepers to comply with Plan Rules.

The Management Agency Board intends to continue to oversee improvements in the implementation of the Plan Order to ensure that the objectives of the Plan are achieved.

The Management Agency considers that the colony levy structure is working well. It enables the cost of funding the Agency to be divided more equitably between beekeepers.

The AFB PMP Review should have been conducted independently. Communication, consultation, and submission processes were poor and biased towards hobby beekeepers. The proposed changes are poorly thought out and the cost-benefit analysis was flawed (Theme 31).

Issues raised by submitters are summarised below.

- The review should have been conducted independently. For instance, by MPI, an industry consortium, or a professional firm.
- Consultation meetings were biased towards hobby bee club meetings, but hobbyists are less affected by the proposed changes.
- Communication about the proposed changes and the impacts of the changes was inadequate and misleading.
- The Management Agency has not set out how information and submissions are analysed, or how it has settled on the proposed changes. There is an overreliance on surveys which is not a submission process. Submissions should be publicly available.
- The cost-benefit analysis is flawed and based on incorrect assumptions.

The Agency reviewed and adopted the best practice approaches that other management agencies (Tiakina Kauri, Kiwifruit Vine Health, and OSPRI) undertook to review, develop and consult on national pest management plan proposals when reviewing the Biosecurity (National American Foulbrood Pest Management Plan) Order 1998.

The Agency conducted a three-round approach to consultation to ensure that beekeeper views on the Plan Order were heard and considered prior to developing a draft detailed proposal for the third round of consultation. In additional to providing information to beekeepers on its website and via email/post, the Management Agency has hosted 11 webinars, travelled the country to meet with beekeepers at 17 roadshow meetings, and received and considered 1,067 submissions.

The receipt and analysis of submissions is clearly documented in three full reports analysing beekeeper submissions, one for each round of consultation. Consideration of beekeeper's submissions is clearly documented in three full 'Analysis of Beekeepers Submissions and Response' documents, one for each round of consultation. These documents are readily available on the Agency's website.

The Management Agency, National American Foulbrood Pest Management Plan Consultation Round Three, Response to Submissions, March 2023	
	The Agency contracted a consultancy, Nimmo-Bell, to undertake the cost benefit analysis. Nimmo-Bell specialise in performing biosecurity and pest management plan cost benefit analyses to meet the requirements of the Biosecurity Act 1993. The assumptions used in the cost benefit analysis were subjected to sensitivity analysis and were found to be robust for a wide range of values.