Research into the Benefit-Cost of Providing Off-Road Motorcycle Facilities in Victoria

VicRoads

Final Report

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Glossary

Aspect	Description
Benefit Cost Ratio (BCR)	The Benefit Cost Ratio (BCR) is a useful measure for comparing between two different projects. The BCR is calculated by dividing the present value of benefits by the present value of costs. If the resulting BCR is greater than one (1) then the project has a net benefit. The higher the BCR the greater the quantified benefits compared to the quantified costs.
Bitumen Track Riding	Involves completing several laps of a sealed track, usually alongside (but not in completion with) other riders. Several facilities which are used for professional racing offer track days at various times throughout the year so that amateur riders can access these facilities.
Benefit Cost Analysis (BCA)	Benefit Cost Analysis (BCA) is an analytical tool that identifies and attempts to quantify the relative costs and benefits of a project using a Discounted Cash Flow (DCF) framework and applies this framework across the entire range of benefits and costs that may accrue as a result of a project to a community or group of stakeholders. BCA assesses the impact of a development by comparing the "with" and "without" scenarios, and is useful in assessing the net benefits accruing to society as a whole as a result of a project. The BCA method considers the effect of real resource costs and benefits, and excludes, for example, taxes and subsidies, which are regarded as transfer payments from one part of the economy to another.
Dirt Track Riding	A type of racing performed on oval tracks. Dirt track racing is the most common form of racing in the USA and is also popular in Australia and Canada.
Discount Rate	The Discount Rate is used to transform a future cash flow to its present value. The selection of appropriate discount rates is of particular importance because they apply to much of the decision criteria and consequently the interpretation of results. The higher the discount rate, the less weight or importance is placed on future cash flows. The choice of discount rates in discounted cash flow analysis should reflect the time value of money.
Enduro Riding	Enduro racing involves a set of rules, which specify exactly when a rider should arrive at certain pre-defined locations along a prescribed route. Routes need to be well defined and are generally much longer than used in motocross. Unlike motocross bikes, enduro bikes usually meet minimum equipment standards (for example headlights and indicators) and can be registered for legal road use.
Internal Rate of Return (IRR)	The Internal Rate of Return (IRR) provides an estimate of the discount rate at which the NPV of the project equals zero. In terms of whether a project is considered desirable or not, the IRR will always return the same result as the NPV decision criterion.
Managed Facility	A designated off-road facility which is appropriately designed to cater for one or more off-road motorcycle activities. Facilities usually include first aid resources, an accident management plan and a road worthiness assessment of all motorcycles prior to granting access to the facility.
Motocross	Motocross events are held on enclosed and marked circuits and use the terrain's natural features such as hills and cambers with man-made jumps. Circuits are generally between 1.4 and 2.5 kilometres in length and the bikes are not designed for road use.
Net Present Value (NPV)	The Net Present Value (NPV) of a project expresses the difference between the discounted present value (PV) of future benefits and discounted PV of future costs, i.e.: NPV = PV (Benefits) – PV (Costs). If the NPV is positive (i.e., the PV of benefits is greater than the PV of costs) then the option or project would have a net economic benefit.
On-Road Riding	Riding activities undertaken on the Victorian road network, including the Victorian State forest road and track network.
Off-Road Riding	Includes all motorcycle riding in Victoria that is not undertaken on the Victorian road network, such as riding at designated off-road facilities, on private land, and on public land/ forest tracks that are not part of the Victorian road network.
Other Forest Track	Tracks other than formed roads and tracks, including walking tracks, "single tracks", seasonally closed tracks and management vehicle-only tracks.
Present Value (PV)	Present Value (PV) refers to the value of a future cash flow in present day terms. PV recognises the concept of "time value of money" – that $1 in the future has a different value to $1 in the present day – and converts future flows of money into their equivalent value today by applying an appropriate discount rate.
Recreational License	Recreation registration allows riding in certain areas without the need to obtain a full registration. The rider must be at least 18 years of age and hold a motorcycle learner permit or license to ride on a road. The motorcycle must also be registered and meet a series of criteria in order to become registered.
Rider	Motorcycle rider that is fully compliant with all legal requirements.
Riding Activity	For the purposes of this report, a "riding activity" or "riding pursuit" refers to any one of the following types of off-road motorcycle riding pursuits: • Bitumen track riding; • Motocross riding; • Trails riding; and • Trials course riding.

Aspect	Description
Riding Episode	For the purposes of this report, a "riding episode" is considered to be any one rider undertaking any one riding activity, once. That is, if two people both undertake trail riding 5 times per year, this is equivalent to 10 (2 x 5) trail riding episodes.
Riding Pursuit	*See "Riding Activity".*
State Forest Tracks	State Forest Tracks includes formed state forest and national park roads and tracks accessible to 4WD vehicles.
Tarmac Tracking	*See "Bitumen Track Riding".*
Trails Riding	Trails riding involves riders following a designated off-road route usually along paths and/or tracks. The length of these tracks is highly variable and can be between 50 and 500 kilometres. Most trails bikes can be road registered.
Trials Course Riding	Competitors ride through an obstacle course attempting to avoid touching the ground with their feet. Sections are often divided into separate courses to accommodate the different skill level of riders.
Unrider	A motorcycle rider who is unlicensed and/or unregistered.
Weighted Average Cost of Capital (WACC)	The Weighted Average Cost of Capital (WACC) for any investment, whether for an entire company or a particular project, is the rate of return capital providers would expect to receive if they invested their money elsewhere. The Weighted Average Cost of Capital refers to a company's (or project's) average cost of capital, whether it be financed through debt or equity, in which each category of capital is proportionately weighted. The WACC is the appropriate discount rate to use for assessing the feasibility of a project.

Executive Summary

The increasing popularity of off-road motorbike riding presents a difficult question to Governments – can managed off-road motorbike facilities improve safety for motorcycle riders in a cost-effective manner? Off-road motorbike accidents represent a significant social and economic cost – meaning reducing risk is a high priority for legislators. The increasing popularity of the activity also means managing this risk is a growing concern.

This report was commissioned by VicRoads to provide a greater understanding of the potential economic, social and environmental benefits and costs associated with the provision of off-road motorcycle facilities in Victoria, and to assess the potential of managed off-road facilities to improve riders' safety by attracting high-risk riders (both on-road and off-road) to a safer environment.

The report provides a detailed compilation and analysis of available published research and utilises this, in conjunction with the findings from a rider survey conducted as part of this project, to provide:

- An overview and understanding of rider behavior and participation characteristics for different riding pursuits;
- The social, environmental and economic costs associated with motorcycle riding, and the potential benefits associated with the provision of off-road riding facilities;
- The type and nature of off-road riding facilities desired by riders and/ or required to meet rider demands and the establishment and operational costs and revenues associated with such a facility;
- An analysis, valuation and comparison of the benefits and costs associated with the provision of off-road motorcycle facilities; and
- Findings and recommendations relating to the provision of off-road motorcycle facilities.

This project found that while existing demand for off-road facilities in Victoria is strong, the current market rate paid by riders to use facilities is low. The costs of establishing and running a privately operated managed off-road motorcycle facility compared to the relatively low price users are willing to pay makes managed facilities neither economically nor commercially viable. While certain potential benefits of managed facilities were not able to be valued in this project – such as potential reductions in noise impacts to the community and reduced costs of crashes –it is unlikely these could significantly alter the findings.

While managed facilities may intuitively be expected to provide a safer environment for motorcycle riders, findings showed safety benefits were largely related to the ability to render first aid more quickly rather than through reducing the frequency or severity of accidents. In fact, survey findings indicate a higher frequency of crashes resulting in injury at managed facilities compared to outside a managed facility, which may be attributable to a number of factors including a perceived safer riding environment by riders, exposure to a greater range of rider skills and techniques and, potentially, peer pressure when attending a managed facility. Of note, many 'high-risk' individuals, in terms of both injury risk and illegal riding behaviour, are unlikely to use managed facilities at all, despite this market presenting the greatest potential for safety benefits at a managed facility.

With low revenue streams making many riding facilities commercially unviable, reducing the number or severity of accidents would be essential to improving the economic viability (i.e., overall benefit to society) from a community point of view.

Technical Summary

Background & Objectives

Off-road motorcycle sales have been increasing at a faster rate than population growth over the past five to ten years, highlighting an increase in the popularity of off-road motorcycling. The growing popularity of off-road motorcycle activities increases the potential for deleterious impacts to the rider, the wider community and the environment, including the economic and social impacts of crashes, social impacts resulting from use conflicts and potential environmental impacts associated with riding behaviours.

This project examines the potential economic, social and environmental benefits and costs associated with the provision of off-road motorcycle facilities, with a specific focus on identifying the potential of managed off-road facilities to improve riders' safety by attracting high-risk riders to a safer environment.

In assessing the benefits and costs of providing a managed off-road facility, the following was considered:

- Current and future demand for off-road motorcycle facilities, rider behavior and participation characteristics for different riding pursuits;
- The social, environmental and economic costs associated with motorcycle riding, and the potential benefits associated with the provision of off-road riding facilities through the attraction of high-risk riders to a safer environment;
- The type, location and nature of off-road riding facilities desired by riders and/ or required to meet rider demands and the establishment and operational costs and revenues associated with such a facility;
- Potential funding models; and
- Legal, amenity and liability issues based on case studies of other similar facilities.

Project Approach

A data framework was prepared to identify the data needed to undertake feasibility and benefit cost analysis (BCA) modelling for the project. The framework utilised outputs from a review of previous studies into the impacts of motorcycle and motor vehicle accidents and a concurrent report on the environmental impacts of off-road motorbikes being undertaken by the Department of Sustainability and Environment. Data gaps were identified and a rider survey prepared to capture data to address the outstanding data requirements. The rider survey was disseminated to all Motorcycle Victoria affiliated clubs via email, for distribution to their club members. Surveys were also administered through face-to-face interviews at a Honda Ride Day on 28 June, 2009.

Data identified and utilised to understand the benefits and costs associated with the provision of off-road motorcycle facilities in Victoria included:

- Costs of motorcycle riding and influencing factors;
- Potential benefits of providing an off-road motorcycle facility;
- Rider activities, demand and use characteristics;
- Facility design and specification;
- Facility setup and operating costs; and
- Facility revenue streams.

A benefit cost analysis was undertaken to assess the net benefits (costs) of a managed off-road facility to the State of Victoria, as well as the attractiveness of such a facility to a commercial investor.

Findings

Rider Activities, Demand & Use Characteristics

Motorcycling activities in Victoria can be separated into on-road riding activities and off-road riding activities. On-road riding activities are those undertaken on the Victorian road network, including the Victorian State forest road and track network, while off-road riding consists of all other riding activities undertaken in the State.

Off-road motorcycle activities include bitumen track riding, motocross, trail bike riding and trials course riding. Trail riding and motocross were identified as the most popular forms of off-road riding based on an off-road rider survey conducted as part of this project.

Bitumen track and motocross riders predominantly ride in managed facilities, and as such it is not anticipated that the provision of a new managed off-road facility will significantly alter rider behaviour in these activities in terms of the type of venue used. By comparison, riders participating in trail riding and trials course riding activities represent the greatest opportunity for altering rider behaviour in terms of type of venue used.

Costs of Motorcycle Riding

Motorcycle activities can have a range of economic, social and environmental impacts, which can accrue to the participants and/ or the wider community. Negative impacts can include:

- Economic costs: Such as the cost of crashes (both in terms of direct expenditure as well as in terms of lost productivity), fines for illegal activity, costs of monitoring and dissuading undesirable rider behaviour, and repair and maintenance costs for preservation of environments used for motorcycle riding;
- Social costs: Such as reduced quality of life (e.g., through injury, suffering, stress and/ or long-term reduction in mobility), noise and/ or dust pollution and use conflicts; and
- Environmental costs: Such as damage to flora and natural habitats, extreme stress reactions in some animals, pollutants, gully formation and transport of noxious or invasive pests.

Safety Impacts Associated with Motorcycle Riding

Motorcycle riding is a considerably more demanding and challenging form of transportation than most other types of vehicle. This contributes to a higher incidence of crashes and fatalities for motorcycle riding compared to other motor vehicles. For instance, in 2002 there were 6.3 motorcyclist deaths per 10,000 registered motorcycles, which compares poorly to the average for motor vehicles in 2002 of 1.2 motorist deaths per 10,000 registered vehicles (Davey *et al*, 2007). Cassell *et al* (2006) note that motorcycle riders travelling on the Victorian road network are approximately 30 times more likely to be killed or seriously injured per kilometre travelled than other vehicle occupants.

A study by the Monash University Accident Research Centre found that on-road motorcycle activities present a higher share of fatalities, hospital admissions and emergency department presentations than off-road motorcycle riding. However, there is no data available to identify the number of on-road and off-road riders and their exposure to riding (i.e., their frequency and duration of riding), making it impossible to infer a comparative risk of injury between the two (Cassell *et al*, 2006).

The study also found that:

- Off-road motorcycling presents a much higher proportion of injuries in younger people (0-19 years) than on-road riding;
- Injuries appear to typically be more severe for on-road riding accidents than off-road riding; and

- The cause of injuries differs considerably between on-road and off-road riding, with on-road injuries primarily a result of collisions with other vehicles while off-road riding injuries are usually the result of non-collision accidents (i.e., falling off the bike).

The main predictor for motorcycle crashes is rider error (i.e., rider mistakes and/ or control errors, which can be linked to either inexperience or mental lapses), although other factors such as high-risk activities (e.g., speeding or performing stunts) have also been found to increase the risk of crashing (Elliott *et al*, 2004).

Rider motivations also have an influence on the likelihood of crashing. Rider motivations and attitudes to safety can differ greatly, and include avoidance of risky behaviour/ situations, use of protective gear to mitigate danger, and for some segments a disregard of safety concerns. A study by Christmas *et al* (2009) indicates that those riders displaying the least regard for their own safety are the most likely to be involved in a crash. Also, those riders whose motivations for riding are driven by performance related criteria have a higher crash propensity than the average rider.

Similar findings to those of Christmas *et al.* are reported by Symmons *et al* (2007) as well as in the "*Trail Bike Riders Attitude Study*" by Instinct and Reason (2009), with self-reported assessment displaying that riders that were more careless, confident in their own skills, irresponsible, risky, fast and intolerant were more likely to have had a crash in the previous five years.

Given the different attitudes to safety, and measures taken to reduce risk, the potential benefits of providing off-road riding facilities in terms of improved safety also differs between segments. For example, those riders that are highly risk-averse are unlikely to receive any significant benefits in terms of reduced crashes by transferring their riding activities to an off-road riding facility. Similarly, performance oriented riders will continue to seek to test their limits regardless of the venue, and as such are likely to desire a venue that offers the most challenging (and risky) riding experience suitable for testing their skills. For these riders, the major benefits of providing off-road motorcycle facilities, in terms of improved safety, lies in the potential for rapid first-aid and emergency response should the rider be involved in an accident.

The Instinct and Reason (2009) study also found that the most responsive segments to changing their behaviour (e.g., transfer to riding in a managed off-road motorcycle facility) cause the least environmental and social impacts. Whereas, riders whose motivations focus on challenge and danger, as well as the desire for freedom, self indulgence, thrill and excitement, typically behave in a manner resulting in highly negative impacts on the environment and noise levels.

Potential Benefits of an Off-Road Motorcycle Facility

The principal benefits associated with providing managed off-road riding facilities are likely to include the day to day operational activity and the avoidance of the economic, social and environmental costs by attracting riders away from high-risk environments along with gate takings and sales. Key benefits include:

- Improved safety through the provision of a controlled and managed environment with enhanced access to first-aid and medical attention if required. The average cost of crashes per 100 riding episodes was estimated to be approximately $39 (indexed to 2009 dollar terms based on CPI) based on findings on the cost of crashes from Monash University (Watson & Ozanne-Smith, 1997) and frequency of crashes reported in the rider survey undertaken as part of this project;
- Avoided quality of life impacts experienced by crash victims through improved rider safety. Much of this benefit is included in the economic benefits from avoided crashes outlined in the dot point above;
- Avoided social costs of noise disturbance. A number of studies have examined the impacts on property values from noise disturbance by motor vehicles, highlighting that property values decrease on average by 0.55% for every decibel above 55 dB. Motor vehicles produce 90 dB of noise at 7.62 metres, with this decreasing by approximately 10 dB to 20 dB for every doubling of distance from the source thereafter;

- Avoided costs of open space conflicts. The Instinct and Reason (2009) report identified that 73% of trail bike riders had personally experienced some form of hostility from other open space users; and
- Reduced degradation of natural habitat. A review of past studies on people's willingness to pay to preserve habitat suggests that natural bush land habitat has a passive utility value of approximately $40 to $50 per person per annum.

Desired Facility Specifications

Findings from the rider survey indicate that riders are seeking multiple track formats from any facility and that trails and motocross are the most popular activities. As well as the type of activity undertaken, riders also appear to be concerned about the relative ability/experience levels of other riders. Many riders would favour facilities where riders are graded by experience/ability and then ride within a group of their riding peers. Grading by speed is already in use at some track days, with initial grading by the rider and ongoing monitoring by track officials.

Findings from the rider survey also suggest that demand for a new facility is strongest near Melbourne (within 1 to 2 hours drive), Geelong and the surrounding Barwon Statistical Division.

A review of case studies of off-road managed facilities suggests that in order to provide sufficient land area to encourage trail bike riders to utilise a managed off-road motorcycle facility an area covering approximately 500 hectares would be required. However, analysis indicated the purchase a dedicated area this large would be unlikely to be a financially feasible venture.

In terms of desired aspects for a new facility, based on findings from the rider survey and case studies of other facilities, a multi-activity centre located approximately 75km from Melbourne is identified as the most appropriate location for the facility, including:

- Land area of approximately 500 hectares, including forested tracks and trails;
- Off-road riding tracks, including 3.0 km of bitumen riding track, 3.0 km of motocross track(s), 25.0 km of trail routes and 2,500 sqm of trials course area;
- Rider support facilities, including clubhouse and administration building, first aid area, pit/mechanic facilities, change/shower facilities and food/drink outlet; and
- Other facilities such as a single-tier viewing area, internal bitumen access roads, 400 sqm camping area and unpaved area providing parking for up to 200 cars.

Net Benefit/Cost of Providing a Managed Off-Road Motorcycle Facility in Victoria

A benefit cost analysis (BCA) of providing a managed off-road motorcycle facility was undertaken as part of this study with the following findings:

- The development of an off-road motorcycle facility is assessed to be economically undesirable, with the costs to the overall Victorian community (including the facility operator) considerably outweighing the benefits. Sensitivity testing of key variables indicates that such a facility is considered economically undesirable even where there is significant variance in key model drivers (e.g., rider charges, rider demand, cost of land) to those used in the BCA. It should be recognised that some economic, social and environmental impacts were not able to be valued appropriately and were therefore not included in the BCA (e.g., reduced cost of crashes, reduced noise disturbance, avoided open space conflicts and preservation of natural environments). For the analysis to indicate that provision of a new managed off-road motorcycle facility in Victoria would be desirable these combined benefits would need to be in the order of approximately $850,000 per annum, which is considered unlikely;
- From an operator's perspective, provision of an off-road motorcycle facility is identified to be an undesirable financial investment. Annual revenues are estimated to be insufficient to offset the ongoing operational costs and returns on capital for the first ten years of operation, even where the initial costs of purchasing land are excluded. As such, even if a new off-road motorcycle facility were considered desirable from a wider community perspective, development of an off-road

motorcycle facility near Melbourne would probably need to be undertaken by a not-for-profit organisation; and

- The development of an off-road motorcycle facility that excludes trail bike riding is also assessed to be undesirable. Comparison of a facility that includes trail bike riding with one that does not highlights there is little difference in terms of overall desirability.

Recommendations

Based on the findings of this project, the following recommendations have been developed:

- As the BCA of a 'generic' off-road motorcycle facility was identified to be economically undesirable, the development of such a facility is not recommended without the identification of a specific site with characteristics that will ensure its viability;
- VicRoads, the Department of Sustainability and Environment and other relevant organisations should continue to collaborate and research to collate additional primary data surrounding the unquantified safety and environmental benefits in order to accurately estimate the full economic, social and environmental impacts associated with the provision of off-road motorcycle riding facilities (such as reduced costs of crashes, reduced noise disturbance, avoided open space conflicts and preservation of natural environments). Based on the findings of the BCA these benefits would have to be in the order of $850,000 per annum to imply the provision of an off-road motorcycle facility is economically desirable;
- Any potential investor should undertake a detailed demand and full feasibility assessment to accurately gauge demand for a facility in a specific location and its capacity to generate a positive return on investment. This demand assessment should include an assessment of price points and willingness to pay for such a facility, across different charging regimes as well as the range of capital and operational costs;
- Any new facility, if developed, should:
    - Be a multi-use facility providing a range of different riding experiences catering to a range of skill levels to facilitate a stronger return on investment. Rider survey respondents identified that trail riding and motocross were the most commonly desired riding experiences for a new facility, and that riders would prefer to ride amongst their peers (in terms of skill level);
    - Be co-located adjacent to an area where riders can undertake trails riding, to avoid the cost of purchasing a trails riding area. Any operator should work with the Department of Sustainability and Environment to ensure appropriate use and control measures are implemented;
    - Employ a variable pricing regime, including an annual membership fee and a reduced entry fee for each visit, a higher entry fee for casual (i.e., non members) entry and additional fees for those wishing to access coaching and training. Special rates for juniors or other users may also be included; and
- VicRoads and the Department of Sustainability and Environment should continue to work together to market, educate and inform users of appropriate use of the forest road and track network to assist in minimising illegal use of the network and reduce social and environmental impacts of off-road riding activities in these areas.

  Marketing, education and awareness campaigns should be targeted towards on-road and off-road riders that present the highest risk in terms of safety, social and environmental impacts. This will likely require research into the most appropriate forms of marketing and education for these rider segments as they are typically the least responsive to changing their behaviour.

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1. Introduction

1.1 Background

The latest Motor Vehicle Census by the Australian Bureau of Statistics (2009a) identified that there were approximately 625,000 motorcycles registered in Australia in March 2009, including road bikes, off-road bikes, minibikes, scooters and ATVs. This represented an increase of over 50% from the approximately 400,000 registered motorcycles in 2004. This growth is more than double that of any other type of motor vehicle identified in the Motor Vehicle Census, highlighting the rapid growth in popularity of motorcycles.

In 2006 it was estimated that there were approximately 350,000 motorcycles in Australia which were unregistered and therefore could not be lawfully used on public roads (Federal Chamber of Automotive Industries, 2009), accounting for an estimated 45% of the total motorcycles in Australia. Assuming this relationship has been maintained, this suggests that there could be over 500,000 unregistered motorcycles in Australia in 2009.

In Australia during 2003 and 2004, the highest selling motorcycles were off-road models and in 2007, sales of off-road motorcycles reached 37,053 (their highest recorded total), which was a five percent increase on 2006 and accounted for 28.5% of total motorcycle sales for the year (Federal Chamber of Automotive Industries, 2009). Minibikes accounted for a further 10.3% of motorcycle sales in 2007, with 13,380 minibikes sold.

While many of these off-road motorcycles and minibikes are likely to be used in farming communities as an inexpensive and reliable means of transport around private properties, these data indicate the scale and popularity of off-road motorcycles in Australia. However, there is little information available to understand or quantify the number of off-road motorcycles available in Australia and Victoria, nor how many of these are ridden illegally.

The growing popularity and number of off-road motorcycles increases the potential for deleterious impacts to the rider, members of the wider community and the environment. These impacts can include the economic and social impacts of crashes, social impacts from use conflicts and potential environmental impacts associated with riding behaviours. Some impacts can be mitigated by undertaking off-road motorcycle activities in managed facilities, however, it is important to understand the impact of providing managed facilities across economic, social and environmental factors from the perspective of riders and the wider community.

1.2 Purpose and Objectives

Motorcycling activities in Victoria can be delineated between two distinct locations:

- **On-road riding activities**: Includes all motorcycle riding undertaken on the Victorian road network, including all major and local roads as well as the Victorian State forest road and track network; and
- **Off-road riding activities**: Includes all other motorcycle riding undertaken in Victoria, such as designated off-road facilities, private land, and public land/ forest tracks that are not part of the Victorian road network.

The purpose of the report is to provide a greater understanding of the potential economic, social and environmental benefits and costs associated with the provision of off-road motorcycle facilities in Victoria, and to assess the potential of managed off-road facilities to improve riders' safety by attracting high-risk riders (both on-road and off-road) to a safer environment.

For the purposes of this assessment, high-risk riders have been defined as those that partake in the following undesirable riding actions:

- Riding on the Victorian road network as an unlicensed rider and/ or on an unregistered motorcycle (unriders);
- Riding on public land that is not part of the designated Victorian public road network (e.g., riding on walking tracks or other informal tracks);

- Other aberrant behaviour on or off the Victorian road network, such as speeding or 'hoon' behaviour; and
- Performing stunts or other high-risk off-road motorcycle manoeuvres in an unmonitored/ unmanaged environment.

This report examines the benefits and costs associated with provision of an off-road motorcycle facility to the Victorian community as a whole using a benefit cost analysis (BCA) framework, as well as the potential commercial attractiveness to a private investor. In assessing the benefits and costs of providing a managed off-road facility, the following is considered:

- Current and future demand for off-road motorcycle facilities, rider behavior and participation characteristics for different riding pursuits;
- The social, environmental and economic costs associated with motorcycle riding, and the potential benefits associated with the provision of off-road riding facilities through the attraction of high-risk riders to a safer environment;
- The type, location and nature of off-road riding facilities desired by riders and/ or required to meet rider demands and the establishment and operational costs and revenues associated with such a facility;
- Potential funding models; and
- Legal, amenity and liability issues based on case studies of other similar facilities.

In examining safety benefits of off-road riding facilities, the report has focused on the potential to attract high-risk riders from other off-road riding locations (e.g., private or public land/ forest tracks that are not part of the Victorian road network), as well as riding activities undertaken on the Victorian forest road and track network. Potential benefits of attracting high-risk riders from major or local roads (e.g., those riders that engage in road racing or high speed road riding) are also discussed, but have not been included in the BCA as these riders were not the focus of this study.

1.3 Off-Road Motorcycle Activities and Locations

Off-road motorcycle activities fall under four broad categories (see Glossary for definitions):

- Bitumen track day riding (as provided at Phillip Island and Broadford)[1];
- Motocross riding (enclosed circuit with hills, cambers and man-made jumps);
- Trail riding (designated route usually along paths and/or tracks); and
- Trials course riding (obstacle course format).

Each of these off-road riding activities can be undertaken legally at club/ managed facilities or on private land (with the land owner's permission). Trail riding can also be undertaken legally on the Victorian road network (on designated State forest tracks and paths) provided that the rider holds a motorcycle learner permit or license, and the motorcycle is appropriately registered.

Each activity has its own distinct requirements in terms of track types, characteristics and features. For example, there are significant differences between the characteristics of tracks used to host bitumen track day riding and tracks used to host motocross events, as well as the forest tracks typically used for trail bike riding. The different track requirements for each riding activity must be taken into consideration in the development of off-road motorcycle facilities.

1.4 Project Approach

The figure below illustrates the key project stages and the connections and information flows between them. A data framework was prepared to identify the data needed to undertake feasibility and BCA modelling for the project. The framework utilised outputs

[1] Predominantly provided for and undertaken within managed facilities.

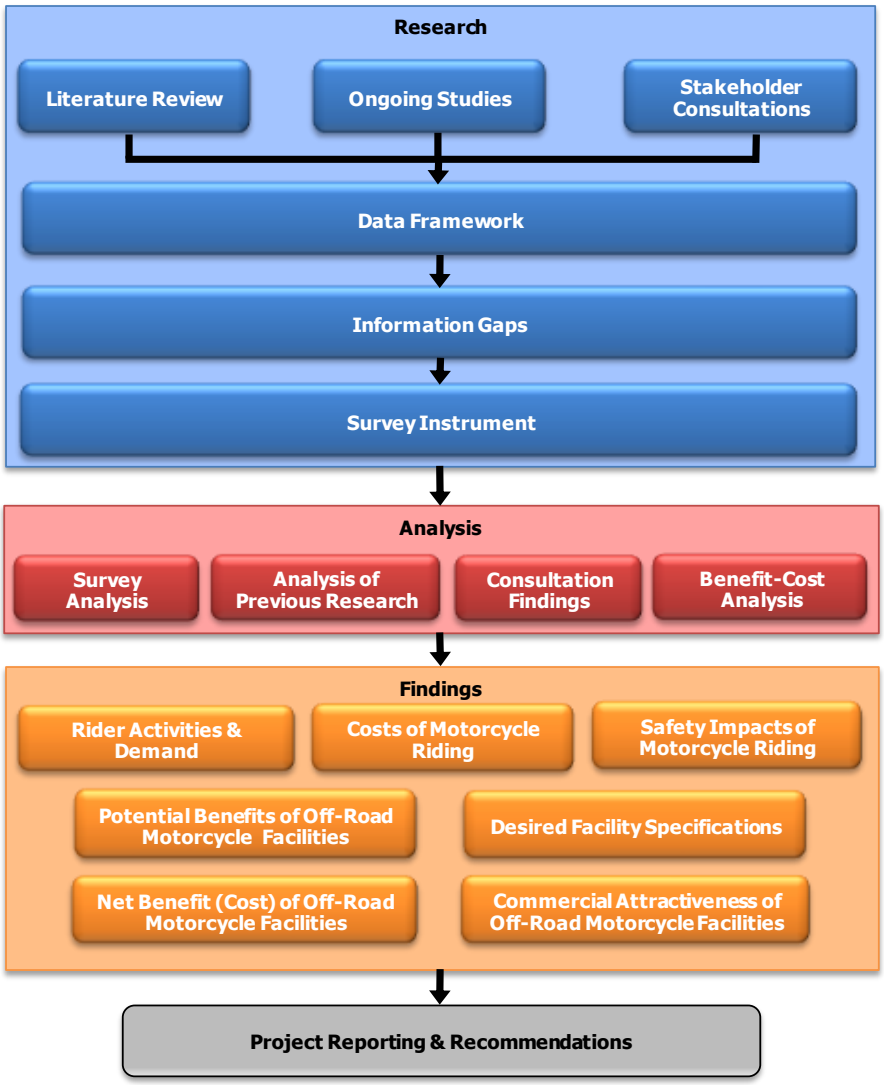
from a review of previous studies into the incidence and impacts of motorcycle and motor vehicle accidents, including crash data and statistics, as well as a concurrent report on the environmental impacts of off-road motorbikes being undertaken by the Department of Sustainability and Environment. The literature review is provided in **Appendix A**.

Data gaps were identified and a rider survey prepared to capture data to address the outstanding data requirements which was disseminated to all Motorcycle Victoria affiliated clubs via email, for distribution to their club members. Surveys were also administered through face-to-face interviews at a Honda Ride Day on 28/06/2009. A summary of the findings from the rider survey is provided in **Appendix B**.

The rider survey assessed the type of activity(s) respondents undertook, their experience level and the frequency and severity of any accidents they had been involved in as well as canvassing views on the additional facilities and services which should be provided at off-road facilities and their willingness to pay for access.

The information obtained during the literature review, through consultation and from the rider survey were then utilised to inform the benefit cost analysis to assess the net benefits (costs) of a managed off-road facility to the State of Victoria, as well as the potential attractiveness of such a facility to a commercial investor.

Figure 1.1. Summary of Project Stages



Source; AEC*group*

2. Impacts and Issues of Motorcycle Riding

Motorcycle riding covers a wide range of activities which can be undertaken at a variety of locations. Issues affecting each group of participants and members of the wider community impacted by their activities can also vary significantly. The following sections outline the findings of the literature review (**Appendix A**) and rider survey (**Appendix B**) in terms of the types of motorcycle activities, the key economic, social and environmental impacts associated with motorcycle activities, rider behaviour and key concerns identified by participants.

2.1 Motorcycle Rider Behaviour and Crash Risk

Motorcycle crashes (on-road and off-road) are responsible for a substantial number of deaths and injuries each year in Australia, with the resultant loss of life and/ or functioning representing a significant economic and social cost in terms of lost productivity, medical and rehabilitative expenses, emotional hardship for both the crash victim and their family/ friends, and compensation.

Australian road traffic crash statistics demonstrate that motorcycle riding presents a considerably higher risk of death and injury than other forms of motor vehicle operation. For instance, in 2002 there were 6.3 motorcyclist deaths per 10,000 registered motorcycles, which compares poorly to the average for motor vehicles in 2002 of 1.2 motorist deaths per 10,000 registered vehicles (Davey *et al*, 2007). Cassell *et al* (2006) note that on-road motorcycle riders are approximately 30 times more likely to be killed of seriously injured per kilometre travelled than other vehicle occupants.

Crash statistics in Australia demonstrate a predominance of males involved in motorcycle crashes, with an over-representation of crashes involving younger (i.e., under 25 years) riders in comparison to motorbike ownership by age group (Davey *et al*, 2007; Symmons *et al*, 2007). However, in the past decade the prevalence of riders aged over 40 years involved in motorbike crashes has increased considerably in both Australia and world-wide. This is widely considered to be driven by an increase in the number of older riders that are either new to motorcycle riding or that have returned to motorcycle riding following an extended absence (Davey *et al*, 2007; Symmons *et al*, 2007).

An assessment of motorcyclists' behaviour and accidents undertaken by Elliott *et al* (2004) in the UK suggests that the main predictor for motorcycle crashes is rider error (i.e., rider mistakes and/ or control errors, which can be linked to either inexperience or mental lapses), and not high-risk factors such as speeding or performing stunts. This contrasts with the findings of similar studies undertaken of car drivers, in which speed violations are the predominant predictor of crashes and not errors. Elliott *et al* (2004) suggest that a reason for this difference may be that riding a motorcycle is more demanding than driving a car (increasing the risk of committing an error), and that errors when riding are likely to have more severe consequences than making an error when driving (e.g., more likely to result in irrecoverable loss of vehicle control).

The study by Elliott *et al* (2004) serves to highlight that motorcycle riding is a considerably more demanding and challenging form of transportation than most other vehicle types, and this is a contributing factor to the higher incidence of crashes and fatalities for motorcycle riding compared to other motor vehicles. In conjunction with the studies by Davey *et al* (2007) and Symmons *et al* (2007), it can be reasoned that the prevalence of crashes by young riders and older riders returning to motorbike riding following an extended absence is fuelled in part by a combination of the demanding and challenging nature of motorcycle riding and comparatively low level of experience/ skill of these riders.

Despite the apparent relationship between rider skills and a reduction in crashes, there is little empirical evidence to suggest that the provision of rider education and training provides a statistically significant improvement in rider behaviour or any safety benefits in terms of a reduction in crashes (Haworth & Mulvihill, 2005; Mayhew, Simpson, & Robinson, 2002). However, a study by Rowden & Watson (2008) suggests that this lack of empirical evidence can largely be attributed to overconfidence of riders following

education and training, which can lead to undesirable and deleterious riding behaviour, rather than a lack of efficacy of rider education and training programs in increasing riders' skills.

While rider errors have been identified in previous studies as a key contributor to crashes, there is a range of literature outlining high-risk activities such as speeding or performing stunts as considerably increasing the risk of crashing (Haworth *et al*, 2009; Davey *et al*, 2007; Symmons *et al*, 2007).

Similarly, rider motivations have an influence on the likelihood of crashing. Motorcyclists are a highly diverse group, with widely differing attitudes to safety and decision-making. Christmas *et al* (2009) undertook an assessment of rider behaviour and motivations utilising a survey of motorcycle riders in the UK. The report classified riders into seven segments based on their riding motivations and attitudes to safety, as follows:

- **Performance disciples**: These are committed, all-year riders with a total focus on high performance riding and a strong dislike for anything that gets in the way of it. They tend to see risk as an unavoidable negative of riding and have an emphasis on personal skill and armour as responses to this risk;
- **Performance hobbyists**: These are solitary, 'fair weather' riders, for whom riding is all about individual experiences and sensations and are not concerned about what other riders are doing. They typically see risk as part of what makes riding fun, but lack confidence in their own abilities to deal with risks, leading to caution in riding behaviour;
- **Riding disciples**: These are passionate riders for whom riding is a way of life, built on a strong relationship with the bike itself and membership of the wider fraternity of riders. Highly conscious of potential risk in riding, and take active steps to manage it by responsible riding behaviour and use of protective gear;
- **Riding hobbyists**: These are older, 'fair weather' riders who enjoy the social interaction with other riders almost as much as the riding itself and like to look the part. Highly conscious of risk, and tend to avoid potentially risky situations altogether;
- **Car rejecters**: These are escapees (a higher proportion of women than in any other segment) from traffic jams, parking tickets, fuel costs and other problems of car use. This segment doesn't care for motorcycles, but do care for low-cost mobility. Very sensitive to the risks of riding, and see this as a strong argument against riding;
- **Car aspirants**: These are young people looking forward to getting their first car when age/finances allow but for the time being are just happy to have their own form of transport. They typically tend not to think about the risks of riding and as a result may not take steps to manage them; and
- **Look-at-me enthusiasts**: These are young (or never-grew-up) riders with limited experience but limitless enthusiasm, for whom riding is all about self-expression and appearances. They typically recognise the risks of riding in general, but see 'themselves' as relatively safe. They have a strong tendency to see risk as part of what makes riding fun, and to engage in risky behaviours.

As can be seen, rider motivations and attitudes to safety can differ greatly, and include avoidance of risky behaviour/ situations, use of protective gear to mitigate danger, and for some segments a disregard of safety concerns. Not surprisingly, the study by Christmas *et al* (2009) indicates that those riders displaying the least regard for their own safety (the look-at-me enthusiasts and car aspirants) are the most likely to be involved in a crash. Also, those riders whose motivations for riding are driven by performance related criteria (i.e., high-risk riding pursuits) have a higher crash propensity than the average rider. Similar findings to those of Christmas *et al.* are reported by Symmons *et al* (2007) as well as in the "*Trail Bike Riders Attitude Study*" by Instinct and Reason (2009), with self-reported assessment displaying that riders that were more careless, confident in their own skills, irresponsible, risky, fast and intolerant were more likely to have had a crash in the previous five years.

Given the different attitudes to safety, and measures taken to reduce risk, the potential benefits of providing off-road riding facilities in terms of improved safety also differs between segments. For example, for those riders that are highly risk-averse an off-road

motorcycle facility is unlikely to provide any significant benefits in terms of reduced crashes. Similarly, performance oriented riders will continue to seek to test their limits regardless of the venue, and as such are likely to desire a venue that offers the most challenging (and risky) riding experience suitable for testing their skills. For these riders, the main potential benefits of providing off-road motorcycle facilities in terms of improved safety lies in the potential for rapid first-aid and emergency response.

Some of these segments are clearly not likely to be attracted to an off-road riding facility as their motivations for riding have little to do with enjoyment derived from the activity (e.g., car rejecters and car aspirants).

2.1.1 Off-Road Motorcycle Rider Behaviour

Unlike on-road motorcycling, off-road motorcycling is a sport and rider behaviour and motivations can differ to some degree from that of on-road riders. As outlined in the "*Trail Bike Riders Attitude Study*" by Instinct and Reason (2009), the sense of thrill and adrenaline of riding are key elements to the enjoyment derived from off-road motorcycle activities.

The rider survey undertaken as part of this project identified that nearly all bitumen track day riding and approximately 80% of motocross riding is undertaken in managed off-road riding facilities (refer **Appendix B**). Given the propensity for riders undertaking these activities to use managed facilities, it is not anticipated that the provision of a new managed off-road facility will significantly alter rider behaviour in these activities in terms of the type of venue used.

By comparison, survey respondents indicated that just under 90% of their trail riding activities is undertaken outside of managed facilities, while approximately 50% of trials course riders indicated they ride outside of managed facilities. Riders participating in these activities therefore represent the greatest opportunity for altering rider behaviour in terms of type of venue used.

Instinct and Reason (2009) utilised a survey approach to examine the attitudes and behaviours of trail bike riders in Victoria. Similar to the report by Christmas *et al* (2009), the study found that trail bike riders can be segmented into four groups based on their riding motivations, empathy for other forest users and behaviour. These are summarised below (Instinct and Reason, 2009):

- **Disciples** (accounting for 43% of riders surveyed in the Instinct and Reason report): Display the greatest empathy for other public land users and residents and ride in a way they believe has a low impact on the environment and noise levels as they believe this to be the right and responsible thing to do. Motivations for riding tend more toward the social aspects of riding with friends and with family and the sense of discovery associated with riding places not normally accessed. Riders from this segment typically ride less often than any other segment;
- **Pragmatics** (accounting for 17% of riders surveyed in the Instinct and Reason report): Lack empathy for other public land users but ride in a way they believe has a low impact on the environment and noise levels as they feel trail bike access to public land is under threat. These riders are the most likely to be fully registered, typically have the most invested in their bikes and have received the fewest infringements. This segment is highly resistant to the idea of stronger enforcement of legislation and regulations. Motivations for trail bike riding are relatively diverse, including challenge, focus, thrill, escape from everyday life, discovery and social aspects;
- **Carried Aways** (accounting for 21% of riders surveyed in the Instinct and Reason report): Have significant empathy for other public land users. However, despite knowing their behaviour causes inconvenience to others and raises conflict levels they often ride in a way that has a highly negative impact on the environment and noise levels as they cannot control the desire for freedom, self indulgence, thrill and excitement. Challenge and danger are key motivators for this group, as is riding with close friends. Riders from this segment reported a higher requirement for medical treatment than any other segment; and
- **Don't Give a Damns** (accounting for 18% of riders surveyed in the Instinct and Reason report): Display ambivalence towards their impacts to the environment, noise levels and other public land users, and report the lowest levels of motivation towards

trail bike riding (e.g., challenge, focus, escape, social aspects, discovery, etc.). Riders from this segment are typically the least experienced, have the least invested in their bikes, tend to ride unregistered and unlicensed, and are the most likely to have had a crash resulting in an injury requiring minor first aid treatment. They ride in a way that typically results in highly negative impacts to the environment and noise levels, and is irritating to other public land users.

The Instinct and Reason (2009) report outlined that "Disciples" and "Pragmatics" are the most responsive to change, however, these groups also cause the least environmental and social impacts. "Carried Aways" are considered to be somewhat responsive to change, and given the high level of environmental and social impacts from this segment these riders represent great potential for environmental and social benefits if a managed facility can be developed to cater to their desires for a challenging riding environment.

The Instinct and Reason report (2009) indicates that the "Don't Give a Damns" segment, which is predominantly comprised of unregistered and unlicensed riders (unriders), provides the least potential for change in behaviour. Given the lower levels of motivation towards trail riding, it is unlikely that many (if any) riders from this segment would be interested in paying an entrance fee to ride at a managed facility.

2.1.2 Off-Road Motorcycle Rider Concerns

A review of online forums[2] (Dirt Bike World, 2009; Full Noise, 2009; Miniriders, 2009; Motorsports Journal, 2009; Total Racing Solutions, 2009) identified several areas of concern for off-road motorcycle riders, including:

- **Supply of Suitable Facilities**: Discussion on the forums highlighted riders' concerns that there is a shortage of suitable tracks available, and where these are available the travel time and costs to access them is prohibitive;
- **Legislation**: Many riders indicated they felt their "group" was targeted by the police and that riding areas (number and size) are being reduced. Concerns were also raised about legislation changes and the risk of fines and further police action if caught undertaking unrider activity;
- **Danger**: Many forum participants indicated their concern that some riders are not adhering to rules and regulations, and that this is increasing the danger that other riders and trail users are exposed to;
- **Entry Costs**: Riders noted that entrance fees for organised races are increasing, while prize money appears to be declining (this only applied to entrance fees for races, not general admission to facilities);
- **Insurance Costs**: Riders highlighted the limitations imposed when clubs have to organise and run under umbrella organisations for insurance reasons (Motorcycling South Australia was quoted as the example); and
- **Governance**: There is a perceived lack of transparency and understanding relating to the use of funding by clubs and Government Departments.

The most commonly repeated concerns among riders contributing to online forum discussions appear to relate to the lack of accessible facilities. There is a perception among forum participants that off-road motorcyclists are being targeted by legislation, that the facilities and space available for their use was diminishing and that regulations of these spaces had become stricter. Concerns over the danger and the cost of participation in facility use also featured numerous times.

2.2 Costs of Motorcycle Activities

Motorcycle activities can have a range of economic, social and environmental impacts, which can accrue to the participants and/ or the wider community. The following sections

[2] In assessing the outcomes of forum reviews, it is important to recognise the shortcomings of this medium, namely that forums reflect individual opinions, may not necessarily be indicative of the views of the general rider community and are unvalidated. However, despite these issues, the forums give an unedited insight into prevailing rider issues.

introduce the types of impacts typically associated with motorcycle activities that may be avoided or reduced if the activity is undertaken in a managed off-road riding facility.

2.2.1 Economic Costs

There are a wide range of potential economic costs associated with undertaking motorcycle activities and these can accrue to both the participant and the wider community.

Economic costs experienced by participants include:

- Costs of crashes, such as loss of earnings following injury, long-term medical costs, additional insurance costs and damage to motorcycle and other equipment; and
- Fines for illegal riding activities.

Economic costs experienced by the wider community include:

- The costs incurred in attempting to control and or/dissuade undesirable behaviour (e.g., unlicensed or unregistered riding, speeding, hooning) through education and awareness campaigns and in some cases police action;
- Costs of dealing with crashes, including emergency services attending the accident, subsequent emergency medical treatment and long-term care period (depending on the severity of the accident);
- Costs of establishing and maintaining a larger emergency and services health network;
- Additional repair and maintenance costs of shared pathways and access routes, which are not part of the VicRoads network; and
- Lost contribution to total economic output.

2.2.2 Social Costs

There are two main categories of social costs associated with motorcycle activities. The first relates to the social costs to participants and their families and friends as a result of crashes, the second is the external impact of motorcycle activities on the general public.

Social costs to participants and their families and friends resulting from crashes include:

- Injury, pain and suffering resulting from crashes;
- Stress and worry for family and friends;
- Long-term loss/reduction in mobility/utility; and
- Ongoing impact on family and friends of providing care and/or support to an injured friend/family member.

Social costs to the general public of motorcycle riding include:

- Noise disturbance and pollution (this is primarily incurred through excessive revving by riders, both on and off-road);
- Use conflicts resulting in effective exclusion from some areas, such as walking tracks and paths;
- Increased dust pollution (primarily through off-road riding activities); and
- Injury following accidents.

2.2.3 Environmental Costs

There are environmental costs associated with all motorbike activity (for example greenhouse gas emissions), which are incurred irrespective of whether the activity is legal or otherwise. However, there are also some environmental costs that may be exacerbated where motorcycle riding is undertaken in an inappropriate location, in particular off-road riding.

Environmental impacts associated with off-road motorcycle activities undertaken outside a managed facility include:

- Destruction/damage of flora;
- Destruction/damage to habitats and breeding grounds;
- Extreme stress reactions in some animal species leading to reproductive failure and in some examples fatalities;
- Pollutant wash off into sensitive areas, including water courses;
- Gully formation, which during rainfall events can allow water to reach a critical velocity with significantly higher erosion impacts that would otherwise occur; and
- The potential transport of noxious and invasive pest species.

2.3 Summary

The principal benefits associated with providing managed off-road riding facilities are likely to be the avoidance of the economic, social and environmental costs from attracting riders away from high-risk environments. The rider survey undertaken as part of this project highlights that bitumen day track riders and motocross riders predominantly use managed facilities for their riding activities, and as such the provision of a new managed facility is unlikely to provide much benefit in terms of avoided costs from these riders.

The greatest potential for attracting riders away from high-risk environments lies in trail bike riding, with almost 90% of trail bike riding activities undertaken outside of a managed facility. A review of the Instinct and Reason report (2009) "*Trail Bike Rider Attitude Study*" indicates that the trail bike riders that are most likely to be responsive to using a managed facility instead of public land are also those that are the most environmentally, socially and safety conscious. As such, the benefits (in terms of avoided costs) of attracting these riders to a managed facility are likely to be small.

The greatest potential for avoided economic, social and environmental costs as a result of attracting riders away from high-risk environments is in the "Carried Aways" segment. These riders display great empathy towards other land users, however, their desire for the challenge and danger of their sport drives them to disregard the environmental, noise and safety issues their riding activities generate (Instinct and Reason, 2009). If a facility can be developed that can cater to this segments' desire for challenge and freedom, there is potential for a considerable portion of this segment to be attracted away from high-risk environments, with associated benefits from avoided economic, social and environmental costs.

The "Don't Give a Damns" segment, which constitute predominantly unregistered and unlicensed riders (unriders), provide the least potential for change in behaviour despite being the least socially and environmentally responsible riders. These riders are ambivalent towards the damage and irritation they cause, and are highly unlikely to be attracted to managed facilities.

It is important to recognise not all of the costs associated with off-road motorcycle riding would be removed if a purpose built facility were established. For example, it is likely that there would still be some crashes. However, the facility could be managed in such a way to reduce the consequence of crashes and manage the way crashes are handled should they occur (i.e., rapid access to and application of first aid). It is also evident that a well managed facility, near to a major population, has the potential to promote rider use and enjoyment of a facility.

When comparing the costs associated with off-road motorcycle riding, some costs vary according to the type of activity. For example, environmental costs associated with damage to flora and fauna would be expected to be higher for trail bike riding than for bitumen track day riding. As such, in terms of environmental benefits, there is likely to be greater benefit achieved where trail bike riders can be diverted from accessing natural environments that are not part of the Victorian forest road and track network. Other costs, for example the costs associated with crash injuries, may vary based on other factors such as the rider's experience and skill level, or access to emergency services in case of a serious injury.

3. Potential Benefits of an Off-Road Motorcycle Facility

This chapter examines the potential economic, social and environment benefits of providing managed off-road motorcycle facilities.

3.1 Economic Benefits

A managed off-road motorcycle facility can provide benefits in terms of financial revenues (and costs) associated with the operation of such as facility as well as through the potential avoided costs from crashes through the provision of a managed and controlled environment for riding activities.

3.1.1 Financial

A managed off-road motorcycle facility provides economic benefits (and costs) through its day to day operation, in terms of revenues, operating expenses, employee compensation, etc. These benefits and costs are examined in detail in Chapter 5.

3.1.2 Avoided Costs from Crashes (Through Improved Safety)

As outlined in section 2.1, Australian road traffic crash statistics highlight that motorcycle riding is the riskiest form of motor vehicle operation in terms of death and injury, with the highest ratio of deaths and serious injury per registered vehicle or kilometre travelled of any vehicle type (Davey *et al*, 2007; Cassell *et al*, 2006).

Previous studies have found that the higher risk of crashes inherent in motorcycle riding is largely due to rider mistakes or control errors, which is considered to be a factor of the more demanding and challenging nature of motorcycle riding compared to other motor vehicle operation (Elliott *et al*, 2004).

In line with the risk inherent in motorcycle riding in general, off-road motorcycling is a sport with a significant element of danger in terms of crashes which could cause serious injury or death (Motorcycling Australia, 2006). For many riders, the element of risk associated with off-road riding is an integral component of the activity's attraction. Instinct and Reason (2009) found that the two (of four) segments most likely to have needed medical treatment were the two groups which most emphasised the element of danger as a motivation for riding ("Carried Aways" and "Don't Give a Damns", see section 2.1.1).

The Monash University Accident Research Centre investigated the frequency of fatalities and hospital-treated injuries among on-road and off-road motorcyclists, the demographic profile of injured riders, temporal factors, causes of injury and the nature and site of injuries (Cassell *et al*, 2006). Key findings are summarised in **Appendix A**. Overall, the study found that:

- On-road motorcycle activities present a higher share of fatalities, hospital admissions and emergency department presentations than off-road motorcycle riding. However, there is no data available to identify the number of on-road and off-road riders and their exposure to riding (i.e., their frequency and duration of riding), making it impossible to infer a comparative risk of injury between the two.
- Off-road motorcycling presents a much higher proportion of injuries in younger people (0-19 years) than on-road riding. Injuries appear to typically be more severe for on-road riding accidents than off-road riding, evidenced by the higher number of fatalities and higher average length of stay in hospital.
- The cause of injuries differs considerably between on-road and off-road riding, with on-road injuries primarily a result of collisions with other vehicles while off-road riding injuries are usually the result of non-collision accidents (i.e., falling off the bike). This is a reflection of the different risks and hazards posed by on-road and off-road riding.

There are a range of costs when riders are involved in crashes (either on-road or off-road). These costs can vary based on the location, type and severity of the crash. From an economic perspective the main costs relate to:

- **Direct expenditure**: The costs of medical treatment, including immediate primary care and all secondary rehabilitation and treatment costs (including ongoing treatment);
- **Morbidity costs**: The value of lost output as a result of non-fatal crashes (including lost output from both paid and unpaid activities); and
- **Mortality costs**: The lost value of output resulting from fatalities (including lost output from both paid and unpaid activities).

A Monash University (Watson & Ozanne-Smith, 1997) report estimated the economic cost of motor vehicle crashes in Victoria. The findings of this study are presented in **Appendix C**, and outline the following average cost of motor vehicle crashes by age range (costs adjusted to 2009 dollar terms based on CPI). While the costs outlined in the table below are for all motor vehicles and do not separate costs between the type of crash or location, they still provide useful insight for understanding the potential costs of motorcycle crashes in general.

Table 3.1. Cost of Crashes ($/Crash)

Severity [(a)]	Age Ranges				Average
	5-14	15-24	25-44	45-64	
Minor	$36	$220	$199	$145	**$150**
Moderate	$357	$2,150	$1,986	$1,445	**$1,485**
Severe	$24,938	$36,428	$36,314	$30,836	**$32,129**
Fatal	$818,062	$1,222,990	$1,142,596	$646,041	**$957,422**

Note: Costs have been adjusted to 2009 dollar terms based on CPI. (a) The severity categories utilised in this table are based on the costs of motor vehicle crashes involving fatalities (fatal), those crashes that involved injuries requiring hospitalisation (severe) and those that did not require hospitalisation (moderate). There is no data available to assess the cost of "minor" injuries – for the purposes of this analysis the average cost per crash resulting in minor injuries has been derived as 10% of the cost of a crash involving a "moderate" injury to incorporate any direct expenditure on first aid equipment/ treatment, as well as any morbidity costs (while expected to be small, it has been assumed there is potential for temporary reductions in output as a result of minor injuries). Source: Watson & Ozanne-Smith (1997).

The provision of managed off-road facilities has the potential to reduce the costs of crashes by providing a controlled and managed environment for riding activities with access to first-aid and medical attention.

The rider survey undertaken as part of this report examined crash rates of riders at managed off-road riding facilities compared to other off-road riding environments (refer to **Appendix B** for a summary of rider survey results). Results from the rider survey suggest there is little difference in crash rates (in terms of crashes per one hundred riding episodes[3]) at off-road motorcycle facilities compared to other off-road riding environments. In fact, respondents indicated higher crash rates resulting in minor injuries at off-road riding facilities compared to other off-road environments. Given this finding from the rider survey, provision of off-road riding facilities, and a potential transition of off-road riding activities to off-road riding facilities, is not considered to provide a safety benefit in terms of a reduction in the number of crashes.

There also may be some potential for managed off-road facilities to attract 'high-risk' on-road riders. However, there is no available data to identify what proportion, if any, of on-road riders may transfer high-risk on-road activities (e.g., speeding) to off-road facilities. Where a managed facility ameliorates riders' desire to undertake aberrant behaviour outside the facility, in particular on the Victorian road network, this may have potential benefits to third parties through reduced risk of vehicle-to-vehicle collisions.

There is also some potential for training and coaching to be provided at a managed off-road motorcycle facility, with 41.8% of rider survey respondents indicating that they consider coaching and training as an important feature for a managed facility. However,

[3] For the purposes of this report, a "riding episode" is considered to be any one rider undertaking any one riding activity, across one single day. For example, if two respondents indicated that they both undertake trail riding 5 times per year, this is equivalent to 10 (2 x 5) trail riding episodes.

as outlined in section 2.1, there is little empirical evidence to support an improvement in rider safety as a result of training or coaching, with some studies suggesting that riders' receiving coaching and training may over-estimate their own ability post training (thus increasing their risk of crashing).

Regardless of the empirical evidence, safety benefits are expected to be achieved at a managed off-road riding facility (compared to other environments) through enhanced access to first-aid and medical attention where required. There is considerable medical evidence indicating crash victims have a greater chance of survival and a reduction in the severity of their injuries if first aid and medical (paramedic or ambulance) assistance can be immediately administered (British Red Cross, 2001; Hussain & Redmond, 1994). This literature suggests that, due to the time-limited nature of treating some injuries, pre-hospital deaths may be preventable and injuries may have less long-term impact if casualties could be treated immediately by people who have first aid knowledge.

For example, one of the most common causes of a road accident fatality is the casualty suffering from a loss of oxygen supply caused by a blocked airway (British Red Cross, 2001; Hussain & Redmond, 1994). On average, it takes less than four minutes for a blocked airway to cause death. In Victoria, the target response time for emergency services is to respond to 90% of emergencies within 15 minutes (Ambulance Victoria, 2009), indicating that for a large proportion of accidents resulting in a loss of oxygen supply first-aid treatment would need to be performed before ambulance staff arrive.

While there is considerable evidence supporting the benefits of immediate delivery of first-aid treatment, there is little in the way of information and statistics to identify the quantum of this benefit (i.e., in terms of the reduction in severity of injury), or the monetary value thereof. Due to the paucity of information available for quantifying the potential improvement in safety resulting from enhanced access to first-aid and medical services, this benefit has not been included in the BCA, which will serve to underestimate the benefits of providing a managed facility.

Results from the rider survey regarding the number of crashes (by severity of injury) and costs by injury severity presented above can provide an indication of the cost of crashes associated with off-road motorcycle activities. The table below outlines the number of crashes per 100 riding episodes by severity of injury as indicated in the rider survey (see **Appendix B**). Estimates of crashes resulting in fatalities per 100 riding episodes have been developed based on crash statistics provided in Cassell *et al* (2006) for off-road riding between 2002 and 2004, showing that there were 9 fatalities between this period compared to 3,444 hospitalisations (injuries requiring hospitalisation are equivalent to a "severe" injury). This ratio has been applied to results from the rider survey regarding the number of crashes per 100 riding episodes resulting in a severe injury to develop an estimate of the number of crashes resulting in a fatality.

Table 3.2. Number of Crashes Per 100 Riding Episodes

Severity of Injury	Number of Crashes Per 100 Riding Episodes
Minor	0.75
Moderate	0.24
Severe	0.10
Fatal	0.0003
Total	**1.09**

Source: Cassell *et al* (2006), AEC*group*.

Applying the estimated average cost of crashes outlined in Table 3.1 to the number of crashes per 100 riding episodes resulting in an injury provides an estimate of the cost of crashes per 100 riding episodes, as outlined in the table below. The table identifies that the estimated cost of crashes per 100 off-road riding episodes is approximately $39.

Table 3.3. Cost of Crashes Per 100 Riding Episodes

Crash Severity	Average Cost of Crashes	Number of Crashes Per 100 Riding Episodes	Cost of Crashes Per 100 Riding Episodes
Minor	$150	0.75	$1.13
Moderate	$1,485	0.24	$3.53
Severe	$32,129	0.10	$32.13
Fatal	$957,422	0.0003	$2.50
Total	**-**	**1.09**	**$39.29**

Source: Watson & Ozanne-Smith (1997), Cassell *et al* (2006), AEC*group*.

An examination of the potential benefits of enhanced access to first-aid and medical services based on a range of reductions in costs is provided as part of the sensitivity analysis for the BCA (see section 6.4).

3.2 Social Benefits

Social benefits from off-road facilities relate primarily to avoided costs. Avoided social costs include quality of life impacts experienced by crash victims, as well as the impact of off-road riding to neighbouring residents as experienced through noise disturbance and use conflicts on pathways and tracks.

3.2.1 Avoided Reduction in Quality of Life from Crashes

In addition to the avoided economic cost of crashes as a result of improved rider safety outlined above, there is potential for a reduction in social costs as a result of fewer crashes resulting in impairment and a loss in quality of life. Compensation awards are one of the most commonly used methods of assessing the impact of accidents on quality of life (Bureau of Transport Economics, 2000). In Victoria, the Transport Accident Commission (TAC) uses an impairment rating to assess transport accident victims once their condition has stabilised. Impairment is defined as the permanent physical or psychological injury as a result of a transport related accident (Transport Accident Commission, 2008). All accident victims are assessed on a standard scale.

Adults assessed as having an impairment rating of 11% or more are entitled to receive a one-off, lump sum payment to compensate for their impairment. Children with an impairment rating of 11% or more receive a weekly benefit, paid to the parent or guardian until the child turns 18, the TAC then determine the child's eligibility for a lump sum payment. The following table shows the current impairment payment scale.

Table 3.4. TAC Lump Sum Compensation Scale (as at 1st July 2009)

Degree of Impairment	Impairment Benefit
10% or less	$0
11%-19%	$5,180 +((D-10) x $1,160)
20%-49%	$17,260 +((D-20) x $1,720)
50%-59%	$69,320 +((D-50) x $2,010)
60%-79%	$89,740 +((D-60) x $2,310)
80%-89%	$138,060 +((D-80) x $4,600)
90%-99%	$188,690 +((D-90) x $9,200)
100%	$289,960

Note: "D" = degree of impairment.
Source: Transport Accident Commission (2008)

Although the TAC scheme only covers transport accidents on the designated road network[4], the payments are considered to be indicative of the social value placed on loss of quality of life as a result of accidents. The assessment of the impairment score is complex, especially where multiple injuries have been sustained.

[4] TAC does not payout in some cases where the victim was at fault, for example where driving with an excess blood/ alcohol reading.

The benefit associated with the development of an off-road motorcycle facility would be the avoided impacts on quality of life to crash victims through improved rider safety. However, this has not been included in the Benefit Cost Assessment (BCA) in Chapter 6 as:

- There is no information available to identify what proportion of off-road recreational riding crashes result in an impairment, the degree of impairment resulting from these crashes, or the potential reduction in crashes resulting in an impairment through the provision of a managed off-road motorcycle facility; and
- The impact on quality of life is incorporated at least partially in the economic cost of crashes estimated by Monash University (Watson & Ozanne-Smith, 1997), and to include this assessment in the BCA would result in double counting.

3.2.2 Avoided Costs of Noise Disturbance

It is widely recognised within the off-road motorcycling community that noise and associated disturbance is a serious issue for the sport (Instinct and Reason, 2009). Several jurisdictions, including Victoria and New South Wales, have established statutory noise limits for off-road motorbikes. To be roadworthy, motorcycles in Victoria must have an effective silencer (muffler) to keep the exhaust noise below the legal limit of 94dB (Department of Sustainability and Environment, 2007).

While noise impacts of off-road motorcycle riding is widely acknowledge in the literature, placing value on the cost of noise emissions is not straight forward, as the cost is likely to be influenced by multiple factors including the level of exposure, frequency and the timing of noise events. Due to these limitations, the avoided social costs from noise disturbance have not been quantified for inclusion in the BCA.

Most studies examining the impact of noise pollution attempt to measure its affect on property values (i.e., by utlising the hedonic pricing valuation method). A cut-off threshold is used to set a noise level below which zero damage is assumed, this is generally 55 decibels (dB) for road and aircraft transport (Navrud, 2002). Beyond the cut-off, a noise sensitivity depreciation index (NSDI) is established to identify the percentage decrease in housing prices following every one dB increase in noise pollution. However, transferring the findings from one study to an alternative location can be misleading due to the characteristics of different housing markets.

An extensive review of previous studies undertaken by Navrud (2002) identified that NSDIs for road traffic noise were reported to range from 0.08% to 2.22%, with an "average" value somewhere in the lower part of this range. A simple mean of these studies suggests a NSDI of about 0.55%.

A standard motorcycle typically produces approximately 90 dB at 25 feet (7.62 metres) (Michael Minor & Associates, 2009), although this can range up to approximately 120 dB when being revved (Bikernet.com, 2009). Sound decreases over distance, and the rate at which sound decreases is determined by several factors. Under ideal conditions (i.e., no reflecting surfaces or other background sound or interference), noise decreases at a rate of approximately 6 dB each time the distance doubles (University of Salford, 2009). However, interactions of the sound waves with the ground often results in greater noise attenuation than experienced in ideal conditions above. Other factors such as existing structures, topography, foliage, ground cover, and atmospheric conditions such as wind, temperature, and relative humidity can have significant affects on the attenuation of sound (Michael Minor & Associates, 2009). Given that off-road motorcycle riding is most often undertaken in areas with considerable ground cover and foliage, it is likely the rate of attenuation is higher than 6 dB each time the distance doubles. The table below outlines the impact on noise levels assuming attenuation rates of between 10 dB and 20 dB for each doubling in distance.

Table 3.5. Noise Levels of Motorcycles at Various Distances and Rates of Attenuation

Distance from Source	Attenuation Rate of 10 dB	Attenuation Rate of 15 dB	Attenuation Rate of 20 dB
7.62 metres	90	90	90
25 metres	73	64	56
50 metres	63	49	36
100 metres	53	34	16
200 metres	43	19	0
500 metres	30	0	0
1,000 metres	20	0	0

Note: Attenuation rates represent the decrease in dB for every doubling in distance from the noise source.
Source: Michael Minor & Associates (2009), Bikernet.com (2009), AEC*group*.

The table below outlines the anticipated loss in value of a property worth $500,000 as a result of off-road motorcycle noise nearby, using an NSDI of 0.55% of the property value for every decibel above 55 dB.

Table 3.6. Reduction in Value of a $500,000 Property Due to Noise Levels of Motorcycles at Various Distances and Rates of Attenuation

Distance from Source	Loss in Value at Attenuation Rate		
	of 10 dB	of 15 dB	of 20 dB
7.62 metres	$96,250	$96,250	$96,250
25 metres	$49,113	$25,545	$1,976
50 metres	$21,613	$0	$0
100 metres	$0	$0	$0

Note: Attenuation rates represent the decrease in dB for every doubling in distance from the noise source.
Source: Michael Minor & Associates (2009), Bikernet.com (2009), AEC*group*.

The benefit associated with the development of an off-road motorcycle facility is the result of avoided noise impacts due to mitigation measures implemented at an off-road facility and the diversion of off-road riding in other surrounding areas to the managed facility. However, as there is no way of knowing the number of riders attracted to a new managed facility that would otherwise ride in proximity to residential properties this has not been incorporated into the quantitative analysis.

3.2.3 Avoided Costs of Open Space Conflicts

Other social costs to the wider community relate to diminished enjoyment of open spaces and pathways as a result of usage conflicts with off-road motorcyclists. A report by Instinct and Reason (2009) found that:

> '*It is thought that as the number of trail bike riders increases, conflicts will become more prevalent*.'

A survey completed as part of the Instinct and Reason report (2009) identified many examples of usage conflicts between riders and other open space users which ranged from verbal abuse to ropes left across single tracks. In all, 73% of trail bike riders in the survey had personally experienced some form of hostility (Instinct and Reason, 2009).

However, there is little information available to quantify the costs of open space conflicts, either in terms of the number of instances of conflict that could be avoided or in terms of the value of avoiding conflicts of use.

3.3 Environmental Benefits

Where a new managed off-road motorcycle facility encourages riders to use a facility rather than unlawfully accessing areas of natural vegetation and bushland, this would be expected to provide some form of environmental benefit in terms of reduced degradation of a natural habitat. There is little information available to quantify the number of riders that would cease riding in areas of natural habitat, nor the marginal benefit that one less riding episode in an area of natural habitat would provide. As such, the environmental benefits of reducing the number of riding episodes in areas of natural habitat have not been valued or included in the BCA. The examples below, however, outline the range of

potential benefits that could be realised if off-road riding in areas of natural habitat were to cease:

- Windle, J. & Cramb, R.A. (1993) completed an assessment of local residents' willingness to pay to preserve, upgrade and maintain an area of natural bush land in Brisbane. The area was owned by Brisbane City Council and could have been rezoned to allow development. Some areas were attractive and appealing while other areas are degraded and required some upgrading and ongoing maintenance. The sample of local residents within 1.5 km of the area and found that mean maximum willingness to pay was $31.83 per annum, equivalent to $49.09 in 2009 dollar terms ($2009).
- Lockwood, M. & Tracy, K. (1995) reviewed residents' willingness to pay for Centennial Park in Sydney. Centennial Park is 5 km south east of the CBD in an area of high density housing. It consists of 220 hectares of parkland ranging from sculptured gardens and ornamental wetlands to sports fields and more natural areas. The study found a mean willingness to pay of $25.81 per person per annum in 1993, equivalent of $39.22 ($2009).
- In 2005, CSIRO conducted a willingness to pay assessment for wetland, scrubland and grassy woodland in south eastern South Australia (CSIRO Land and Water, 2005). Based on survey participant responses throughout South Australia, the report found that willingness to pay in order to maintain habitats 'in a healthy condition, for perpetuity' was $800 per hectare for scrubland ($914 in $2009), $1,100 for grassy woodland ($1,257 in $2009) and $1,700 for wetland ($1,942 in $2009).

While these studies provide an indication as to the value placed on areas of natural habitat, the values can not be readily applied to provide estimates of the damage caused per rider. It should also be recognised that, as outlined in section 2.1, those riders that cause the most environmental harm are typically the riders that are least likely to alter their behaviour – meaning that the provision of off-road motorcycle facilities is unlikely to result in significant environmental benefits unless these "high-risk" riders can be engaged and educated appropriately.

4. A Model for an Off-Road Motorcycle Facility

This chapter provides an overview of a model off-road motorcycle facility including a variety of off and on track features identified through the rider survey and case studies of other facilities.

4.1 Requirements of Successful Facilities

Case Studies of Off-Road Motorcycle Facilities

A desktop review of off-road motorcycle facilities in Victoria and other Australian States and Territories is included in the Literature Review in **Appendix A**. The Literature Review identifies a variety of off-road motorcycling facilities offered throughout Victoria and Australia. These facilities feature various track types and surfaces from sealed bitumen to off-road trails. The organisational structures, charges and range of additional facilities on offer also vary significantly, influenced by the level of use and market penetration.

In Victoria, the reviewed facilities cover a range of facility types, activities, management structures and price ranges. In general, smaller local tracks are unsealed and cater for motocross type events. These facilities tend to be run on a not-for-profit basis and rely upon members to provide their time in order to staff and maintain the facility. The Victorian facilities tend to be more focussed towards servicing local populations (with some exceptions, for example the more commercial facilities of Phillip Island and Broadford) than the interstate case studies, which were more remote and required additional driving time. This difference was also reflected in the additional non-riding related services at each site. The interstate facilities tended to offer accommodation options and a range of recreational activities and supporting amenities reflective of their more remote nature. The interstate facilities were all privately operated on a commercial basis.

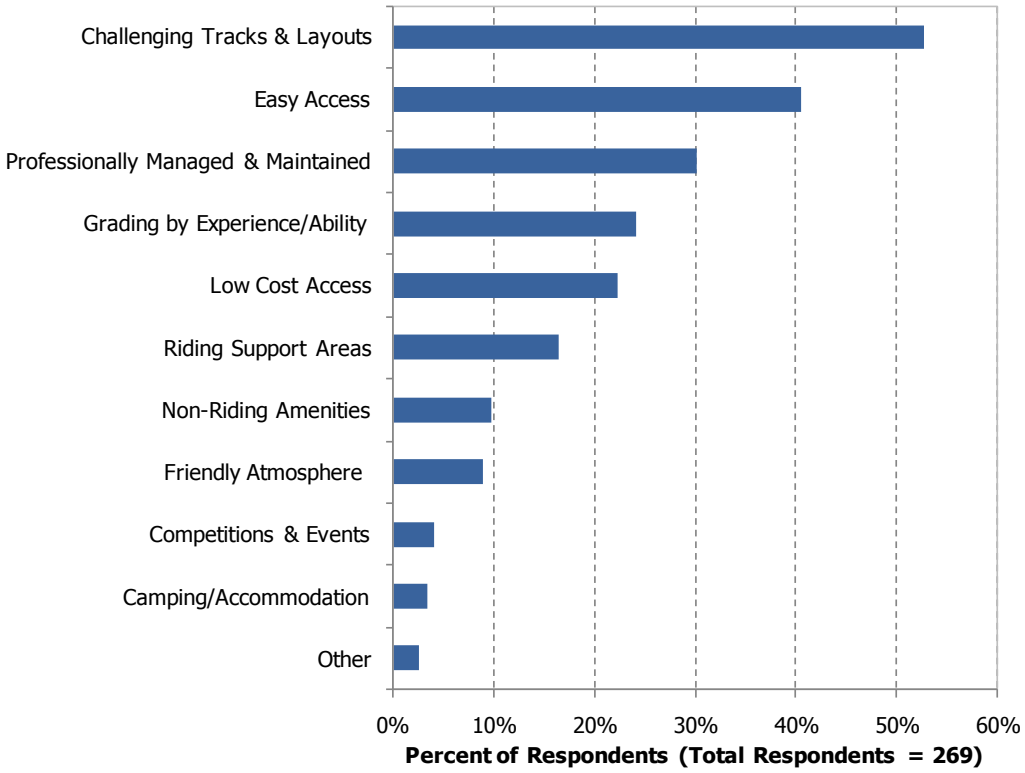
Unlike the unsealed sites, the bitumen facilities reviewed have specifically set out to offer amateur riders the opportunity to ride on the same track as professional racers. They also set out clear and detailed safety requirements and manage the riders more carefully, for example by grading them into groups based on ability and scrutinising riders' bikes and equipment before permitting track access. Off the track, there is also a larger range of services on offer. All tracks examined are managed by companies specialising in managing this type of facility and are significantly more expensive to access.

Of significance, those facilities offering trail bike riding activities are typically expansive, forested sites situated in remote areas with considerable drive times from metropolitan locations. This is not surprising given trail bike riders' preference for discovery and exploring areas that are not easily accessible (Instinct and Reason, 2009). In order to encourage trail bike riders to use a managed facility, it is important that sufficient, forested land area be available to satisfy riders' desires for exploration and discovery.

4.1.1 User Requirements

Respondents to the rider survey undertaken as part of this project (refer **Appendix B**) were asked to nominate the features of an off-road motorcycle facility, which if available, would encourage them to use it. The following figure summarises respondent opinions.

Figure 4.1. Key Features of Off-Road Motorcycle Facilities



Notes: This was a multiple response question and as such the total can sum to more than 100%.
Source: AEC*group*

These responses can be grouped into three types of facility features:

- **Those directly related to the ride experience**: Challenging tracks and layouts, professionally managed and maintained and riders graded by experience/ability;
- **Those related to access to the facility**: Ease of access (e.g., travel times, proximity to major roads, etc.) and low cost access; and
- **Rider support features**: Riding support areas, non-riding amenities, friendly atmosphere, competition and events and camping and accommodation facilities.

When asked to list riding experiences and track features that were most important in an off-road facility, respondents indicated they undertook more than one type of activity and thought a new facility should feature multiple track types and track layouts. A trail bike track was nominated by 70.7% of respondents as being the most important followed by a motocross track with 54.7% of respondents. The response is interesting given that previous questions identified that currently only 11.2% of trail bike riding is undertaken within managed facilities compared to 80.4% for motocross, and likely reflects the lack of managed trail facilities. Respondents also nominated bitumen track riding and trials (both 19.9%) and 'other' including enduro races, speedway and grass track events (14.0%).

It is clear from the rider survey that riders are seeking multiple track formats from any facility and that trails and motocross are the most popular activities. As well as the type of activity undertaken, riders also appear to be concerned about the relative ability/experience levels of other riders. Many riders would favour facilities where riders are graded by experience/ability and then ride within a group of their riding peers. Grading by speed is already in use at some track days, with initial grading by the rider and ongoing monitoring by track officials.

The rider survey also asked respondents why some riders did not undertake off-road activities in managed facilities. Responses largely mirrored the responses concerning important facility features but also identified that 39.2% of responses related to tracks which failed to meet rider expectations.

4.1.2 Operational Requirements

Online forums and discussions (Dirt Bike World, 2009; Full Noise, 2009; Miniriders, 2009; Motorsports Journal, 2009; Total Racing Solutions, 2009) were studied to consider riders' views on the merits and shortcomings of a number of managed facilities. Key points raised were:

- **Organisation and Management**: It is important that a facility be appropriately managed and that the organisers provide riders with information about track conditions and techniques as well as managing and ensuring appropriate rider behaviours;
- **Promotion**: Facilities need to be well promoted – riders identified that without adequate promotion it was difficult to find out about the available tracks, the facilities on offer, opening times, fees and regulations;
- **Track Condition and Maintenance**: It is important that tracks be properly maintained (recognising that part of the attraction of motocross is the variation in track conditions);
- **Competition Standard and Sponsorship**: Riders engaged in competitions consider the standard of other competitors and the sponsorship and prize money available to be important issues; and
- **Variety**: Variety in track layouts and conditions is important – riders noted a preference to try somewhere new/ different once they become familiar with a track.

It is evident from the review of online forums and discussions that riders consider management of the facility to be important in terms of providing an enjoyable and safe recreational environment. In addition, riders highlighted the importance of variety and a range of track layouts and experiences to provide for continued enjoyment, suggesting that a facility may be more successful where track layouts and features are periodically altered throughout the year to provide new challenges and riding experiences. The need to access sponsors and to promote events and competitions held at the venue were also identified as important elements for a successful facility.

4.2 Facility Specification

Key learnings from the rider survey and a review of other off-road riding facilities indicate that any new managed facility should offer multiple tracks covering a range of rider activities to provide riders with different challenges at the one facility. A multi-activity centre should include the following specifications.

Site Location

The chosen site would need to be of a sufficient size to safely accommodate the multiple activity types identified as well as providing sufficient room for each track to provide participants with an engaging ride experience. As well as the tracks, the site would need to accommodate the identified rider and spectator support areas including car parking, internal roads, site facility and maintenance equipment, offices, showers and changing rooms and a first aid area.

Findings from the rider survey suggest that riders would prefer a facility within 1 to 2 hours drive of where they reside. As Melbourne is the major population centre in Victoria, it is considered appropriate that this study examine the benefits and costs of providing a facility in the vicinity (within 75km) of Melbourne.

A key factor in determining site location for a new managed facility would be the inclusion or exclusion of trail bike riding, which requires a much larger land area than other riding activities, and should be in a forested area to meet rider preferences. As outlined in section 4.1.1, findings from the rider survey suggest that trail bike riding is considered an

important feature for a managed facility, and as such has been included in this specification[5].

A review of case studies of off-road managed facilities (**Appendix A**) identifies that the area available for trail bike riding varies significantly between facilities, ranging from approximately 215 hectares (530 acres) to over 4,000 hectares (9,885 acres). In order to provide sufficient land area to encourage trail bike riders to utilise the facility it has been assumed that an area covering approximately 500 hectares would be required.

An examination of rural property prices located approximately 75km from Melbourne indicates that there is considerable variability in property prices in this radius, typically ranging between $5,000 per hectare and $25,000 per hectare (realestate.com.au, 2009). An average price of $15,000 per hectare was assumed in developing estimates of the cost of purchasing land.

Other location considerations, which have not been included in this assessment, would include ease of access from the public road network and location relative to other developments, including residential areas.

Track Types

Track types to be offered at a new managed facility and their dimensions have been developed based on rider preferences identified from the rider survey and case studies, as well as venue standards specified by Motorcycling Australia (2006). The following track types and dimensions have been utilised in this report:

- **Bitumen Track**: Typically range from between 2.5 kilometres to 4.5 kilometres long, with 3.0 kilometres long used in this analysis (with an average width of approximately 10 metres);
- **Motocross Tracks**: Multiple tracks totaling 3.0 kilometres in length (can range from 0.8 kilometres to 3.0 kilometres) and an average width of 8 metres (minimum of 6 metres). The motocross track(s) would feature a series of jumps, turns and other features. It would be anticipated that the track(s) would be designed to be re-configured on a semi-regular basis to continue to provide a riding challenge to participants;
- **Trail Route**: Approximately 20.0 kilometres to 30.0 kilometres of maintained trails and tracks are assumed to be available for trail bike riding in the 500 hectare land area (25.0 kilometres used in this analysis), which is in keeping with the length of track available per hectare at the Louee Enduro and Motocross Complex (refer **Appendix A**). In Victoria a private off-road motorcycle facility would not typically provide an enclosed trail route area, with trails riding primarily undertaken on government-owned land;
- **Trials Area**: A 2,500 square metre trials area to allow participants to undertake this activity entirely separately from riders undertaking lap based activities; and
- **Minibike Area**: A 1,000 square metre area which could be set up to accommodate dirt track activities as well as use for coaching sessions.

Rider Support Facilities

In addition to the track layout and features, the following rider support facilities are likely to be required for the successful operation of a managed facility:

- **Clubhouse and Administration Building**: The facility would need a professional manager/administrator. In common with the majority of other facilities it is likely marshals would be volunteers. However, such a complex site would need a full-time manager with appropriate accommodation. As well as housing the facility manger, the administration building would provide a rest and administration area for volunteers;
- **First Aid Facility**: Appropriately trained staff would be on site whenever the facility was open and the new facility should provide a basic first aid centre where minor

[5] An alternative scenario examining a facility that does not include a trail bike riding track is outlined in **Appendix H** with the findings presented in the sensitivity analysis in section 6.4. There may be potential to develop a facility that does not include a trail bike riding track adjacent to an area designated for trail riding.

injuries could be assessed and treated and more serious casualties given immediate assistance prior to transfer to hospital/doctor as required;

- **Public Toilets and Shower Blocks**: These facilities were considered vital by respondents. Many current facilities do not provide these types of amenities for participants or spectators;
- **Retail Area**: Many respondents to the rider survey identified the provision of food and drink facilities as an important component of any off-road facility. It is likely the facility would focus on quick service with a limited range of pre-made convenience foods. There may be some potential to develop the retail offering to include specialist products including equipment and accessories;
- **Track Maintenance Equipment**: In order to maintain the non-bitumen tracks, including the periodic re-configuration of track layouts, the facility would require at least one item of heavy earth moving equipment. Although this type of equipment could be hired on an a needed basis, it is likely the demand from the facility would be such that it would be more cost effective to buy or lease the equipment to have on site at all times;
- **Machinery Shed**: The built structures and track areas would need constant upkeep and maintenance, which in the case of the non-paved tracks this is likely to require the use of heavy earth moving equipment. It is important that maintenance staff have a secure storage facility for security and to reduce equipment maintenance; and
- **Testing Area**: Before being allowed to ride at the facility, a series of safety checks will need to be made to ensure riders and motorbikes meet track standards and that they are not in breach of noise and other environmental constraints. The testing area would provide a controlled environment where this could be undertaken.

Other Facilities

Other facilities that have been included in this report include:

- **Viewing Area**: In 2008, more than 14,000 mini-bikes were sold in Australia, accounting for 28.6% of the total off-road motorcycle market. Unless coming to a facility in a supervised group or club, these riders are almost certain to have a parent with them requiring the provision of an adequate spectator viewing area. If the facility were used as a venue for club or high standard competition meetings, the viewing area would be essential to safe and comfortable accommodation of spectators. Further if the facility is to be used as a venue for competition events, spectator facilities are essential;
- **Internal Access Roads**: The facility will require internal access roads for riders and staff to access track areas and riding support facilities. These access roads are assumed to be paved, with approximately 4.0 kilometres of internal roads provided;
- **Car Parks**: Participants not riding their motorcycle to the facility will need access to a car parking space. Room for approximately 200 car spaces is assumed to be required to accommodate participants and spectators and to limit impact on parking provision in the surrounding areas. Car parks are assumed to be provided in an unpaved, cleared area with sufficient space for trailers; and
- **Camp Ground**: 400 square metre area offering spaces for tents allowing overnight stays. Visitors using the camp site would also be able to use the changing rooms and other facilities after riding had finished for the day.

4.3 Facility Utilisation & Capacity

A review of off-road motorcycle facilities in Victoria and elsewhere in Australia highlights that most off-road motorcycle facilities are open on weekends, with only the larger facilities open during the week and even then, normally for just one day (with the exception of school holidays or if an individual or group hire the venue for their exclusive use). It is important to recognise the additional costs associated with opening hours, principally staff costs, as well as the impact of opening hours on the number of participants using the facility. The rider survey identified overcrowding as a key reason why some off-road riders do not make greater use of off-road facilities.

Based on the information contained in the case study review and interpreting the findings relating to the rider needs, desires and priorities, the following operational and utilisation attributes were developed:

- The facility would be open for 8 hours per day on Saturdays and Sundays, as well as one additional day throughout the week for 52-weeks a year;
- There are three weekends when the facility is unavailable for general use (when events are held);
- The assumed maximum on-track capacity for each riding activity is outlined below. On-track capacities have been developed based on track standards and on-track capacities at other facilities:
  - 30 riders on the bitumen track;
  - 60 riders on the motocross tracks;
  - 400 riders on the trails tracks; and
  - 50 riders on the trials course;
- Depending on the day, time of day and season, utilisation rates may vary throughout the year (i.e., it is unlikely that maximum capacity thresholds will be achieved at all times during operation). This assessment has assumed, including the use of track scheduling/ booking to assist in smoothing the demand for the facility over the operating hours and increasing utilisation, an average daily utilisation would be approximately 60% of capacity;
- Based on the findings of the Instinct and Reason (2009) report regarding average ride times, the average rider stays at a facility for between two and four hours (average of three hours used in this analysis);
- Using the above estimates of number of days of operation, hours of operation, maximum on-track capacity, average daily capacity and average hours stayed, the maximum number of riding episodes the facility can support throughout the year is estimated to be:
  - 7,200 riding episodes on the bitumen track;
  - 14,400 riding episodes on the motocross tracks;
  - 96,000 riding episodes on the trail riding tracks; and
  - 12,000 riding episodes on the trials course.

5. Facility Costs & Revenues

This chapter outlines the estimated costs of developing and operating a facility as specified in section 4.2 based on industry benchmarks and consultation, and the associated demand and revenues for such a facility as identified through the rider survey, case studies and consultation.

5.1 Costs

5.1.1 Establishment Costs

The following table sets out the estimated establishment costs of the facility identified in section 4.2. The costs are derived from construction industry benchmarks and have been compared to plans for a similar facility. While actual land purchase and construction costs are likely to vary between locations, the table below provides an indicative estimate of the establishment costs of the facility. Any additional costs associated with higher construction costs in regional Victoria, are likely to be off set to some extent by lower land values.

Table 5.1. Facility Establishment Costs

Item	Units		Unit Cost	Total Cost
Land Purchase (site located within 75km radius of Melbourne)	Ha	500	$15,000	$7,500,000
Preliminary Earthworks	Ha	50	$2,660	$133,000
Bitumen Track	sqm	30,000	$50	$1,500,000
Motocross Track	sqm	30,000	$15	$360,000
Trail Route	sqm	75,000	$10	$750,000
Trials Course	sqm	2,500	$20	$50,000
Minibike	sqm	1,000	$15	$15,000
Car Parks (open, unpaved area with drainage)	cars	200	$540	$108,000
Internal Roads (paved)	sqm	4,000	$20	$80,000
Camp Ground (cleared, leveled and landscaped)	sqm	400	$20	$8,000
Administration Building	sqm	100	$2,120	$212,000
First Aid Facility	sqm	50	$2,120	$106,000
Public Toilets	sqm	40	$4,420	$176,800
Club House & Changing Rooms	People	150	$2,215	$332,250
Viewing Area (single-tier stepped deck)	People	100	$785	$78,500
Retail Building	sqm	100	$660	$66,000
Machinery Shed	sqm	200	$195	$39,000
Testing Area (bitumen)	sqm	200	$50	$10,040
Track Maintenance & Service Equipment	Vehicles	1	$150,000	$150,000
Professional Fees	10%			$1,167,459
Contingency	10%			$1,284,205
Total				**$14,126,254**

Source: Rawlinsons (2009).

5.1.2 Finance Costs

It has been assumed the facility owner would borrow 100% of the capital costs of the facility, and would do so over a ten year term at an interest rate of 8%. In this period, the interest repayments would be a proxy for a return to capital invested. Once all debt financing had been repaid the owner would seek to earn a return on their investment estimated at a rate of 10% to 12.5% per annum.

5.1.3 Operating Costs

5.1.3.1 Fixed Operating Costs

It has been assumed the facility would be run by a combination of permanent and volunteer staff. Several rider survey respondents noted the need for proper management at off-road facilities and this would be provided through 3.25 FTE staff. It has been assumed all on-track marshals and first aiders would be volunteers, which is common practice at other off-road facilities throughout Victoria. It is assumed facility staff includes one person that is a fully accredited coach that will provide coaching and training services at the facility. The paid staff costs and positions are set out in the following table.

Table 5.2. Indicative Annual Off-Road Facility Employee Expenses

Staff Cost Calculations	FTE	Salary	On Costs	Total
Manager	0.75	$80,000	20%	$72,000
Facility Staff	1.00	$50,000	20%	$60,000
Retail	0.50	$45,000	20%	$27,000
Site Maintenance	1.00	$60,000	20%	$72,000
Total	**3.25**			**$231,000**

Source: AEC*group*

Total annual employee expenses would be $231,000 including on costs such as superannuation and administrative overheads.

Although smaller facilities often rely on volunteers to manage the track, given the scale and likely demand for this type of facility it is expected a permanent site maintenance team would be required. As well as maintaining the tracks, this resource would also be responsible for changing track layouts to maintaining the riding challenge at the facility, hopefully helping to attract and retain users.

Repair/ maintenance costs are assumed to be incurred regardless of the number of facility users, although it is recognised that this is a conservative assumption and that track wear and tear is likely to be lower where there are fewer riders. Repair/ maintenance costs are summarised in the table below, and are based on a useful working life estimate of approximately ten years for the bitumen track, and five years for the other track types.

Table 5.3. Indicative Annual Off-Road Facility Repair/ Maintenance Costs

Repair/ Maintenance Item	Cost
Bitumen Track Repairs	$150,000
Motocross Track Repairs	$72,000
Trail Route Repairs	$150,000
Trails Repairs	$10,000
Minibike Area Repairs	$3,000
Total Repair/ Maintenance Costs	**$385,000**

Source: AEC*group*

Additional fixed operating costs include items such as fire fighting equipment (and services), bank fees, IT equipment and services, rates and charges, camp grounds and other miscellaneous costs. The fixed annual operating costs of the facility are summarised in the following table and would be incurred irrespective of the number of facility users.

Table 5.4. Indicative Annual Off-Road Facility Fixed Operating Costs

Fixed Operating Cost Item	Cost
Staff Costs	$231,000
Repair/ Maintenance Costs	$385,000
Fire Fighting	$20,000
Bank Fees	$5,000
IT	$10,000
Rates and Charges	$10,000
Camp Grounds	$800
Miscellaneous	$5,000
Total Fixed Costs	**$666,800**

Source: AEC*group*

5.1.3.2 Variable Operating Costs

Variable operating costs for the facility include the cost of retail goods sold, utilities, insurance, first aid supplies and consumables. For the purposes of this analysis, these variable operating costs are assumed to correlate with the number of riders entering the new facility. The following table sets out the estimated variable operating costs per rider entering the facility and are based on costs incurred at existing facilities as well as industry averages for the Australian café and restaurant industry in 2003-04 (Australian Bureau of Statistics, 2005).

Table 5.5. Indicative Annual Off-Road Facility Variable Operating Costs

Variable Operating Costs	Per Rider Entering Facility
Cost of Retail Goods Sold	$4.69
Utilities	$0.50
Insurance	$0.75
First Aid Supplies	$0.50
Consumables	$0.25
Total	**$6.69**

Source: Australian Bureau of Statistics (2005), AEC*group*

5.2 Revenue

5.2.1 Pricing

There are three pricing approaches which could be employed:

- **Membership Fee:** Participants pay an annual fee for unlimited access to the facility;
- **Entry Charge:** Participants pay every time the use the facility, this is likely to be a daily fee payable on entrance although it could potentially be limited to a shorter time period or by activity (i.e., number of laps); or
- **Combination:** Users could pay an annual membership fee in return for a reduced entry charge.

The major advantages for membership fees are the reduction in administration and cash handling costs and reduced risks to cash flows from poor weather or other major disruption. The major disadvantages include potentially excluding the casual rider. It is likely a combination would be utilised.

The rider survey showed the majority of respondents were in favour of a combined annual fee and entry charge per use. The most commonly identified membership fees rider survey respondents would be willing to pay were:

- $101 - $200 (30.5%);
- $51 - $100 (30.2%); and
- $201 - $300 (17.1%).

The most commonly identified entry charge that respondents were willing to pay were:

- $11 - $20 (41.2%);
- $5 - $10 (23.8%); and
- $21 - $50 (21.3%).

An additional 11.2% of respondents indicated that they would be willing to pay over $100 per entry.

Based on the findings of the rider survey, as well as a comparison to other off-road motorcycle facilities, it is estimated the average charge per rider entering the facility would be approximately $30 to $50 to meet existing market conditions (including any combination of membership fee and entry charge), with an average of $40 used in this analysis. This includes any revenues from coaching and training sessions if this is provided at the facility. The actual pricing structure utilised by such a facility could include a differentiated fee structure for juniors and adults.

5.2.2 Other Revenues

The facility would also be able to generate revenues from staging competition events, providing camping facilities and providing basic retail facilities. In order to minimise incursion onto the availability of the facility for all riders, events would be limited to three per year. Based on consultation, it is estimated that the surplus from these types of events would be approximately $10,000 per event or $30,000 per year (P. Ovens, Save McAdam Park Coordinator, *pers. comm.*, 28/07/2009).

Several rider survey respondents identified the provision of food and drink facilities as an important feature of a new facility. Given the indicated demand and the absence of nearby competitors it is assumed each participant, on average, spends $12.50 per visit to the facility (e.g., food, drink, equipment purchases and fuel). The revenues from retail then depend upon the number of participants.

As outlined in section 4.2, the new facility will include a camping ground so as to provide accommodation for riders wishing to stay overnight. Case studies of similar off-road motorcycle facilities (see **Appendix A**) indicate that the typical pricing structure for camping grounds is approximately between $10 and $25 per night. An average of $15 per night has been used in this report. Given the facilities proximity to Melbourne and understanding that the majority of demand will be generated from Melbourne, it is assumed that approximately 2% of riders visiting the off-road motorcycle facility may use the camping grounds.

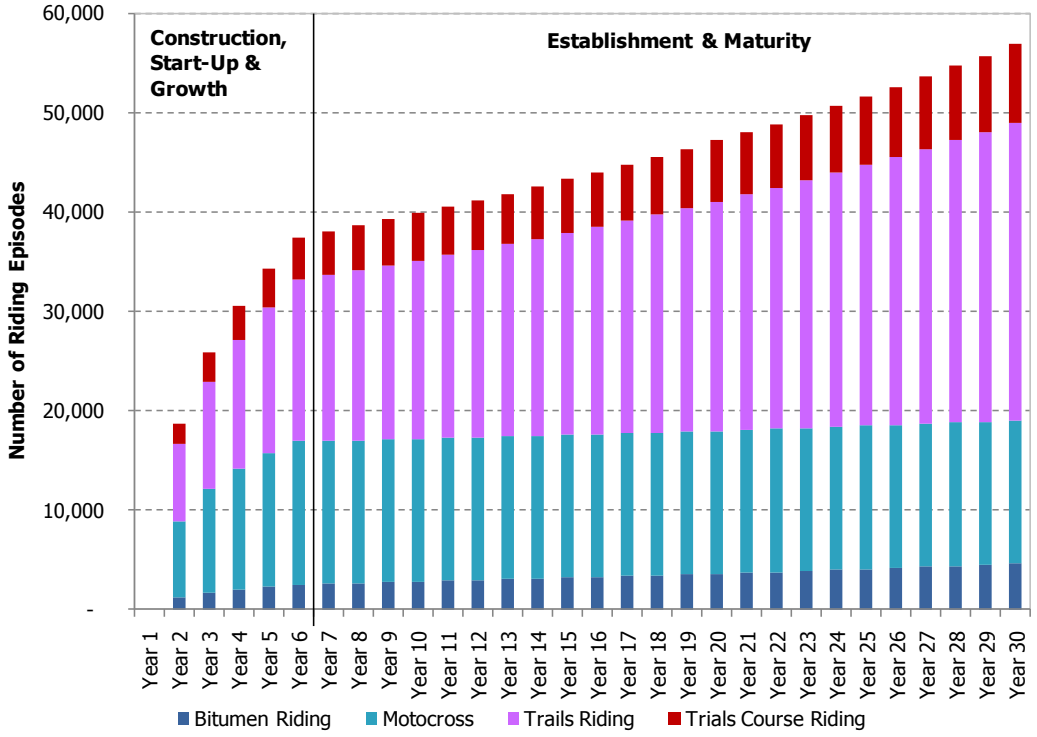
5.3 Demand

Estimates of recreational off-road riding participation at the new managed facility over a 30 year period, including one year for construction, were developed in consideration of:

- The number of off-road motorcycles currently in Victoria used for recreational purposes, as a proportion of the Victorian population;
- Historical trends in off-road motorcycle sales growth;
- Projected growth in the Victorian population;
- Participation in recreational off-road motorcycle riding in Victoria by riding pursuit, and the proportion for each pursuit currently undertaken in managed off-road motorcycle facilities;
- Frequency of recreational off-road motorcycle riding by riding pursuit in managed facilities, both currently and in terms of any changed demand patterns for a new facility; and
- The maximum track capacities outlined in section 4.3.

A detailed assessment of rider demand and the assumptions used is outlined in **Appendix D**. A summary of estimated rider demand is provided in the following figure.

Figure 5.1. Estimated Off-Road Recreational Riding Episodes Within the New Managed Facility



Source: AEC*group*

The demand estimates outlined in the figure are used in the benefit cost analysis as the base scenario, with sensitivity analysis conducted to examine the impacts of different demand scenarios.

6. Benefit Cost Analysis

This chapter examines the net benefits (costs) to the Victorian community of providing an off-road riding facility using a benefit cost analysis (BCA).

6.1 Approach

A BCA was undertaken to assess the potential benefits and costs associated with the development of a new managed off-road motorcycle facility, including consideration of potential safety benefits, impacts on unrider behaviour and potential environmental and community benefits. To examine this, all financial, economic, social and environmental impacts associated with a new managed off-road motorcycle facility were identified and compared to a counterfactual case (or "without project" scenario) to present a stream of benefits and costs. This assessment considers a generic case developed to identify and assess the range of benefits and costs associated with the development of such a facility and in no way infers that VicRoads intends on developing such a facility.

A detailed description of the methodology applied in the BCA is provided in **Appendix E**. BCA does not typically include transfer payments in the identified benefit and cost flows (i.e., payments from one party to another within Victoria) as BCA does not typically include an assessment of the distribution of costs and benefits to different stakeholders within the study area (i.e., Victoria).

The BCA undertaken for this assessment examines the stream of costs and benefits accruing to the facility operator (identified as the "facility" costs and benefits) and those accruing to the rest of the Victorian community (identified as the "external community" costs and benefits). A detailed assessment of the attractiveness of the investment to the facility operator is in **Appendix F**.

Key assumptions behind the development of the BCA model include:

- The economic planning period is 30 years due to the impact of discounting on values beyond this time scale;
- It is assumed the project has no impact on other projects and developments elsewhere in Victoria; and
- All values are expressed in 2009 dollars.

Decision Criteria:

The Net Present Value (NPV) and Benefit Cost Ratio (BCR) will be the primary decision criteria for the BCA. The NPV of a project expresses the difference between the present value (PV) of future benefits and PV of future costs, i.e.: NPV = PV (Benefits) – PV (Costs). The BCR of a project is calculated by dividing the PV of benefits by the PV of costs.

Where the BCA results in a:

- Positive NPV and BCR above 1: the development of a new managed off-road motorcycle facility will be deemed as being desirable.
- NPV equal to zero and BCR of 1: the development of a new off-road motorcycle managed facility will be deemed as being neutral (i.e., neither desirable nor undesirable).
- Negative NPV and BCR of less than 1: the development of a new off-road motorcycle managed facility will be deemed undesirable.

6.2 Model Drivers

The BCA uses the facility specifications and the demand estimates set out in Chapter 4 and Chapter 5 to assess the commercial aspects of a new managed off-road motorcycle facility (i.e., the benefits and costs accruing to the investor), as well as social benefit and cost drivers specific to examining the overall costs and benefits of developing a new

managed off-road motorcycle facility to the Victorian community. These model drivers are summarised below.

6.2.1 Rider Demand Drivers

Rider demand for the new facility has been set out in section 5.3. However, as outlined in **Appendix E**, a BCA methodology compares the "with project" scenario to the "without project" scenario in order to reflect the additional benefits of the development of a new off-road motorcycle managed facility and avoid double counting. With this in mind, all benefits and costs accruing from the development and operation of the new facility need to be identified in comparison to those that would be expected to occur if the new facility is not developed. To reflect this, only revenues and costs that would not be incurred by or at another managed facility (if the project did not proceed) should be attributed as a community impact in the assessment.

To account for this, the following assumptions were developed regarding the proportion of riders entering the facility (by riding pursuit) that would otherwise use another facility if the new managed facility is not developed.

Table 6.1. Market Capture of Riders That Would Otherwise Use Another Facility

Riding Pursuit	% That Would Otherwise Use Another Facility
Bitumen Riding	75%
Motocross	25%
Trails Riding	10%
Trials Course Riding	25%

Source: AEC*group*.

The assumptions in the table above are based on information obtained from the rider survey regarding the proportion of riding episodes undertaken inside and outside of managed facilities by type of riding pursuit, and were validated through consultation with key stakeholders, with an assumption that the majority of riding episodes at the new managed facility would otherwise be undertaken outside of a managed facility (or not at all).

6.2.2 Facility Benefit and Cost Drivers

All of the following benefit and cost drivers accruing to the facility operator are described in detail in Chapter 5.

6.2.2.1 Benefit Drivers

The following benefit drivers are summarised from those presented in Chapter 5:

- An average rider charge (including some combination of entry charges and membership fees) of $40 each time a rider enters the facility. This includes any revenues from those riders paying for and receiving coaching and training;
- Retail revenues of $12.50 per rider entering the facility;
- Surplus from hosting events of $30,000 per annum; and
- Camping fees of $15 per night stayed, with 2% of visitors assumed to stay overnight and an average length of stay of two nights.

6.2.2.2 Cost Drivers

The following cost drivers are summarised from those presented in Chapter 5:

- Initial construction cost of $14.1 million. As noted in **Appendix E**, BCA does not include financing cash flows, but rather assesses the benefit (cost) of a project irrespective of finance arrangements. As such, the construction cost is included as an upfront expenditure in the first year of the analysis;
- The facility commences operation in the second year of the analysis, with the following operating expenses:

- Fixed operating costs of $666,800 per annum; and
- Variable operating costs of $6.69 per rider entering the facility.

6.2.3 External Community Benefit and Cost Drivers

In addition to the facility related drivers set out above, additional drivers specific to the external community aspects of the BCA have been developed to assist in understanding the broader economic and social benefits and costs of the development of a new off-road motorcycle managed facility to the Victorian community. These external community benefit and cost drivers are outlined below[6].

6.2.3.1 Benefits

Value Added Activity

In constructing the facility, construction and professional services businesses in Victoria will directly receive benefits in the form of additional turnover. In this analysis the value added[7] component of the construction and professional services fees has been used to estimate the contribution to the State resulting from this increased activity. Standard industry output to value added ratios and import requirements have been used as outlined in the Australian 2004-05 Input-Output transaction tables from the Australian Bureau of Statistics (2008b).

Table 6.2. Value Added Component Calculations

Industry	Fees ($M)	Imports (%)	Output to Value Add Ratio	Value Added Component ($M)
Construction Services	$5.5	4.5%	0.311	$1.6
Professional Services	$1.2	5.9%	0.504	$0.6

Source: Australian Bureau of Statistics (2008b), Rawlinsons (2009).

Employee Compensation and On Costs

The new managed off-road motorcycle facility will provide employment opportunities in the form of general management and facility staff, retail operators and site maintenance. This will provide salaries for those employed, as well as additional expenditure (on costs) by the employer on superannuation, insurance and other employee related expenses, as outlined in Table 5.2.

6.2.3.2 Costs

Lost Rider Revenues at Other Managed Facilities

While those riders using the new facility that would otherwise use another managed facility are assumed to not incur any additional rider charge costs, the transfer of riders from other managed facilities to the new facility represents a loss of rider charge revenues at these other facilities. It is assumed the pricing structure at the new facility is similar to other managed facilities, equating to a loss of revenues at other facilities of $40 per rider using the new facility that would otherwise have ridden at another managed facility.

Partially off-setting this loss would be a reduction in variable operating costs. It has been assumed that the variable operating cost structure at other managed facilities is similar to new facility, equating to a saving of $6.69 per rider using the new facility that would otherwise have ridden at another managed facility. As such, the net loss from rider revenues is estimated to be $33.31 per rider.

[6] Any potential broader community costs and benefits arising from holding events have not been included in this assessment. However, where they were included, the benefits received in terms of rider utility, spectator utility, sponsorship, etc., would at a minimum offset the cost to riders and spectators for attending the event.

[7] The value added component includes all additional wages and salaries paid as a result of the project as well as additional company gross operating surplus and associated taxes.

Lost Retail Revenues from Elsewhere in Victoria

It is assumed that those people using the new managed off-road motorcycle facility would spend approximately the same amount of money on food, beverages and other goods elsewhere in Victoria if they did not go to the facility. This is based on the assumption that food and beverages would need to be consumed regardless, and merchandise (or other goods) would likely be purchased outside of the facility in the "without project" scenario.

This represents a transfer of payment (or loss of revenue) from other retailers in Victoria to the new managed facility equal to the revenues received from retailing at the new facility. When considering the number and distribution of retailers throughout Victoria, and the quantum of spend associated with this project, it is not anticipated this loss in revenue would be identifiable by individual businesses outside of normal fluctuations, especially given the Victorian population is projected to expand by approximately 2.2 million people over the next 30 years (Department of Planning and Community Development, 2008). Even so, this impact is included for completeness.

6.2.4 Impacts Not Included in the Modelling

Some economic, social and environmental impacts of providing a managed off-road facility have not been included in the modelling due to lack of available information to appropriately quantify these impacts. These impacts, identified in Chapter 3, would be the result of a transfer of riding activity from high-risk environments to a managed and controlled environment, and include:

- Avoided costs from crashes (through improved safety);
- Avoided social costs of noise disturbance;
- Avoided costs of open space conflicts; and
- Reduced degradation of natural habitat.

As outlined in Chapter 3, each of these impacts represents a benefit to the wider community, and if included in the modelling would result in an increase in the total benefits quantified.

6.3 Results

6.3.1 Present Value of Benefits

The table below outlines the present value (PV) of the identified benefits associated with the development and operation of a new managed off-road motorcycle facility in Victoria at discount rates of 7.5%, 10.0% and 12.5%.

The PV of total benefits to the facility operator is estimated to be approximately $15.7 million at a discount rate of 10.0%, while the PV of total benefits to the external community is estimated to be approximately $4.3 million. Rider revenues ($11.6 million) are estimated to the largest benefit at a discount rate of 10.0%. Over the 30-year analysis, the total benefit of the new off-road motorcycle facility, across all stakeholders, is estimated to be $20.1 million at a 10.0% discount rate.

Table 6.3. Present Value of Benefits of a New Managed Off-Road Motorcycle Facility

Benefit	PV ($M) – Discount Rate		
	7.5%	10.0%	12.5%
Facility Benefits			
Rider Revenues (Entry & Membership)	$15.1	$11.6	$9.3
Retail Revenues	$4.7	$3.6	$2.9
Event Surplus	$0.4	$0.3	$0.2
Camping Revenues	$0.2	$0.2	$0.1
Total Facility Benefits	*$20.3*	*$15.7*	*$12.6*
External Community Benefits			
Construction Value Added Activity	$1.6	$1.6	$1.6
Professional Services Value Added Activity	$0.6	$0.6	$0.6
Employee Compensation	$2.7	$2.2	$1.8
Avoided Costs from Crashes (through improved safety)	N/a	N/a	N/a
Avoided Social Costs of Noise Disturbance	N/a	N/a	N/a
Avoided Costs of Open Space Conflicts	N/a	N/a	N/a
Reduced Degradation of Natural Habitat	N/a	N/a	N/a
Total External Community Benefits	*$4.9*	*$4.3*	*$4.0*
Total Benefits	**$25.2**	**$20.1**	**$16.5**

Note: Totals may not sum due to rounding. N/a = Not available due to data limitations.
Source: AEC*group*.

6.3.2 Present Value of Costs

The table below outlines the present value (PV) of the identified costs associated with the development and operation of a new managed off-road motorcycle facility in Victoria at discount rates of 7.5%, 10.0% and 12.5%.

The PV of total costs to the facility operator is estimated to be approximately $22.2 million at a discount rate of 10.0%, while the PV of total costs to the external community is estimated to be approximately $5.7 million. The initial capital cost ($14.1 million at 10.0% discount rate) incurred by the developer is identified as the largest cost, followed by fixed operating costs (PV of $6.2 million at 10.0% discount rate). Over the 30-year analysis, the total cost of the new off-road motorcycle facility, across all stakeholders, is estimated to be $28.0 million at a 10.0% discount rate.

Table 6.4. Present Value of Costs of a New Managed Off-Road Motorcycle Facility

Cost	PV ($M) – Discount Rate		
	7.5%	10.0%	12.5%
Facility Costs			
Initial Capital Costs	$14.1	$14.1	$14.1
Fixed Operating Costs	$7.8	$6.2	$5.2
Variable Operating Costs	$2.4	$1.9	$1.5
Total Facility Costs	*$24.3*	*$22.2*	*$20.8*
External Community Costs			
Lost Retail Revenues from Elsewhere in Victoria	$4.7	$3.6	$2.9
Lost Rider Revenues at Other Managed Facilities	$2.7	$2.1	$1.7
Total External Community Costs	*$7.4*	*$5.7*	*$4.6*
Total Costs	**$31.8**	**$28.0**	**$25.4**

Note: Totals may not sum due to rounding.
Source: AEC*group*.

6.3.3 Summary of BCA Results

Assuming a discount rate of 10.0%, the Net Present Value (NPV) of a proposed new managed off-road motorcycle facility to Victoria is estimated to be negative $7.9 million, with a benefit to cost ratio (BCR) of 0.72, which implies a return in present value terms

of $0.72 for every dollar cost. The NPV of the proposed new facility (at a 10.0% discount rate) is comprised of:

- A PV of benefits of $20.1 million; and
- A PV of costs of $28.0 million.

Even at a lower discount rate of 7.5% the proposed new facility returns an overall NPV of negative $6.6 million, with a BCR of 0.79, while at a discount rate of 12.5% the NPV reduces to negative $8.8 million with a BCR of 0.65. The negative NPV at all discount rates used is reflective of the relatively high capital cost of establishing the facility in the first year and extended timeframe of benefits from the facility into the future.

Table 6.5. NPV and BCR of a New Off-Road Motorcycle Facility in Victoria

Real Discount Rate	PV of Benefits ($M)	PV of Costs ($M)	Total NPV ($M)	BCR
7.5%	$25.2	$31.8	-$6.6	0.79
10.0%	$20.1	$28.0	-$7.9	0.72
12.5%	$16.5	$25.4	-$8.8	0.65

Note: Totals may not sum due to rounding.
Source: AEC*group*.

The benefit cost analysis identifies that the development of a new managed off-road motorcycle facility would be **undesirable** with the costs outweighing the benefits at a discount rate of 10%. The BCA results demonstrate that a managed off-road motorcycle facility is undesirable across a range of discount rates, with the ongoing benefits insufficient to outweigh the considerable upfront costs of providing such a facility.

Some social and environmental impacts have not been valued quantitatively due to difficulties in deriving appropriate values. As outlined in Chapter 3 these impacts would be expected to be positive, resulting in an increase in the NPV and BCR from those identified in this analysis.

6.3.3.1 Facility Summary (Commercial Feasibility)

The NPV of a new managed off-road motorcycle facility to a commercial facility operator is estimated to be negative $6.5 million at a discount rate of 10.0%, with a BCR of 0.71. The NPV of a new facility (at a 10.0% discount rate) is comprised of:

- A PV of benefits of $15.7 million; and
- A PV of costs of $22.2 million.

As with the overall BCA, the NPV to the facility operator is negative across each of the discount rates used. A detailed assessment of the attractiveness of the investment from an operator's perspective is provided in **Appendix F**, and summarised in the table below.

Table 6.6. NPV and BCR of Facility Impacts of a New Off-Road Motorcycle Facility in Victoria

Real Discount Rate	PV of Benefits ($M)	PV of Costs ($M)	Total NPV ($M)	BCR
7.5%	$20.3	$24.3	-$4.0	0.84
10.0%	$15.7	$22.2	-$6.5	0.71
12.5%	$12.6	$20.8	-$8.2	0.60

Note: Totals may not sum due to rounding.
Source: AEC*group*.

As the BCA of facility impacts returns a negative NPV across all discount rates used, the BCA identifies the development of a new managed off-road motorcycle facility is an undesirable investment from the point of view of the facility operator with the PV of costs outweighing the PV of revenues.

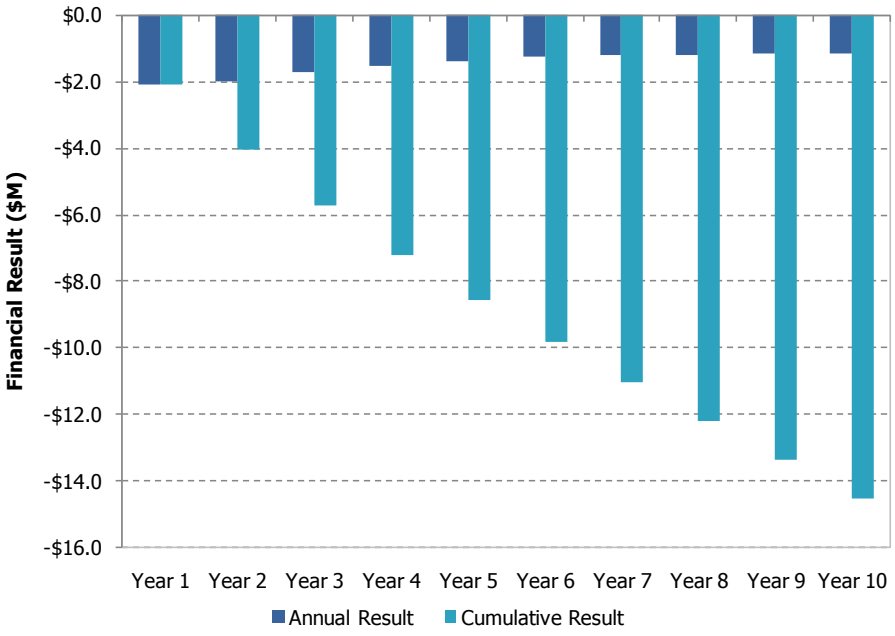
The internal rate of return (IRR) for the project is estimated to be 4.9%, which reflects the maximum discount rate (or WACC) at which the project would be deemed desirable. That is, if a developers borrowing rate and risk margin exceeds 4.9% then they should not proceed with the development. The minimum rate of return acceptable to a private developer is likely to be between 10% and 12.5%, suggesting that an off-road

motorcycle facility is unlikely to be a commercially attractive investment. Where the cost of purchasing the land is excluded from the analysis, the IRR increases to 11.3%, which suggests the facility would be a marginally attractive investment assuming a WACC of between 10% and 12.5% for a commercial investor, or more likely a not-for-profit organisation.

To assess the commercial feasibility of developing an off-road motorcycle facility, a detailed analysis of financial flows (including debt financing of 100% over a 10-year term at an interest rate of 8.0%) was undertaken to examine the operational viability of the project from the standpoint of an investor's equity capital (i.e., can the project generate sufficient short term cash revenues to cover start-up and operating expenses, including financing). This analysis is included in **Appendix G** and identified that:

- Where an investor uses 100% finance to purchase the land and construct the new off-road riding facility, the annual financial position will be negative over the entire ten year repayment period (including the first year when construction takes place), as the financial repayments and operating expenses outweigh the revenues generated by the facility. The cumulative financial position will be negative $14.5 million in the tenth year (see figure below); and

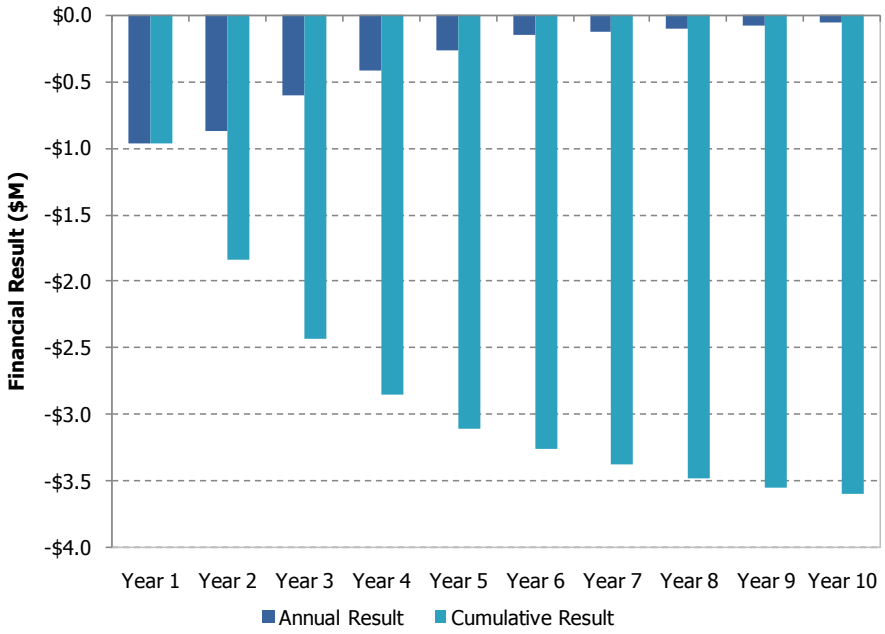
Figure 6.1. Ten-Year Financial Result for the New Managed Facility, Including Land Costs



Source: AEC*group*

- Excluding the cost of land would still result in the new facility reporting a negative annual financial position over the entire 10-year repayment period, with the cumulative financial position peaking at negative $3.6 million in the tenth year. Of note, the annual financial result also remains negative over the entire 10-year repayment period, indicating that revenues generated by the facility are less than the combination of ongoing operating expenses and annual loan repayments over this period.

Figure 6.2. Ten-Year Financial Result for the New Managed Facility, Excluding Land Costs



Source: AEC*group*

The financial analysis identifies that a new off-road motorcycle facility, as specified in this analysis, would not likely be commercially viable, with annual revenues estimated to be insufficient to offset ongoing operating expenses and returns on capital even where initial land costs are excluded. As such, even if the development of an off-road motorcycle facility were considered desirable from a wider community perspective, it would probably need to be undertaken by a not-for-profit organisation.

6.4 Sensitivity Analysis

A range of magnitudes for key input variables have been examined to determine the sensitivity of the project outcomes to changes in these drivers. Key inputs used in the BCA that were tested for their influence on the model include:

- Charges levied on riders (average rider charges) at the new managed facility (includes per use entry charges and annual membership fees);
- Demand for the new managed facility (in terms of riders and riding episodes per annum);
- Proportion of riders at the new managed facility that would otherwise ride at another facility in Victoria (market capture from other facilities);
- Social benefit from improved rider safety and reduced cost of crashes; and
- The inclusion or exclusion of an area for trail bike riding.

Sensitivity assessment of key inputs has been conducted at a discount rate of 10.0%. Findings from the sensitivity assessment are provided in the sub-sections below.

Rider Charges

Based on the findings of the rider survey and a comparison to other managed off-road motorcycle facilities it is estimated that the new facility, to be 'in the market', would look to recover an average of approximately $40 per rider entering the facility, through some combination of entry charges and membership fees. The table below provides a summary of the sensitivity analysis from a variation in rider charges (i.e., $20 to $75 on average recovered from each rider through a combination of entry and membership fees).

As the table shows, an increase in rider charges to $75 would be required in order to breakeven (e.g., result in a neutral NPV and BCR of one), assuming no change in rider demand. However, these two factors are inversely linked (i.e., an increase in price is

likely to reduce demand and vice versa), and as such it is considered extremely unlikely that an increase in rider charges to $75 would achieve breakeven in reality.

Table 6.7. Sensitivity Analysis of Average Rider Charges (Entry Charge + Membership)

Rider Charges	PV of Benefits ($M)	PV of Costs ($M)	Total NPV ($M)	BCR
$20	$14.2	$26.7	-$12.5	0.53
$30	$17.2	$27.4	-$10.2	0.63
$40	$20.1	$28.0	-$7.9	0.72
$50	$23.0	$28.6	-$5.7	0.80
$60	$25.9	$29.3	-$3.4	0.88
$75	$30.2	$30.2	$0.0	1.00

Note: Totals may not sum due to rounding.
Source: AEC*group*.

Demand for the New Managed Facility

The assumed demand profile for the new managed facility is outlined in section 5.3, and is based on estimates of the number of off-road motorcycles available in the catchment that are used in managed facilities and the number of riding episodes per rider based on the findings from the rider survey.

Sensitivity analysis was conducted for variations in demand for the new facility ranging from 50% to 200% of that used in the base analysis. The table below provides a summary of the sensitivity analysis from a variation in demand and shows that, *ceteris paribus*, even where demand were to be double that estimated in the analysis the new facility would return a negative NPV and BCR below one.

Table 6.8. Sensitivity Analysis of Demand for the New Managed Facility

% Change in Demand	PV of Benefits ($M)	PV of Costs ($M)	Total NPV ($M)	BCR
50%	$14.7	$25.4	-$10.7	0.58
75%	$17.6	$26.8	-$9.2	0.66
100%	$20.1	$28.0	-$7.9	0.72
150%	$25.1	$30.4	-$5.3	0.82
200%	$29.9	$32.7	-$2.8	0.91

Note: Totals may not sum due to rounding.
Source: AEC*group*.

Combined Land Purchase Price & Demand for the New Facility

The base analysis has assumed that the new facility would be located approximately 75km from Melbourne to be in proximity to a large rider catchment. The purchase of price of land in this radius can vary considerably, but typically ranges between $5,000 per hectare and $25,000 per hectare (realestate.com.au, 2009). An average of $15,000 per hectares was used in the base analysis.

The following sensitivity analysis examines the implication of a variation in land purchase price within the $5,000 to $25,000 per hectare range. This has been undertaken in combination with changes in rider demand to examine the potential impacts of locating the facility in an area with a different rider catchment and land price characteristics.

The tables below outline the impact of variances in both the land purchase price and demand for the new facility in terms of NPV (Table 6.9) and BCR (Table 6.10). The tables show that a decrease in land purchase price of $10,000 per hectare (to $5,000 per hectare) would still return a negative NPV and BCR assuming the same level of demand as used in the base analysis. In fact, demand would need to increase to around 150% of that used for in the base analysis in order to breakeven at a land price of $5,000 per hectare.

This suggests that the development of an off-road motorcycle facility is unlikely to be desirable regardless of the location.

Table 6.9. Sensitivity Analysis of Combination of Land Purchase Price and Demand for the New Managed Facility (NPV)

NPV		Land Purchase Price ($/Ha)				
		$5,000	$10,000	$15,000	$20,000	$25,000
% Change in Demand	50%	-$5.0	-$7.9	-$10.7	-$13.5	-$16.3
	75%	-$3.6	-$6.4	-$9.2	-$12.1	-$14.9
	100%	-$2.3	-$5.1	-$7.9	-$10.8	-$13.6
	125%	-$1.0	-$3.8	-$6.6	-$9.5	-$12.3
	150%	$0.3	-$2.5	-$5.3	-$8.2	-$11.0

Source: AEC*group*.

Table 6.10. Sensitivity Analysis of Combination of Land Purchase Price and Demand for the New Managed Facility (BCR)

BCR		Land Purchase Price ($/Ha)				
		$5,000	$10,000	$15,000	$20,000	$25,000
% Change in Demand	50%	0.74	0.65	0.58	0.52	0.48
	75%	0.83	0.73	0.66	0.60	0.55
	100%	0.90	0.80	0.72	0.65	0.60
	125%	0.96	0.85	0.77	0.71	0.65
	150%	1.01	0.91	0.82	0.76	0.70

Source: AEC*group*.

Market Capture of Riders from Other Facilities

Based on the findings of the rider survey regarding the number of riders that use managed facilities and the type of riding pursuits undertaken, it has been assumed that the new managed facility may capture approximately:

- 75% of bitumen track day riders that would otherwise use a different facility;
- 25% of motocross riders that would otherwise use a different facility;
- 10% of trail riders that would otherwise use a different facility; and
- 25% of trials course riders that would otherwise use a different facility.

Community benefits of a new managed facility would be greater where the facility captures more riders that would otherwise ride outside of a managed facility rather than from competing facilities.

Sensitivity analysis has been undertaken on the market capture of riders from other facilities by applying an adjustment of between 50% and 150% to the percentages outlined above for each type of riding pursuit (to a maximum of 100% for any one riding pursuit). For example, where an adjustment of 150% is used, market capture is assumed to be:

- 100% of bitumen track day riders (as 75% adjusted by 150% is greater than the maximum of 100%);
- 37.5% of motocross riders;
- 15% of trail riders; and
- 37.5% of trials course riders.

The table below summarises the changes to the BCA results resulting from variations in the market capture. As can be seen, the BCA is relatively insensitive to changes in the assumptions regarding market capture.

Table 6.11. Sensitivity Analysis of Market Capture of Riders from Other Facilities

% Change in Market Capture	PV of Benefits ($M)	PV of Costs ($M)	Total NPV ($M)	BCR
50%	$20.1	$26.9	-$6.9	0.74
75%	$20.1	$27.5	-$7.4	0.73
100%	$20.1	$28.0	-$7.9	0.72
125%	$20.1	$28.5	-$8.5	0.70
150%	$20.1	$29.0	-$8.9	0.69

Note: Totals may not sum due to rounding.
Source: AEC*group*.

Benefit from Improved Rider Safety and Reduced Cost of Crashes

Benefits associated with improved safety as a result of managed off-road facilities (compared to riding outside of a managed facility) are not included in the base analysis due to data limitations. While there is insufficient data to infer the quantum of safety benefit that may be achieved at an off-road motorcycle facility, a range of reductions in the cost of a crash in an off-road motorcycle facility compared to a crash outside a facility have been examined to provide an indication of what the potential benefit may be.

As outlined in section 3.1.2, it is estimated that the cost of crashes per 100 off-road riding episodes is approximately $39. The table below provides an estimate of the potential total reduction in crash costs resulting from an off-road motorcycle facility if the average cost per crash were to be reduced by between 0% and 25%, primarily as a result of enhanced access to first-aid and emergency services.

The table shows that where the provision of an off-road motorcycle facility results in a reduction in costs per crash relative to riding outside of a managed off-road facility of 25% would result in a PV of safety benefits of approximately $2.7 million, although this would not result in a positive overall NPV for the off-road motorcycle facility.

Table 6.12. Sensitivity Analysis of Social Benefit from Improved Rider Safety & Reduced Cost of Crashes

% Reduction in Cost of Crashes	PV of Benefits ($M)	PV of Costs ($M)	Total NPV ($M)	BCR	*PV of Safety Benefits ($M)*
0.0%	$20.1	$28.0	-$7.9	0.72	*$0.0*
2.5%	$20.3	$28.0	-$7.7	0.73	*$0.3*
5.0%	$20.6	$28.0	-$7.4	0.74	*$0.5*
10.0%	$21.1	$28.0	-$6.9	0.76	*$1.1*
15.0%	$21.7	$28.0	-$6.3	0.77	*$1.6*
20.0%	$22.2	$28.0	-$5.8	0.79	*$2.1*
25.0%	$22.7	$28.0	-$5.2	0.81	*$2.7*

Note: Totals may not sum due to rounding.
Source: AEC*group*.

Exclusion of Trail Bike Riding

The base analysis includes the provision of an area for trail bike riding as this activity was identified as one of the most important features for riders from an off-road facility and provides the greatest potential for reducing riding in high-risk environments. However, trail bike riding requires a significantly larger area than other riding activities to satisfy participants' desires for challenge, freedom, exploration and discovery.

Where a new managed facility is developed that does not provide a trail bike riding area, a considerably smaller area of land would be required than that identified in the base analysis. **Appendix H** examines the potential benefits and costs of providing a facility that does not cater to trail bike riding, and assuming a facility similar in size to Broadford (approximately 100 hectares accommodating bitumen track riding, motocross tracks, trials course riding and a minibike area). The findings of this analysis are summarised in the table below.

Table 6.13. NPV and BCR of a New Off-Road Motorcycle Facility in Victoria, Excluding Trail Bike Riding

Real Discount Rate	PV of Benefits ($M)	PV of Costs ($M)	Total NPV ($M)	BCR
7.5%	$15.2	$17.8	-$2.6	0.85
10.0%	$12.2	$15.3	-$3.1	0.80
12.5%	$10.1	$13.5	-$3.4	0.75

Note: Totals may not sum due to rounding.
Source: AEC*group*.

The benefit cost analysis identifies that the development of a new managed off-road motorcycle facility that excludes trail bike riding would be **undesirable** with the costs outweighing the benefits at all discount rates examined.

Comparing the results of the BCA of an off-road motorcycle facility that includes trail bike riding with the above results highlights there is little difference in terms of overall desirability of developing an off-road motorcycle facility regardless of whether trail bike riding is included or not, with the BCRs relatively comparable.

It should be recognised these BCA results do not include valuations of environmental and social benefits of an off-road managed facility. Trail bike riding is more commonly undertaken in high-risk environments than any other form of motorcycle riding, and as such the provision of an off-road motorcycle facility catering to trail bike riding would be expected to deliver considerably greater benefits through avoided environmental and social costs. As such, the inclusion of environmental and social benefits in the analyses may result in a higher NPV and BCR for a facility that caters to trail bike riding than one that does not.

7. Key Findings & Recommendations

7.1 Rider Activities, Demand & Use Characteristics

Motorcycling activities in Victoria can be separated into on-road riding activities and off-road riding activities. On-road riding activities are those undertaken on the Victorian road network, including the Victorian State forest road and track network, while off-road riding consists of all other riding activities undertaken in the State.

Off-road motorcycle activities include bitumen track riding, motocross, trail bike riding and trials course riding. Trail riding and motocross were identified as the most popular forms of off-road riding based on an off-road rider survey conducted as part of this project.

Bitumen track and motocross riders predominantly ride in managed facilities, and as such it is not anticipated that the provision of a new managed off-road facility will significantly alter rider behaviour in these activities in terms of the type of venue used. By comparison, riders participating in trail riding and trials course riding activities represent the greatest opportunity for altering rider behaviour in terms of type of venue used.

7.2 Costs of Motorcycle Riding

Motorcycle activities can have a range of economic, social and environmental impacts, which can accrue to the participants and/ or the wider community. Negative impacts can include:

- Economic costs: Such as the cost of crashes (both in terms of direct expenditure as well as in terms of lost productivity), fines for illegal activity, costs of monitoring and dissuading undesirable rider behaviour, and repair and maintenance costs for preservation of environments used for motorcycle riding;
- Social costs: Such as reduced quality of life (e.g., through injury, suffering, stress and/ or long-term reduction in mobility), noise and/ or dust pollution and use conflicts; and
- Environmental costs: Such as damage to flora and natural habitats, extreme stress reactions in some animals, pollutants, gully formation and transport of noxious or invasive pests.

7.3 Safety Impacts Associated With Motorcycle Riding

Motorcycle riding is a considerably more demanding and challenging form of transportation than most other types of vehicle. This contributes to a higher incidence of crashes and fatalities for motorcycle riding compared to other motor vehicles. For instance, in 2002 there were 6.3 motorcyclist deaths per 10,000 registered motorcycles, which compares poorly to the average for motor vehicles in 2002 of 1.2 motorist deaths per 10,000 registered vehicles (Davey *et al*, 2007). Cassell *et al* (2006) note that motorcycle riders travelling on the Victorian road network are approximately 30 times more likely to be killed or seriously injured per kilometre travelled than other vehicle occupants.

A study by the Monash University Accident Research Centre found that on-road motorcycle activities present a higher share of fatalities, hospital admissions and emergency department presentations than off-road motorcycle riding. However, there is no data available to identify the number of on-road and off-road riders and their exposure to riding (i.e., their frequency and duration of riding), making it impossible to infer a comparative risk of injury between the two (Cassell *et al*, 2006).

The study also found that:

- Off-road motorcycling presents a much higher proportion of injuries in younger people (0-19 years) than on-road riding;
- Injuries appear to typically be more severe for on-road riding accidents than off-road riding; and

- The cause of injuries differs considerably between on-road and off-road riding, with on-road injuries primarily a result of collisions with other vehicles while off-road riding injuries are usually the result of non-collision accidents (i.e., falling off the bike).

The main predictor for motorcycle crashes is rider error (i.e., rider mistakes and/ or control errors, which can be linked to either inexperience or mental lapses), although other factors such as high-risk activities (e.g., speeding or performing stunts) have also been found to increase the risk of crashing (Elliott *et al*, 2004).

Rider motivations also have an influence on the likelihood of crashing. Rider motivations and attitudes to safety can differ greatly, and include avoidance of risky behaviour/ situations, use of protective gear to mitigate danger, and for some segments a disregard of safety concerns. A study by Christmas *et al* (2009) indicates that those riders displaying the least regard for their own safety are the most likely to be involved in a crash. Also, those riders whose motivations for riding are driven by performance related criteria have a higher crash propensity than the average rider.

Similar findings to those of Christmas *et al.* are reported by Symmons *et al* (2007) as well as in the "*Trail Bike Riders Attitude Study*" by Instinct and Reason (2009), with self-reported assessment displaying that riders that were more careless, confident in their own skills, irresponsible, risky, fast and intolerant were more likely to have had a crash in the previous five years.

Given the different attitudes to safety, and measures taken to reduce risk, the potential benefits of providing off-road riding facilities in terms of improved safety also differs between segments. For example, those riders that are highly risk-averse are unlikely to receive any significant benefits in terms of reduced crashes by transferring their riding activities to an off-road riding facility. Similarly, performance oriented riders will continue to seek to test their limits regardless of the venue, and as such are likely to desire a venue that offers the most challenging (and risky) riding experience suitable for testing their skills. For these riders, the major benefits of providing off-road motorcycle facilities, in terms of improved safety, lies in the potential for rapid first-aid and emergency response should the rider be involved in an accident.

The Instinct and Reason (2009) study also found that the most responsive segments to changing their behaviour (e.g., transfer to riding in a managed off-road motorcycle facility) cause the least environmental and social impacts. Whereas, riders whose motivations focus on challenge and danger, as well as the desire for freedom, self indulgence, thrill and excitement, typically behave in a manner resulting in highly negative impacts on the environment and noise levels.

7.4 Potential Benefits of an Off-Road Motorcycle Facility

The principal benefits associated with providing managed off-road riding facilities are likely to include the day to day operational activity and the avoidance of the economic, social and environmental costs by attracting riders away from high-risk environments along with gate takings and sales. Key benefits include:

- Improved safety through the provision of a controlled and managed environment with enhanced access to first-aid and medical attention if required. The average cost of crashes per 100 riding episodes was estimated to be approximately $39 based on findings on the cost of crashes from Monash University (Watson & Ozanne-Smith, 1997) and frequency of crashes reported in the rider survey undertaken as part of this project;
- Avoided quality of life impacts experienced by crash victims through improved rider safety. Much of this benefit is included in the economic benefits from avoided crashes outlined in the dot point above;
- Avoided social costs of noise disturbance. A number of studies have examined the impacts on property values from noise disturbance by motor vehicles, highlighting that property values decrease on average by 0.55% for every decibel above 55 dB. Motor vehicles produce 90 dB of noise at 7.62 metres, with this decreasing by approximately 10 dB to 20 dB for every doubling of distance from the source thereafter;

- Avoided costs of open space conflicts. The Instinct and Reason (2009) report identified that 73% of trail bike riders had personally experienced some form of hostility from other open space users; and
- Reduced degradation of natural habitat. A review of past studies on people's willingness to pay to preserve habitat suggests that natural bush land habitat has a passive utility value of approximately $40 to $50 per person per annum.

7.5 Desired Facility Specifications

Findings from the rider survey indicate that riders are seeking multiple track formats from any facility and that trails and motocross are the most popular activities. As well as the type of activity undertaken, riders also appear to be concerned about the relative ability/experience levels of other riders. Many riders would favour facilities where riders are graded by experience/ability and then ride within a group of their riding peers. Grading by speed is already in use at some track days, with initial grading by the rider and ongoing monitoring by track officials.

Findings from the rider survey also suggest that demand for a new facility is strongest near Melbourne (within 1 to 2 hours drive), Geelong and the surrounding Barwon Statistical Division.

A review of case studies of off-road managed facilities suggests that in order to provide sufficient land area to encourage trail bike riders to utilise a managed off-road motorcycle facility an area covering approximately 500 hectares would be required. However, analysis indicated the purchase a dedicated area this large would be unlikely to be a financially feasible venture.

In terms of desired aspects for a new facility, based on findings from the rider survey and case studies of other facilities, a multi-activity centre located approximately 75km from Melbourne is identified as the most appropriate location for the facility, including:

- Land area of approximately 500 hectares, including forested tracks and trails;
- Off-road riding tracks, including 3.0 km of bitumen riding track, 3.0 km of motocross track(s), 25.0 km of trail routes and 2,500 sqm of trials course area;
- Rider support facilities, including clubhouse and administration building, first aid area, pit/mechanic facilities, change/shower facilities and food/drink outlet; and
- Other facilities such as a single-tier viewing area, internal bitumen access roads, 400 sqm camping area and unpaved area providing parking for up to 200 cars.

7.6 Net Benefit/ Cost of Providing a Managed Off-Road Motorcycle Facility in Victoria

A benefit cost analysis (BCA) of providing a managed off-road motorcycle facility was undertaken as part of this study with the following findings:

- The development of an off-road motorcycle facility is assessed to be economically undesirable, with the costs to the overall Victorian community (including the facility operator) considerably outweighing the benefits. Sensitivity testing of key variables indicates that such a facility is considered economically undesirable even where there is significant variance in key model drivers (e.g., rider charges, rider demand, cost of land) to those used in the BCA. It should be recognised that some economic, social and environmental impacts were not able to be valued appropriately and were therefore not included in the BCA (e.g., reduced cost of crashes, reduced noise disturbance, avoided open space conflicts and preservation of natural environments). For the analysis to indicate that provision of a new managed off-road motorcycle facility in Victoria would be desirable these combined benefits would need to be in the order of approximately $850,000 per annum, which is considered unlikely;
- From an operator's perspective, provision of an off-road motorcycle facility is identified to be an undesirable financial investment. Annual revenues are estimated to be insufficient to offset the ongoing operational costs and returns on capital for the first ten years of operation, even where the initial costs of purchasing land are excluded. As such, even if a new off-road motorcycle facility were considered

desirable from a wider community perspective, development of an off-road motorcycle facility near Melbourne would probably need to be undertaken by a not-for-profit organisation; and

- The development of an off-road motorcycle facility that excludes trail bike riding is also assessed to be undesirable. Comparison of a facility that includes trail bike riding with one that does not highlights there is little difference in terms of overall desirability.

7.7 Recommendations

Based on the findings of this project, the following recommendations have been developed:

- As the BCA of a 'generic' off-road motorcycle facility was identified to be economically undesirable, the development of such a facility is not recommended without the identification of a specific site with characteristics that will ensure its viability;
- VicRoads, the Department of Sustainability and Environment and other relevant organisations should continue to collaborate and research to collate additional primary data surrounding the unquantified safety and environmental benefits in order to accurately estimate the full economic, social and environmental impacts associated with the provision of off-road motorcycle riding facilities (such as reduced costs of crashes, reduced noise disturbance, avoided open space conflicts and preservation of natural environments). Based on the findings of the BCA these benefits would have to be in the order of $850,000 per annum to imply the provision of an off-road motorcycle facility is economically desirable;
- Any potential investor should undertake a detailed demand and full feasibility assessment to accurately gauge demand for a facility in a specific location and its capacity to generate a positive return on investment. This demand assessment should include an assessment of price points and willingness to pay for such a facility, across different charging regimes as well as the range of capital and operational costs;
- Any new facility, if developed, should:
    - Be a multi-use facility providing a range of different riding experiences catering to a range of skill levels to facilitate a stronger return on investment. Rider survey respondents identified that trail riding and motocross were the most commonly desired riding experiences for a new facility, and that riders would prefer to ride amongst their peers (in terms of skill level);
    - Be co-located adjacent to an area where riders can undertake trails riding, to avoid the cost of purchasing a trails riding area. Any operator should work with the Department of Sustainability and Environment to ensure appropriate use and control measures are implemented;
    - Employ a variable pricing regime, including an annual membership fee and a reduced entry fee for each visit, a higher entry fee for casual (i.e., non members) entry and additional fees for those wishing to access coaching and training. Special rates for juniors or other users may also be included; and
- VicRoads and the Department of Sustainability and Environment should continue to work together to market, educate and inform users of appropriate use of the forest road and track network to assist in minimising illegal use of the network and reduce social and environmental impacts of off-road riding activities in these areas.

  Marketing, education and awareness campaigns should be targeted towards on-road and off-road riders that present the highest risk in terms of safety, social and environmental impacts. This will likely require research into the most appropriate forms of marketing and education for these rider segments as they are typically the least responsive to changing their behaviour.

Bibliography

ABC News (2008). *Fight Continues to Re-open Black Duck Valley Park*. Available from: http://www.abc.net.au/news/stories/2008/12/18/2449689.htm. Last accessed: 24 March, 2009.

Albury Wodonga Motor Cycle Club (2009). Available from: http://www.awmcc.com.au/. Last accessed: 19 March, 2009.

Ambulance Victoria (2009). *Annual Report, 2008-09.* Ambulance Victoria, Melbourne.

Australian Bureau of Statistics (2005). *Cafés and Restaurants, Australia, 2003-04*. Cat. No. 8655.0, ABS, Canberra.

Australian Bureau of Statistics (2008a). *Population Projections, Australia, 2006 to 2101.* Cat. No. 3222.0, ABS, Canberra.

Australian Bureau of Statistics (2008b). *Australian National Accounts: Input-Output Tables - Electronic Publication, 2004-05 Final*. Cat. No. 5209.0.55.001, ABS, Canberra.

Australian Bureau of Statistics (2009a). *Motor Vehicle Census 2009.* Cat. No. 9309.0, ABS, Canberra.

Australian Bureau of Statistics (2009b). *Australian Demographic Statistics, Mar 2009.* Cat. No. 3101.0, ABS, Canberra.

Australian Federal Chamber of Automotive Industries (2009). www.fcai.com.au/motorcycles/introduction. Accessed 20th March 2009.

Australian Government Department of Finance and Administration (2006). *Introduction to Cost Benefit Analysis and Alternative Evaluation Methodologies – January 2006.* Australian Government, Department of Finance and Administration, Financial Management Group, Canberra.

Australian Sports Commission (2008). *Participation in Exercise, Recreation and Sport – Annual Report 2008*. Australian Sports Commission, Australian Government Department of Health and Ageing, Canberra.

Bacchus Marsh Motocross Club Inc (2009). Available from: http://bmmxc.org/index2.htm. Last accessed: 20 March, 2009.

Bikernet.com (2009). *Bikernet.com Independent Motorcycle Noise Study.* Available from: http://www.bikernet.com/news/PageViewer.asp?PageID=902. Last accessed: 7 December 2009.

Brisbane Times (2008). *'Coroner fears more will die at 4WD Park'*. 3 May, 2008. Available from: http://www.brisbanetimes.com.au/news/queensland/coroner-fears-more-will-die-at-4wd-park/2008/05/02/1209235130806.html. Last accessed: 24 March, 2008.

British Red Cross (2001). *Anyone Can Save a Life: Road Accidents and First Aid.* British Red Cross, London.

Broadmeadows Motocross Park (2009). Available from: http://www.broadmeadowsmxpark.com.au/. Last accessed: 20 March, 2009.

Bureau of Transport and Communications Economics (1992). *Social Cost of Transport Accidents in Australia*. Available from: http://www.bitre.gov.au/publications/70/Files/R079.pdf. Last accessed: 6th April 2009.

Bureau of Transport Economics (2000). *Road Crash Costs in Australia – Report 102.* Bureau of Transport Economics, Canberra.

Campbell, H. and Brown, R. (2003). *Benefit-Cost Analysis – Financial and Economic Appraisal Using Spreadsheets.* Published by Cambridge University Press, Cambridge.

Cassell, E., Clapperton, A., O'Hare, M. and Congiu, M. (2006). *On- and Off-Road Motorcycling Injury in Victoria.* Hazard 64 (Spring 2006). Victorian Injury Surveillance Unit (VISU), Melbourne.

Cassell, E. (2007). *RSD 0453 Further research into off-road motorcycling injuries: Feasibility study report*. Victorian Injury Surveillance Unit (VISU), Monash University Accident Research Centre, Melbourne.

Christmas, S., Young, D., Cookson, R. and Cuerden, R. (2009). *Passion, Performance, Practicality: Motorcyclists' Motivations and Attitudes to Safety*. Road Safety Research Reports - Theme 2: Driver and Rider Behaviour. TRL Report PPR442.

Chronicle (2008a). *'End of the line for Black Duck Park'*. 10 December 2008. Available from: http://www.finda.com.au/story/2008/12/10/end-of-the-line-for-black-duck-park/. Last accessed: 24 March, 2009.

Chronicle (2008b). *'Black Duck closure marks end to sister's fight'*. 11 December, 2008. Available from: http://www.finda.com.au/story/2008/12/11/park-closure-marksend-to-sisters-fight/. Last accessed: 24 March, 2009.

Courier Mail (2008). *'Coroner finds Black Duck Valley 'dangerous''.* May 02, 2008. Available from: http://www.news.com.au/couriermail/story/0,23739,23633931-952,00.html. Last accessed: 24 March, 2009.

Crime and Misconduct Commission (2008). *The CMC Review of Queensland's Off-Road Motorbike Noise Laws*. Queensland.

CSIRO Land and Water (2005). *Value of Habitat in the Upper South East*. Prepared by CSIRO Land and Water on behalf of the South Australian Department for Land, Water and Biodiversity Conservation.

Davey, J.D., Enraght-Moony, E.L., Tippett, V., Freeman, J.E., Steinhardt, D.A. and Wishart, D.E. (2007). *A state-wide analysis of pre-hospital injuries and fatalities resulting from motorcycle road traffic accidents in Queensland*. Road and Transport Research, 16(3): pp. 30-40.

Department of Planning and Community Development (2008). *Victoria in Future (VIF) 2008, First Release.* Department of Planning and Community Development, Melbourne.

Department of Sustainability and Environment (2007). *Trail Bike Noise - Turn it down*. Forests Notes, FS0090, December 2007, Department of Sustainability and Environment, Victoria.

Department of Sustainability and Environment (2005). *Trail Bike Project Options Paper*. Department of Sustainability and Environment, Victoria.

Department of Sustainability and Environment (2003). *Where can I ride my motorbike in a State Forest?*. Forests Notes, FS0003, July 2003, Department of Sustainability and Environment, Victoria.

Dirt Bike World (2009). 'Members Forums'. Available from: http://www.dirtbikeworld.net/forum/. Last accessed: 20 February, 2009.

Elliott, M.A., Sexton, B. and Keating, S. (2004). *Motorcyclists' behaviour and accidents*. Safety Group, TRL Limited, Crowthorne, RG45 6AU.

Emu Creek Extreme Retreat (2009). Available from: http://www.emucreek.com/. Last accessed: 20 March, 2009.

Federal Chamber of Automotive Industries (2008). *Motorcycle Sales Rise to Record Levels.* Available from: http://www.fcai.com.au/news/all/all/191/motorcycle-sales-rise-to-record-levels. Last accessed: 31st August 2009.

Full Noise (2009).'Forum Home'. Available from: http://www.fullnoise.com.au/. Last accessed: 20 February, 2009.

GLA Economics (2003). *Valuing Greenness: Green spaces, house prices and Londoners' priorities.* Available from: http://www.london.gov.uk/mayor/economic_unit/docs/valuing_greenness_report.pdf. Last accessed: 15th September 2009.

Haworth, N.L., Greig, K. and Nielson, A.L. (2009). *A comparison of risk taking in moped and motorcycle crashes*. TRB 88th Annual Meeting, 11-15 January 2009, Washington D.C.

Haworth, N., and Mulvihill, C. (2005). *Review of Motorcycle Licensing and Training – Report No. 240.* Monash University Accident Research Centre, Melbourne.

Hussain, L.M. and Redmond, A.D. (1994). *Are pre-hospital deaths from accidental injury preventable?*. BMJ 1994, 308: pp. 1077-80.

Instinct and Reason (2009). *Trail Bike Riders Attitude Study*. Prepared on behalf of the Department of Sustainability and the Environment.

Lockwood, M. & Tracy, K. (1995). *Nonmarket Economic Evaluation of an Urban Recreation Park*. Journal of Leisure Research, 27(2): pp. 155-167.

Mayhew, D.R., Simpson, H.M. and Robinson, A. (2002). *The Safety Value of Driver Education and Training*. Journal of Injury Prevention, 8: pp. 3-8.

Medical Journal of Australia (2008). *Motorcycle Injuries Jump for Victorian Kids and Teens*. Available from: http://www.ama.com.au/node/3348. Last accessed: 6th April 2009.

Michael Minor & Associates (2009). *Traffic Noise Background Information.* Available from: http://www.drnoise.com. Last accessed: 7 December 2009.

Miniriders (2009). 'Aussie Mini Bike Forum'. Available from: http://www.miniriders.com.au/. Last accessed: 20 February, 2009.

Motorcycling Australia (2006). *Venue Standards – Edition 1.* Motorcycling Australia, Melbourne.

Motorcycling South Australia Inc. (2009). *'2009 List of Affiliated Motorcycle Clubs/Promoters'*. Available from: http://www.motorcyclingsa.org.au/clubs.html. Last accessed: 24 March, 2009.

Motorcycling New South Wales Limited (2009). *'Affiliated Clubs – Contact Details'*. Available from: http://www.motorcycling.com.au/pg_disp.php?page=p06. Last accessed: 24 March, 2009.

Motorcycling Queensland (2009). *'Contact a Club/Track'*. Available from: http://www.mqld.org.au/ab_contact_club.html. Last accessed: 24 March, 2009.

Motorcycling Tasmania Inc. (2009). *'Clubs'*. Available from: http://www.mtas.org.au/clubs.htm. Last accessed: 24 March, 2009.

Motorcycling Victoria (2009a). *State Motorcycle Complex*. Available from: http://www.motorcyclingvic.com.au/Default.htm. Last accessed 6 April 2009.

Motorcycling Victoria (2009b). *'Club Directory'*. Available from: http://www.motorcyclingvic.com.au/. Last accessed: 20 February, 2009.

Motorcycling Western Australia (2009). *'Affiliated Clubs'*. Available from: http://www.motorcyclingwa.org.au/contact_clubs.php. Last accessed: 24 March, 2009.

Motorsports Journal (2009). Available from: www.motorsportsjournal.com. Last accessed 6 April 2009.

Municipal Association of Victoria (2009). *Motorcycle Safety – Background and Crash Risks – Safer Roads Initiative*. Available from: http://www.mav.asn.au/hosting/mav/saferoads.nsf/f11e0ec46dbe4df54a256ace001017c8/ec0a6a0b931479afca256bf1001700b3/$FILE/Fact%20Sheet.pdf. Last accessed: 25 March 2009.

Navrud, S. (2002). *The State-Of-The-Art on Economic Valuation of Noise*. Final Report to European Commission DG Environment, Department of Economics and Social Sciences Agricultural University of Norway.

New York New Jersey Trails Conference (2000). *Off-road Motorcycles Threaten Forest Trails on State Parks*. Available from: http://www.nynjtc.org/issues/s529.html. Last accessed: 6th April 2009.

Northern Territory Department of Natural Resources, Environment and the Arts (2007). *We need your help this Finke*. Media Release, 5th June 2007.

Nunawading & District MX Club (2009). Available from: http://www.ndmx.com.au/index.html. Last accessed: 20 March, 2009.

O'Hare, M., Cassell, E. and Congiu, M. (2006). *Off-road motorcycling injury in Victoria*. Victorian Injury Surveillance Unit (VISU), Monash University Accident Research Centre, Melbourne.

Pyramidmx.com (2009). Last accessed 25th March 2009.

Queensland Department of Infrastructure and Planning (2008). *Project Assurance Framework - Cost Benefit Analysis*. Queensland Department of Infrastructure and Planning. http://www.dip.qld.gov.au/resources/guideline/project-assurance-framework/paf-cost-benefit-analysis.pdf. Last accessed 12 October, 2009.

Queensland Outdoor Recreation Federation Incorporated (2003). *Solutions to Unlawful Trail Bike Riding in South East Queensland*. Available from: http://www.qorf.org.au/01_cms/details.asp?ID=625. Last accessed: 6th April 2009.

Rawlinsons (2009). *Australian Construction Handbook – Edition 27.* Rawlinsons Publishing, Perth.

realestate.com.au (2009). *Rural property price listings.* Available from: http://www.realestate.com.au/cgi-bin/rsearch?a=bhp&t=rur. Last accessed: 7 December, 2009.

Rosebud and District Motor Cycle Club (2009). Available from: http://www.rdmc.com.au/. Last accessed: 20 March, 2009.

Rowden, P. and Watson, B. (2008). *Motorcycle Rider Training and Perceptions of Skill*. Australasian Road Safety Research, Policing and Education Conference 2008, 9-12 November 2008, Adelaide, South Australia.

Sinden, J.A. and Thampapillai, D.J. (1995). *Introduction to Benefit-Cost Analysis.* Published by Longman Australia, Melbourne.

South Yorkshire Police (2009). *Nuisance Off Road Motorbikes*. Available from: http://neighbourhood.southyorks.police.uk/priorities/conisbrough/250720071423 Last accessed: 6th April 2009.

Sporting Motorcycle Club (2009). Available from: http://www.smcc.com.au/. Last accessed: 20 March, 2009.

Steinhardt, Sheehan and Siskind (2006). *A Comparison of Off-Road and On-Road Crashes in Rural and Remote Queensland*. Proceedings 2006 Australian Road Safety Research, Policing, Education Conference. Gold Coast Queensland.

Stephan, K., Symmons, M., Hillard, P., Bohensky, M., Muir, C. and Lenné, M. (2008). *Characteristics of fatal motorcycle crashes involving excessive and/or inappropriate speed*. Monash University Accident Research Centre, Melbourne.

Symmons, M., Mulvihill, C. and Haworth, N.L. (2007). *Motorcycle crash involvement as a function of self assessed rider style and rider attitudes*. In Proceedings 2007 Australasian Road Safety Research, Policing and Education Conference, Melbourne, Australia.

Texas Parks and Wildlife (2006). *The Effects of Off-Road Vehicles on Eco-Systems*. Available from: http://www.tpwd.state.tx.us/publications/pwdpubs/media/pwd_rp_t3200_1081.pdf. Last accessed 6th April 2009.

Total Racing Solutions (2009). Available from: www.totalracingsolutions.com. Last accessed: 6th April 2009.

Trailbikemag.com (2009). Last accessed 25th March 2009.

Trailrider.com (2009). Last accessed 25th March 2009.

Transport Accident Commission (2008). *TAC Impairment Benefits.* Available from: http://www.tac.vic.gov.au/upload/Impairment%20Benefit-8pp.pdf. Last accessed: 15th September 2009.

Transport Accident Commission (2009). *Impairment Payments for Accidents on or After 16th December 2004.* Available from: http://www.tac.vic.gov.au/jsp/content/NavigationController.do?areaID=21&tierID=2&navID=CA7212537F00000101A5D193DA4564B9&navLink=null&pageID=668. Last accessed: 15th September 2009.

University of Salford (2009). *Sound Pressure Level and Distance*. Available from: www.acoustics.salford.ac.uk. Last accessed: 7 December 2009.

VicRoads (2009). Unpublished data.

Watson, W.L. and Ozanne-Smith, J. (1997). *The Cost of Injury to Victoria – Report No. 124*. Monash University Accident Research Centre, Melbourne.

Western Australian Department of the Environment and Conservation (2009). *Police and DEC Target Unlicensed Off-Road Vehicles*. Available from: www.dec.wa.gov.au/news/department-of-environment-and-conservation. Last accessed 6th April 2009.

Why-bike.com (2009). *Dirt Bike Crashes – When, How and Why*. Available from: http://www.whybike.com/motorcycle204.htm. Last accessed 1st September 2009.

Windle, J. & Cramb, R.A. (1993). *Contingent Valuation as a Guide to Environmental Policy: An Application to the Conservation of Natural Bushland in Brisbane*. Economic Analysis and Policy, 23(2): 139-149.

Appendix A: Literature Review

Rider Trends & Activities

Registrations & Licensing

The latest Motor Vehicle Census by the Australian Bureau of Statistics (2009a) identified that there were approximately 625,000 motorcycles registered in Australia in March 2009, including road bikes, off-road bikes, minibikes, scooters and all terrain vehicles (ATVs). This represented an increase of over 50% from the approximately 400,000 registered motorcycles in 2004. This expansion is more than double that of any other type of motor vehicle identified in the Motor Vehicle Census, highlighting the rapid growth in popularity of motorcycles. In 2008, there were 136,019 motorcycles registered in Victoria, compared to 99,072 in 2003 (Australian Bureau of Statistics, 2009a). It is estimated there are approximately 250,000 motorcycle license holders in Victoria and approximately 10,000 additional licenses are issued each year (Municipal Association Victoria, 2009).

In 2006 it was estimated that there were approximately 350,000 motorcycles which were unregistered and therefore could not be lawfully used on public roads (Federal Chamber of Automotive Industries, 2009), accounting for an estimated 45% of the total motorcycles in Australia in 2006. Assuming this relationship has been maintained, this suggests that there could be over 500,000 unregistered motorcycles in Australia in 2009.

In Australia during 2003 and 2004, the highest selling motorcycles were off-road models and in 2007, sales of off-road motorcycles reached 37,053 (their highest recorded total), which was a five percent increase on 2006 and accounted for 28.5% of total motorcycle sales for the year (Federal Chamber of Automotive Industries, 2009). Minibikes accounted for a further 10.3% of motorcycle sales in 2007, with 13,380 minibikes sold.

While many of these off-road motorcycles and minibikes are likely to be used in farming communities as an inexpensive and reliable means of transport around private properties, these data indicate the scale and popularity of off-road motorcycles in Australia. However, there is little information available to understand or quantify the number of off-road motorcycles available in Australia and Victoria, nor how many of these are ridden illegally.

The growing popularity of off-road motorcycling increases the potential for deleterious impacts to the rider, members of the wider community and the environment. These impacts can include the economic impacts of accidents, social impacts from use conflicts and potential environmental impacts associated with riding behaviours. Some impacts can be mitigated by undertaking off-road motorcycle activities in managed facilities, however, it is important to understand the impact of providing managed facilities across economic, social and environmental factors from the perspective of riders and the wider community.

Types of Riding Activities

Motorcycling activities in Victoria can be delineated between two distinct locations:

- **On-road riding activities**: Includes all motorcycle riding undertaken on the Victorian road network, including all major and local roads as well as the Victorian State forest road and track network; and
- **Off-road riding activities**: Includes all other motorcycling riding undertaken in Victoria, such as designated off-road facilities, private land, and public land/ forest tracks that are not part of the Victorian road network.

On-Road Riding Activities

Legal on-road riding activities on Victorian local and major roads is restricted to general commuting and road-travel by licensed riders on registered motorcycles, abiding by Victorian road rules and regulations.

All State Forest roads and tracks in Victoria that are open to the public are also available for use by motorcycle riders (as well as public roads in National Parks and reserves), although there are a series of restrictions and conditions. In order to ride in a State Forest, riders must meet the following conditions:

- Riders must at least hold a recreational registration and their motorcycle must meet the appropriate standard depending on the type of registration held;
- Riders may only use roads open to the public (all normal road rules apply); and
- Motorcycles may not use walking tracks, tracks not open to the public or roads which have been closed on a temporary basis (Department of Sustainability and Environment, 2003).

Riders must also obtain a permit to ride when holding:

- Competitive events or undertaking activities, which may pose a risk to public safety;
- Commercial events (with an entry fee and prize money);
- Club activities involving more than 20 motorbikes;
- Any activity which requires a course to be made or mapped out; and
- Any activity which requires the exclusive or near exclusive use of a Department of Sustainability and Environment campgrounds or picnic areas (Department of Sustainability and Environment, 2003).

The Department of Sustainability and Environment has to balance the wishes of motorcycle users of State Forest tracks with those of a range of other stakeholders and user groups including walkers, campers, cyclists and employees as well as protecting the flora and fauna in these areas. As a result, some riders perceive the requirements to be prescriptive and limit motorcycle riders' opportunity to explore (Department of Sustainability and Environment, 2003).

All motorcycle riding activities undertaken on the Victorian road network that do not abide by these rules and regulations is considered illegal.

Off-Road Riding Activities

There are many legal off-road motorcycling activities. At a broad level, these activities fall into two groups:

- Activities which are undertaken in an enclosed area and usually involve laps of a track or the completion of an obstacle course; and
- Activities where riders move over significantly larger areas, usually in a large loop along designated tracks and trails.

The principal legal[8] off-road activities are summarised in the following table, as well as the main characteristics of the areas where each type of activity is undertaken.

[8] When undertaken in an appropriate location.

Table A.1. Characteristics of Principal Off-Road Motorcycle Activities and Venues

Activity	Description	Venue
Motocross	Motocross events are held on enclosed and marked circuits and use the terrain's natural features such as hills and cambers with man-made jumps. Circuits are generally between 1.4 and 2.5 kilometers in length and the bikes are not designed for road use.	Off-road facility
Dirt Track Riding	A type of auto racing performed on oval tracks. Dirt track racing is the most common form of auto racing in the USA and is also popular in Australia and Canada.	Off-road facility
Enduro Riding	Enduro racing involves a set of rules, which specify exactly when a rider should arrive at certain pre-defined locations along a prescribed route. Routes need to be well defined and are generally much longer than used in motocross. Unlike motocross bikes, enduro bikes usually meet minimum equipment standards (for example headlights and indicators) and can be registered for legal road use.	Trails & Tracks
Trails Riding	Trails riding involves riders following a designated off-road route usually along paths and/or tracks. The length of these tracks is highly variable and can be between 50 and 500 kilometers. Most trails bikes can be road registered.	Trails & Tracks
Trials	Competitors ride through an obstacle course attempting to avoid touching the ground with their feet. Sections are often divided into separate courses to accommodate the different skill level of riders.	Off-road facility
Bitumen Racing	Involves racing of sports bikes on sealed surfaces, either on circuits or closed public roads. Most bitumen racing bikes are derivatives of road bikes and could potentially be registered for public road use, however this is considered unlikely.	Off-road facility
Bitumen Tracking	Involves completing several laps of a sealed track, usually alongside (but not in completion with) other riders. Several facilities which are used for professional racing offer track days at various times throughout the year when amateur riders can access these facilities.	Off-road facility

Sources: Trailbikemag.com, Trailrider.com, Pyramidmx.com, Southeast Queensland Trail Bike Management Forum (2003).

There are two main types of venue for these activities, purpose built tracks (for enclosed race/timed events and activities) and other private land. Public land or State Forest tracks (for exploration based events and activities) can also be used legally for some of these types of activities (e.g., trail riding), so long as Victorian road rules and regulations are adhered to.

Each activity has its own specific requirements. For example, there is a significant difference between the type of facility required to cater for bitumen based tracking and/ or racing compared to motocross, although both involve completing an enclosed track in as fast a time as possible.

Off-road facilities must comply with relevant health and safety legislation and they must also ensure tracks are properly maintained and that riders are aware of the risks associated with the activity. Facilities have their own rules and procedures which all riders must obey, based around minimum equipment standards and the condition of the participant's motorcycle. In order to be affiliated to their State body, all clubs must provide the appropriate number of race officials and first aid officers[9] relevant to the size of the facility and the activity being undertaken (B. Furlong, Licensing Officer, Motorcycling Victoria, *pers. comm*., 8/04/2009).

Bitumen (or tarmac) racing and tracking facilities are particularly stringent, and riders must attend a mandatory briefing session before riding, obey a series of track flags at all times and both bike and rider are scrutinised to ensure all riding and safety equipment complies with track standards.

Unriders

'Unriders' is a term used to describe riders who are either underage, unlicensed, operating an unregistered motorcycle or any combination of these. Unrider behaviour may take place in areas where motorbikes are totally prohibited or in areas where appropriately registered and licensed bikes and riders can access lawfully (including public roads). The term unrider encompasses a wide range of activities and individuals and ranges from off-road enthusiasts who feel unfairly excluded from being able to explore non-urban areas to unlicensed riders riding on public roads.

[9] Minimum first aid requirements for a practice day are a level 2 first aid officer (can be part of management) and for open or inter-club event St John's, SES or rural ambulance. (Motorcycling Victoria, 2009).

There is very little information available on the number of each type of unrider activity at the state or national scale. Most data focuses on relatively small study areas where unrider behaviour can be assessed through observation and survey. An example of this kind of study found that in Logan City (Queensland) between January 2002 and January 2004, 321 complaints were made to the Parks Depot and Ranger about trail bike riders accessing land unlawfully and or inappropriately. A further 132 riders were caught by the Ranger. Respondents estimated that the total complaints, including those made directly to the police, was likely to be almost 1,000 (Queensland Outdoor Recreation Federation, 2003). This is suggestive of the relatively small scale of existing studies which have been undertaken and the focus on one element of the total unrider population.

Motorcycle Riding and Crash Risk

Motorcycle Crash Rates

Overview

Motorcycle crashes are responsible for a substantial number of deaths and injuries each year in Australia, with the resultant loss of life and/ or functioning representing a significant economic and social cost in terms of lost productivity, medical and rehabilitative expenses, emotional hardship for both the crash victim and their family/ friends, and compensation.

Australian road traffic crash statistics demonstrate that motorcycle riding presents a considerably higher risk of death and injury than other forms of motor vehicle operation. For instance, in 2002 there were 6.3 motorcyclist deaths per 10,000 registered motorcycles, which compares poorly to the average for motor vehicles in 2002 of 1.2 motorist deaths per 10,000 registered vehicles (Davey *et al*, 2007).

Demographics of Riders Involved in Crashes

Crash statistics in Australia demonstrate a predominance of males involved in motorcycle crashes, with most studies identifying over 85% of motorcycle riders involved in crashes are male (Davey *et al*, 2007; Symmons *et al*, 2007; Cassell *et al*, 2006; O'Hare *et al*, 2006). Motorcycle crash data also identifies an over-representation of crashes involving younger (i.e., under 25 years) riders in comparison to overall motorbike ownership by age group (Davey *et al*, 2007; Symmons *et al*, 2007).

A study published in the Medical Journal of Australia (2008) investigated an anecdotal increase in motorcycle-related injuries in children and adolescents across Victoria. The study found that between July 2000 and June 2004, 3,163 patients under the age of 16 years presented to a Victorian emergency department with injuries from motorcycle accidents and there were 167 motorcycle-related admissions to the Royal Children's Hospital in Melbourne. The study also found that the number of accidents has been increasing at a rate of almost 10% per year in the same four-year period (Medical Journal of Australia, 2008).

The research found only about half of the RCH patients' notes stated whether the patient had been wearing a helmet, of these, 28% were not wearing one. Approximately 25% of these motorbike accidents occurred in children under 10 years old and most occurred off-road. While the most common injuries recorded were fractures 24% of patients suffered head injuries and 40% of the children required surgery, 13% had to be admitted to intensive care and two died.

The authors found that 70% of the young patients admitted to the RCH were in single-vehicle accidents. More than half of the patients had fallen off their bike, 23% had hit a stationary object with only 13% had collided with another vehicle.

In the past decade the prevalence of riders aged over 40 years involved in motorbike crashes has also increased considerably in both Australia and world-wide. This is widely considered to be driven by an increase in the number of older riders that are either new to motorcycle riding or that have returned to motorcycle riding following an extended absence (Davey *et al*, 2007; Symmons *et al*, 2007). The continued over-representation of younger riders and the increasing representation of older riders that are returning to

motorbike riding following an extended absence suggest a strong link between motorcycle crashes and the level of skill/ experience of the rider.

Accident Rates Among Unriders

Most motorcycle accident statistics do not record whether casualties were involved in legal or illegal riding activities at the time of the crash. As a result, statistics on injuries sustained in motorcycle crashes include injuries sustained by unriders as well as legal riders. However, it should be noted that all riders under the age of 18 on the Victorian road network or other public land are unriders, as the minimum age for obtaining a motorcycle learner permit in Victoria is 18 years.

As outlined above, children and adolescents account for a large number of motorcycle crashes. A study by the Monash University Accident Research Centre (MUARC) found that approximately 35% of crashes involving children and adolescents aged 0-17 years between 2002 and 2005 occurred on the Victorian road network, all of whom would have been unriders (Cassell *et al*, 2006).

Injuries Resulting from On-Road Versus Off-Road Crashes

The Monash University Accident Research Centre investigated on-road and off-road motorcycling injuries in Victoria (Cassell *et al*, 2006). The study investigated the frequency of fatalities and hospital-treated injuries among on-road and off-road motorcyclists, the demographic profile of injured riders, temporal factors, causes of injury and the nature and site of injuries. Key findings are summarised in the following table.

Table A.2. Summary of Off-Road Accident Statistics (Various Years)

Fatalities (2002-2004)	Hospitalisations (2002/03-2004/05)	Emergency Department Presentations (2002/03-2004/05)
• A total of 139 motorcycling fatalities, of which 130 (94%) were on-road and 9 (6%) were off-road; • Males accounted for 93% of on-road and 89% of off-road fatalities; • Most common age group for on-road fatalities was 20-24 years, although all 5-year age groups between 15-19 and 44-49 years recorded more than 10 fatalities; • Most common age group for off-road fatalities was 15-24 years; • More fatalities occurred in Autumn than any other season; and • The majority of on-road fatalities were caused by a collision with another vehicle (62%) or with a stationary object (25%); • Off-road fatalities were caused by either a non-collision accident (e.g., thrown off bike, 67%), or a collision with a stationary object (33%).	• 7,961 hospital admissions, of which 4,165 (52%) resulted from on-road accidents and 3,444 (43%) from off-road (5% were unspecified); • Over 90% of all hospitalisations males; • Much higher proportion of off-road hospital admissions were aged 0-19 years (36%) compared to on-road (15%); • Average age for on-road hospital admissions was 33 years, and 27 years for off-road; • Fractures most common injury for both on- (56%) and off-road (60%); • Knee and lower leg most common injured body sites for both on- (23%) and off-road (25%); • On-road accidents resulted a higher average length of stay than off-road accidents (5.3 days vs. 3.2 days); and • Most common cause of accident resulting in hospitalisation was non-collision events (e.g. thrown off, 44% of all hospital admissions). This was more common for off-road (66%) than on-road (30%).	• 9,553 ED presentations, of which 47% resulted from on-road and 37% resulted from off-road (remainder unspecified); • 35% increase in number of ED presentations over the three year period, driven by 66% increase in off-road ED presentations; • Indication that dirt and trail bikes most frequently involved in ED presentations; • 85% of injuries were male; • Much higher proportion of off-road ED presentations were aged 0-19 years (45%) compared to on-road (16%); • 46% of off-road ED presentations occurred at home or on a farm, 38% occurred at recreational venues, and 13% occurred at athletics or sports venues; • Most common cause of accident resulting in ED presentation was non-collision events (67%). This was more common for off-road (87%) than on-road (48%). • Fractures, sprains and strains, superficial injuries and open wounds top four injuries; and • Shoulder (16%), knee (15%), wrist (14%), ankle (13%) and multiple injuries (11%) represented top five injured body sites.

Note: May be exposed to data collation issues.
Source: Cassell *et al* (2006).

Overall, the study found that on-road motorcycle activities present a higher share of fatalities, hospital admissions and emergency department (ED) presentations than off-road motorcycle riding. However, as there is no data available to identify the number of on-road and off-road riders and their exposure to riding (i.e., their frequency and duration of riding) it is impossible to infer a comparative risk of injury between the two.

The study found that off-road motorcycling presents a much higher proportion of injuries in younger people (0-19 years) than on-road riding. Injuries appear to typically be more severe for on-road riding accidents than off-road riding, evidenced by the higher number of fatalities and higher average length of stay in hospital.

The cause of injuries differs considerably between on-road and off-road riding, with on-road injuries primarily a result of collisions with other vehicles while off-road riding injuries are usually the result of non-collision accidents (i.e., falling off the bike). This is a reflection of the different risks and hazards posed by on-road and off-road riding.

Influencing Factors of Crashes

Rider Error

An assessment of motorcyclists' behaviour and accidents undertaken by Elliott *et al* (2004) in the UK suggests that the main predictor for motorcycle crashes is rider error (i.e., rider mistakes and/ or control errors, which can be linked to either inexperience or mental lapses), and not high-risk factors such as speeding or performing stunts. This contrasts with the findings of similar studies undertaken of car drivers, in which speed violations are the predominant predictor of crashes and not errors. Elliott *et al* (2004) suggest that a reason for this difference may be that riding a motorcycle is more demanding than driving a car (increasing the risk of committing an error), and that errors when riding are likely to have more severe consequences than making an error when driving (e.g., more likely to result in irrecoverable loss of control of the vehicle).

The study by Elliott *et al* (2004) serves to highlight that motorcycle riding is a considerably more demanding and challenging form of transportation than most other types of vehicle, and this is a contributing factor to the higher incidence of crashes and fatalities for motorcycle riding compared to other motor vehicles.

Rider Skill Level

The study by Elliott *et al* (2004), in conjunction with the studies by Davey *et al* (2007) and Symmons *et al* (2007), suggests that the prevalence of crashes by young riders and older riders returning to motorbike riding following an extended absence is fuelled in part by a combination of the demanding and challenging nature of motorcycle riding and comparatively low level of experience/ skill of these riders. That is, the experience/ skill of the rider is a key factor in crash-risk, suggesting that mechanisms for improving rider skill may provide considerable safety benefits through reduced incidence of crashes.

There is little empirical evidence, however, identifying a statistically significant relationship between rider education and training and a reduction in crashes (Haworth & Mulvihill, 2005; Mayhew, Simpson, & Robinson, 2002). However, a study by Rowden & Watson (2008) suggests that this lack of empirical evidence can largely be attributed to overconfidence of riders following education and training, which can lead to undesirable and deleterious riding behaviour, rather than a lack of efficacy of rider education and training programs.

High-Risk Behaviour

While not all "high-risk" behaviour is illegal (e.g., performing stunts is legal in an apporpriate environment), there is a wide range of literature which suggests high-risk activities such as speeding or performing stunts are also key contributors to increasing the risk of crashing (Haworth *et al*, 2009; Davey *et al*, 2007; Symmons *et al*, 2007), as well as other behaviour such as drink driving and driving under the influence of drugs.

Travel speed is a widely acknowledged road safety risk factor. An increase in speed generally increases the likelihood of a crash due to a reduction in the time available to spot, interpret and react to a hazard. A crash at a higher speed is also likely to result in more injuries as well as increased severity of any injury that does occur (Stephan *et al*,

2008). Speed as a crash risk factor is particularly pertinent for motorcycles and motorcycle riders given the relative lack of protection offered when a crash does occur (compared to most other vehicles), meaning that that crash outcome are likely to be more severe for a motorcyclist involved in a crash relative to other motor vehicle crashes (Stephan *et al*, 2008).

The Monash University Accident Research Centre (MUARC) investigated the role of speed and speeding in motorcycle crashes by examining 201 fatal motorcycle crashes which occurred during the period from July 2000 to December 2005 (Stephan *et al*, 2008). They found that almost half (49%) of the 115 crashes in which speed relative to the designated speed limit could be determined involved excessive speed (i.e., speed was above the designated speed limit). The study also found that:

- The average age of riders' in fatal crashes involving excessive speed was considerably lower (27 years) than those not involving excessive speed (39 years); and
- Fatal crashes were considerably more likely to involve excessive speed for unlicensed riders than for riders with an appropriate license.

Rider Motivations

Rider motivations have an influence on the likelihood of crashing. Motorcyclists are a highly diverse group, with widely differing attitudes to safety and decision-making strategies. Christmas *et al* (2009) undertook an assessment of rider behaviour and motivations utilising a survey of motorcycle riders in the UK. The report classified riders into seven segments based on their riding motivations and attitudes to safety, as follows:

- **Performance disciples**: These are committed, all-year riders with a total focus on high performance riding and a strong dislike for anything that gets in the way of it. See risk as an unavoidable negative of riding and have an emphasis on personal skill and armour as responses to this risk;
- **Performance hobbyists**: These are solitary, summer-only riders, for whom riding is all about individual experiences and sensations and are not concerned about what other riders are doing. See risk as part of what makes riding fun, but lack confidence in own abilities to deal with risks, leading to caution in riding behaviour;
- **Riding disciples**: These are passionate riders for whom riding is a way of life, built on a strong relationship with the bike itself and membership of the wider fraternity of riders. Highly conscious of potential risk in riding, and take active steps to manage it by responsible riding behaviour and use of protective gear;
- **Riding hobbyists**: These are older, summer-only riders who enjoy the social interaction with other riders almost as much as the riding itself and like to look the part. Highly conscious of risk, and tend to avoid potentially risky situations altogether;
- **Car rejecters**: These are escapees (a higher proportion of women than in any other segment) from traffic jams, parking tickets, fuel costs and other problems of car use. This segment doesn't care for motorcycles, but do care for low-cost mobility. Very sensitive to the risks of riding, and see this as a strong argument against riding;
- **Car aspirants**: These are young people looking forward to getting their first car when age/finances allow but for the time being are just happy to have their own wheels. Tend not to think about the risks of riding and as a result may not take steps to manage them; and
- **Look-at-me enthusiasts**: These are young (or never-grew-up) riders with limited experience but limitless enthusiasm, for whom riding is all about self-expression and looking cool. Recognise risks of riding in general, but see themselves as relatively safe. Have a strong tendency to see risk as part of what makes riding fun, and to engage in risky behaviours.

As can be seen, rider motivations and attitudes to safety can differ greatly, and include avoidance of risky behaviour/ situations, use of protective gear to mitigate danger, and for some segments a disregard of safety concerns. Not surprisingly, the study by Christmas *et al* (2009) indicates that those riders displaying the least regard for their own safety (the look-at-me enthusiasts and car aspirants) are the most likely to be

involved in a crash. Also, those riders whose motivations for riding are driven by performance related criteria (i.e., high-risk riding pursuits) have a higher crash propensity than the average rider. Similar findings to those of Christmas *et al.* are reported by Symmons *et al* (2007) as well as in the "*Trail Bike Riders Attitude Study*" by Instinct and Reason (2009), with self-reported assessment displaying that riders that were more careless, confident in their own skills, irresponsible, risky, fast and intolerant were more likely to have had a crash in the previous five years.

Given the different attitudes to safety, and measures taken to reduce risk, the potential benefits of providing off-road riding facilities in terms of improved safety also differs between segments. For example, those riders that are highly risk-averse are unlikely to provide any significant benefits in terms of reduced crashes by transferring their riding activities to an off-road riding facility. Similarly, performance oriented riders will continue to seek to test their limits regardless of the venue, and as such are likely to desire a venue that offers the most challenging (and risky) riding experience suitable for testing their skills. For these riders, the main potential benefits of providing off-road motorcycle facilities in terms of improved safety lies in the potential for rapid first-aid and emergency response.

Some of these segments are clearly not likely to be attracted to an off-road riding facility as their motivations for riding have little to do with enjoyment derived from the activity (e.g., car rejecters and car aspirants).

Off-Road Rider Motivations

Unlike on-road motorcycling, off-road motorcycling is a sport and rider behaviour and motivations can differ to some degree from that of on-road riders. As outlined in the "*Trail Bike Riders Attitude Study*" by Instinct and Reason (2009), the sense of thrill and adrenaline of riding are key elements to the enjoyment derived from off-road motorcycle activities.

Instinct and Reason (2009) utilised a survey approach to examine the attitudes and behaviours of trail bike riders in Victoria. Similar to the report by Christmas *et al* (2009), the study found that trail bike riders can be segmented into four groups based on their riding motivations, empathy for other forest users and behaviour, and are summarised below (Instinct and Reason, 2009):

- **Disciples**: Display the greatest empathy for other public land users and residents and ride in a way they believe has a low impact on the environment and noise levels as they believe this to be the right and responsible thing to do. Motivations for riding tend more toward the social aspects of riding with friends and with family and the sense of discovery associated with riding places not normally accessed. Riders from this segment typically ride less often than any other segment;
- **Pragmatics**: Lack empathy for other public land users but ride in a way they believe has a low impact on the environment and noise levels as they feel trail bike access to public land is under threat. These riders are the most likely to be fully registered, typically have the most invested in their bikes and have received the fewest infringements. This segment is highly resistant to the idea of stronger enforcement of legislation and regulations. Motivations for trail bike riding are relatively diverse, including challenge, focus, thrill, escape from everyday life, discovery and social aspects;
- **Carried Aways**: Have significant empathy for other public land users. However, despite knowing their behaviour causes inconvenience to others and raises conflict levels they often ride in a way that has a highly negative impact on the environment and noise levels as they cannot control the desire for freedom, self indulgence, thrill and excitement. Challenge and danger are key motivators for this group, as is riding with mates. Riders from this segment reported a higher requirement for medical treatment than any other segment; and
- **Don't Give a Damns**: Display ambivalence towards their impacts to the environment, noise levels and other public land users, and report the lowest levels of most motivations towards trail bike riding (challenge, focus, escape, social aspects, discovery, etc.). Riders from this segment are typically the least experienced, have the least invested in their bikes, tend to ride unregistered and unlicensed, and are the most likely to have had a crash resulting in an injury requiring minor first aid

treatment. They ride in a way that typically results in highly negative impacts to the environment and noise levels, and is irritating to other public land users.

The Instinct and Reason report (2009) outlined that "Disciples" and "Pragmatics" are the most responsive to change, however, these groups also cause the least environmental and social impacts. "Carried Aways" are considered to be somewhat responsive to change, and given the high level of environmental and social impacts from this segment these riders represent great potential for environmental and social benefits if a managed facility can be developed to cater to their desires for a challenging riding environment.

The Instinct and Reason report (2009) indicates that the "Don't Give a Damns" segment, which is predominantly comprised of unregistered and unlicensed riders (unriders), provides the least potential for change in behaviour. Given the lower levels of motivation towards trail riding, it is unlikely that many (if any) riders from this segment would be interested in paying an entrance fee to ride at a managed facility.

Costs of Motorcycle Activities

Introduction

There is considerable literature and research examining the costs associated with motorcycle riding activities, including economic, social and environmental impacts. These studies highlight that motorcycle activities can have a range of economic, environmental and social impacts, which can accrue to the participants and/ or the wider community. The following sections introduce the types of impacts typically associated with motorcycle activities, some of which may be avoided or reduced if the activity were undertaken in a managed off-road riding facility.

Economic Costs

There are a wide range of economic costs associated with motorcycle activities, including costs incurred in attempting to control and or/dissuade illegal riding activity through education and awareness campaigns and in some cases police action, as well as the costs of dealing with the aftermath of accidents and lost economic outputs. These economic costs can accrue to both the riding participant and the wider community.

Economic costs experienced by participants include:

- Costs of crashes, such as:
  - Loss of earnings following injury;
  - Long-term medical costs;
  - Additional insurance costs; and
  - Damage to motorcycle and other equipment;
- Fines for illegal riding activities.

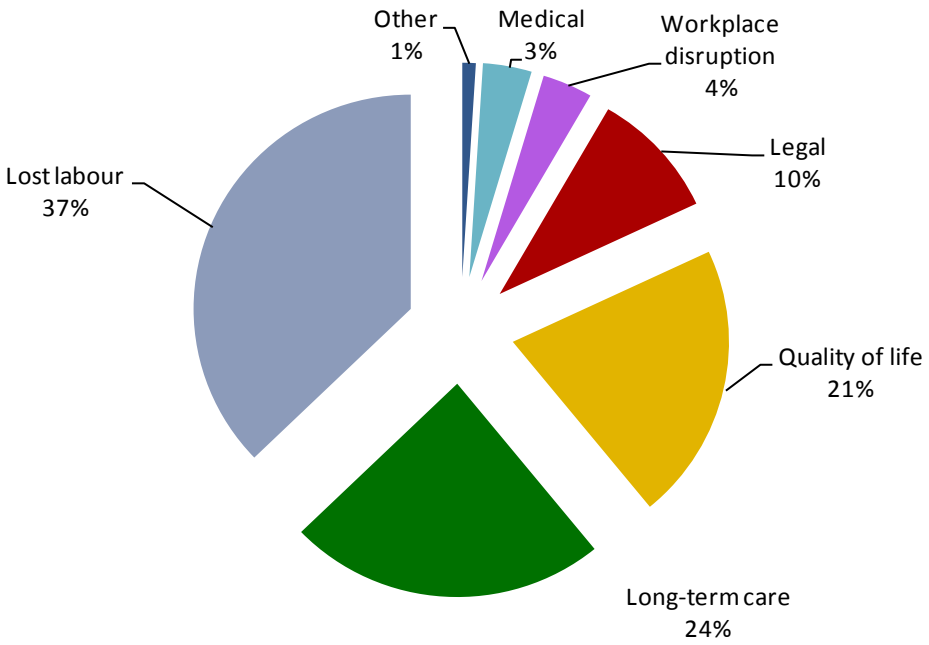
Economic costs experienced by the wider community include:

- The costs incurred in attempting to control and or/dissuade undesirable behaviour (e.g., unlicensed or unregistered riding, speeding, hooning) through education and awareness campaigns and in some cases police action;
- Costs of dealing with crashes, including:
  - Emergency services attending the accident;
  - Subsequent emergency medical treatment; and
  - Long-term care period (depending on the severity of the accident);
- Costs of establishing and maintaining a larger emergency and services health network;
- Additional repair and maintenance costs of shared pathways and access routes, which are not part of the VicRoads network; and
- Lost contribution to total economic output.

The principal economic cost associated with motorcycle activity is the direct cost of dealing with accidents, including the costs of the emergency services attending the accident and subsequent emergency medical treatment. These costs may continue over a long period depending on the severity of the accident and the requirement for ongoing medical care. There can also be significant costs to the individual involved through lost earnings and to the wider economy through lost economic output.

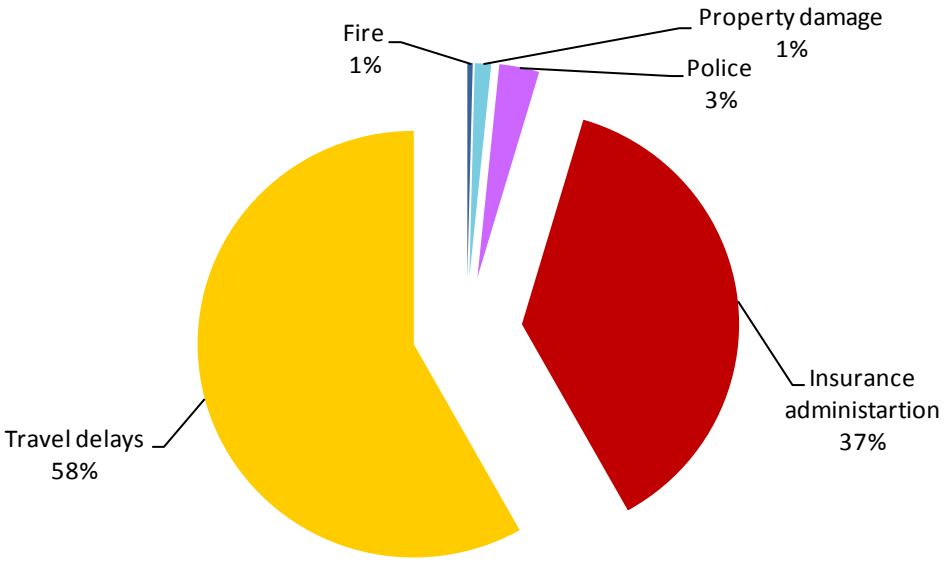
The Bureau of Transport Economics (2000) has produced a series of reports investigating the costs of road crashes in Australia. The latest update was published in 2000 and investigated the most appropriate means of valuing human and general crash costs. The following figures show the estimated distribution of human and general costs for road traffic accidents.

Figure A.1. Estimated Relative Significance of Human Costs of Road Transport Accidents



Source: Bureau of Transport Economics (2000).

Figure A.2. Estimated Relative Significance of General Costs of Road Transport Accidents



Source: Bureau of Transport Economics (2000).

Although it is likely some costs (for example travel delays) would only apply to accidents on high use public roads, others including police and fire service costs are likely to apply to all accidents requiring a response by the emergency services. The costs of lost earnings and production will be influenced by both the number of accidents and the earnings and economic contribution of those involved.

Social Costs

There are two main categories of social costs associated with motorcycle activities. The first relates to the cost to riders and their families and friends as a result of accidents (in terms of emotional costs, stress and loss of quality of life), the second to the impact of motorcycle activities on society in general.

Social Costs to Riders and Their Families

The Bureau of Transport and Communications Economics (1992) utilised a pain and suffering index, based on the level of court awards for general damages, which include consideration of the casualty's pain and suffering, loss of amenities of life and life expectation. The study found that on average pain and suffering per crash victim requiring hospitalisation was approximately $53,700 (equivalent to $99,876 in $2009). It should be noted, this approach assumes the same level of pain and suffering irrespective of fault or cause (Bureau of Transport and Communications Economics, 1992).

The study also developed an estimate for costs to the victim's family and community. This calculation relied on ABS data on unpaid family and community work, and found that family and community losses contributed approximately 11 percent of the total costs of road accidents (Bureau of Transport and Communications Economics, 1992).

Social Costs to the General Public

Social costs are experienced by society in general are difficult to value and are usually assessed using a qualitative approach. Typical social impacts include:

- Increased noise impacts;
- Use conflicts resulting in exclusion from some areas which are used for motorcycle activities;
- Increased dust pollution; and
- Injury following accidents.

Each of these social impacts can be caused by legal or illegal riders (including use conflict and exclusion issues).

It is widely recognised within the off-road motorcycling community that noise and associated disturbance is a serious issue for the sport (Instinct and Reason, 2009). Trail bike noise is a key concern of some rural residents, particularly for landholders whose properties adjoin public land where trail bike riding occurs (Department of Sustainability and Environment, 2005).

Trail bike noise can also directly impact on the enjoyment level of other forest users. Public land is an important recreational setting for a broad range of recreational activities, and the noise generated by motorcycle riding can severely impact on the enjoyment of other recreational users (Department of Sustainability and Environment, 2005).

Several jurisdictions, including Victoria and New South Wales, have established statutory noise limits for off-road motorbikes. To be roadworthy, motorcycles in Victoria must have an effective silencer (muffler) to keep the exhaust noise below the legal limit of 94dB (Department of Sustainability and Environment, 2007). In Queensland, the Queensland Government introduced legislation in 2006 providing police with a series of graduated steps which could be taken to address excessive motorbike noise (Crime and Misconduct Commission, 2008). The legislation was introduced following resident complaints throughout South East Queensland at the noise generated by off-road motorbikes (which were being ridden outside of approved facilities).

There are several case studies where off-road facilities have been implemented in order address some of these social issues as well as using the facilities as a means of

addressing wider social issues including crime and violence. One recent example from the UK involved community groups, local government and the police working together to establish a park providing opportunities for off-road motorcycling in a controlled environment in response to resident complaints about the distress caused by unrider behaviour (South Yorkshire Police, 2009).

Environmental Costs

There are environmental costs associated with all motorbike activity (for example greenhouse gas emissions), which are incurred irrespective of whether the activity is undertaken legally or otherwise. However, there are also environmental costs (for example damage to habitats), which may be exacerbated where these activities are undertaken in an inappropriate location.

The unique characteristics of each environment impacted makes it difficult to establish general principles for the quantum of environmental damage incurred as a result of motorcycle activities. This means that in many cases, these types of impact are assessed qualitatively, examples include:

- In the Northern Territory around Alice Springs following the 2007 Finke Desert Race, the Department of Natural Resources, Environment and the Arts (NRETA) appealed to off-road riders to stick to designated tracks. NRETA highlighted the high degree of environmental damaged observed after the race as a result of off-road motorbikes on non-designated tracks damaging vegetation and increasing soil erosion. It was claimed longer-term impacts of this type of activity would include a loss of vegetation, hardening of the ground and loss of shallow and fragile soils. As well as the immediate environmental loss, the report also highlighted the potential impact that increased damage could have on local industries including agriculture and tourism as well as potential health issues (Northern Territory Department of Natural Resources, Environment and the Arts, 2007);
- In Western Australia, the Department of the Environment and Conservation has launched a campaign targeting unlicensed off road vehicles. This has included establishing road blocks to stop vehicles carrying unlicensed off-road vehicles accessing the holiday shack communities surrounding Perth where significant levels of environmental degradation have been discovered. On one day in 2008, 176 vehicles were stopped and turned around in the region. Environmental damage has included dune degradation and reduced visitor attractiveness (Department of Environment and Conservation, 2009); and
- A study into the effects of off road vehicles on ecosystems was conducted by Texas Parks and Wildlife (2006) and found that soils could be severely damaged by off-road vehicle usage principally as a result of soil compaction and vegetation disruption as well as:
    - Pollutant wash off caused by off-road vehicles fording water deep enough to wash off engine lubricants, fuels and other contaminants;
    - Gully formation which during rainfall events allowed water to reach a critical velocity required for significantly higher erosion impacts that would otherwise occur;
    - The study also found evidence to support the claim that off road motorcycles may be in important vector in the transport of noxious and invasive pest species;
    - Noise from off-road vehicles was found to cause extreme stress reactions in some vertebrate species leading to cases of reproductive failure and in extreme examples ear bleeding and even death; and
    - It was possible to observe significantly lower populations of several species in areas with the highest levels of off road activity.

Motorcycle Clubs & Facilities

Introduction

Throughout Australia there are a wide range of motorcycling clubs. There are currently 355 affiliated off-road motorcycling clubs listed in Australia, of which 67 are located in Victoria (19%), 115 in New South Wales (32%), 83 in Queensland (23%), 40 in South Australia (11%), 34 in Western Australia (10%), 10 in Tasmania (3%) and 6 in the Northern Territory (2%).

Some clubs own and manage their own facilities while others use municipal or private facilities. Clubs may concentrate on one element of motorcycling while others cover multiple activities. By reviewing the websites of state controlling bodies affiliated with Motorcycling Australia, a list of affiliated clubs has been compiled to develop an overview of the current provision of off road motorcycling clubs (full listing provided in **Appendix I**). A number of selected facilities have been researched and the main features of each are set out in the following table.

Selected Facilities

The key features of each selected facility are presented in the flowing tables based on information sourced from each facility's website.

Table A.3. Review of Selected Off-Road Motorcycling Facilities

Name	Fees & Charges	Opening Times	Main Facilities	Organisational Structure	Additional Detail
Victorian Facilities					
Albury Wodonga Motorcycle Club	Annual Membership: Single $45 Family $70	N/A	Flat track Motocross track	4 committee members Working bee to involve members on a voluntary basis to help run events and maintain the track	Scheduled practice sessions Coaching sessions
Bacchus Marsh Motocross Club Incorporated	N/a	N/a	One dirt track	Run by a not-for-profit club	Coaching weekends Club championship series Club days for members Monthly newsletter
Broad Meadows Motocross Park	Annual membership or pay per entry Wednesdays: <125cc $20 >125cc $25 Weekend: < 125cc $25 >125cc $30	Wednesday: 2pm-5pm (8pm during daylight savings) Saturday, Sunday & Public Holidays: 10am-5pm	Experienced: Largest and most interesting track with three sets of doubles, five tabletops, whoops, big berms and deep natural valley Intermediate: Little jumps and berms Advanced Pee Wee: For more advanced Pee Wee riders Pee Wee: For kids of all ages – restricted to 2-strokes under 80cc and 4-strokes 100cc and under	N/a	Track also available for hire
Nunawading & District MX Club Inc	$180 for a family $150 for a single	Saturday: 9:30am-4:30pm School Holidays (Tues & Thurs): 10am-3pm	N/a	Committee selected by members annually at AGM	N/a
Phillip Island (Ride Days)	$199 per day (includes 6 x 20 minute sessions)	Various days throughout the year	Phillip Island Circuit Tyre services Photography Refreshments Coaching Bike and equipment hire	Privately owned company	All riders must attend briefing session All bikes and riders must pass safety inspection
Rosebud and District Motorcycle Club Incorporated	Annual membership: Family $120 Senior $100 Junior $80 Associate $25	N/a	Senior Track: All senior riders Junior Track: Riders under 16 years riding bikes up to 250cc Pee Wee: Bikes under 65 cc ArenaX events held on this track for all ages/size bikes	Committee – 14 members listed for 2009 on volunteer basis Working bee for members to volunteer time to help maintain/fix up the tracks	Junior coach/manager available for bookings

Name	Fees & Charges	Opening Times	Main Facilities	Organisational Structure	Additional Detail
State Motorcycle Sports Complex (Broadford)	Multiple depending on track used. Ride days and track days are managed by Champion Ride Days	Various depending on track used and competition dates	Road race super-moto circuit Enduro trials areas Quarry trials Speedway/dirt track Supercross track Motocross track	The Broadford complex is owned by Motorcycling Victoria (630 hectares) , the controlling body for the sporting motorcycle activities in the State, and the Harley Club (350 hectares). Motorcycling Victoria operate the facility	Tracks are available for hire Camping facilities available at the facility
Sporting Motorcycle Club of Geelong	Annual membership: Family $190 Senior $160 Junior $120 Social $10 Access/use fees: Family $15 Senior $12 Junior $8 or $5	N/A	McAdam Park's Barrabool Motocross Complex Beginners ride area Competitor pits	Working bees to assist in running events, preparing tracks etc Affiliated with OTR (Otway Trail Riders)	Activities offered include: Motocross, Otway Trail Riders, Enduro Trials MX Vintage
Other Australian Facilities					
Binacrombi Motorbike Park	Accommodation starts at $300 Day riders start at $33	Saturday & Sunday: 8am to 5pm	Two tracks 530 acres of fire trails and bush tracks	Privately owned	Bush cabin and camping Camping facilities Bushwalking/wildlife spotting and fishing
Emu Creek Extreme Retreat	Annual membership Access/use fees	Riding during daylight only	3 Motocross tracks: Sprint: 46k one line winds around 100 acres of bush Enduro: 4 loops Flat track: Beginners	Privately owned	Coaching available Free rider tours
Eastern Creek Ride Days	$219 (weekend)	Various	Eastern Creek Raceway Tyre services Photography Refreshments Coaching Equipment hire	Privately owned	All riders must attend briefing session All bikes and riders must pass safety inspection
Glen Echo Dirt Bike and Camping Facility	N/a	Saturday & Sunday: 8am to 5pm	3 Motocross tracks available: Natural terrain combing natural bank formations and man-made jumps and tabletops Enduro: Loops vary from novice to hard through forest, creeks and gullies, moderate & steep hillclimbs Pee wee track	Privately owned	Camping facilities Swimming in the dam Bushwalking

Name	Fees & Charges	Opening Times	Main Facilities	Organisational Structure	Additional Detail
Lochmaree	Weekend (incl. accommodation): Adult $150 Children (U16) $80 Day Riders: Adult $35 Children (U16) $25	8am to 5pm	2,300 acres of enduro trails 2km motocross track with 5 table-tops Enduro cross track with ski jump	Privately owned	Accommodation available Bookings essential No quads allowed
Louee Enduro and Motocross Park	Day Riders: Adults $45 Children $25 Weekend Accommodation: Starting from $135 for camp grounds, to $220 for house accommodation	Saturday & Sunday: 8am to 5pm Fridays (and other days as relevant): 9am to 5pm	10,000 acres with 150km of tracks and trails for off-road riding and racing, including: 4 motocross tracks of varying difficulty Freestyle compound A junior track Enduro trails and tracks	Privately owned	Accommodation available, including a homestead and cottages, as well as camping

Case Studies

State Motorcycle Sports Complex (Broadford)

The Broadford facility is owned by Motorcycling Victoria (630 hectares) and the Harley Club (350 hectares) and is situated in a valley surrounded by undulating countryside, providing some buffer to noise transmittal.

The Broadford facility currently has circuits suitable for road race, motocross, supercross, speedway, dirt track, enduro and trials. A specialised pee wee circuit is also at the complex. An annual recreational license costs $85.50 whilst the one day recreation licence costs $20 and both include catastrophic accident insurance and public liability insurance.

The facility is operated by Motorcycling Victoria subject to a planning permit. The permit conditions include hours of operation (9am - 6pm daily) and that it close for 4 weeks each year (the 2 weeks either side of Christmas). In the interests of good will the facility closes at 4pm on Sundays (2 hours earlier than allowed under the permit). Tuesday and Wednesday operate as noise free days and the permit provides for one noise free weekend per month.

A caretaker for the facility lives on-site. There is a nine megalitre dam on-site supplying water for daily watering of the tracks (to contain dust).

The Broadford & District Motorcycle Club use Broadford as their base, and have approximately 180 members, drawing members from throughout the State, with a strong junior development program focusing on young riders aged 7-8 years.

Black Duck Valley Coronial Inquest

The Black Duck Valley Park was located near Gatton in the Lockyer Valley, west of Brisbane. It was a family-run business that has been operating for more than 20 years. Three users of the park were killed and 285 injured in the three years of operation prior to its forced closure on 10 December, 2008 (Courier Mail, 2008). The closure followed a coronial inquest which considered the reasons behind the three deaths. Michael Barnes, the coroner of the inquest, believed the deaths were preventable and highlighted the following shortcomings (Brisbane Times, 2008; Chronicle, 2008a and 2008b; Courier Mail, 2008; ABC News, 2008):

- Failure to implement adequate safety measures and effective risk management:
  - Incorrect/inadequate signage on dangerous tracks;
  - Insufficient instructions for riders to assess risk factors;
  - Customer experience ignored; and
  - Inadequate map provision.
- Inadequate track maintenance and classification, with tracks not regularly inspected; and
- Inadequate visitor monitoring and competency assessment, with a failure to check riders competency and skill before entry.

Final recommendations of the inquest included an urgent full risk audit of the park and for legislation to be amended to require development applications for outdoor recreation facilities are assessed by the Department of Local Government, Sport and Recreation. In December 2008, the park closed after its insurance policy was cancelled and it failed to find another insurer (ABC News, 2008).

This incident serves to highlight the importance of safety and the expectations on management and the organisational structure of the facility in ensuring a safe environment for all riders. Recommendations from the coronial inquest of the Black Duck Valley Park highlight the key organisational and management structures that are pertinent to reducing risk and providing a safe and well-run facility to users that protects their best interests.

The example of the Black Duck Valley demonstrates that where facilities are not properly managed, there can be serious consequences for both participants and facility owners and operators.

Binacrombi Motorbike Park

The Binacrombi Motorbike Park is located halfway between Bathurst and Goulburn in New South Wales, and is a four and a half hour drive from Sydney.

The Park offers a variety of motorbike activities, including trail bike riding, 4x4 riding, and enduro tracks, over 530 acres set on a valley following the Abercrombie River. The Park does not hire out bikes, and requires each participant to bring their own motorbike and fuel. Other activities apart from motorbiking include bushwalking and wildlife spotting, trout fishing, as well as a recreation room for indoor relaxation and leisure.

The Park offers accommodation for weekend stay-overs, as well as a commercial kitchen to cater to large groups. Prices for weekend accommodation start at $300, while camping grounds range from $11.55 on weekdays to $23.10 on weekends. Riding fees start at $33 per day, however special rates apply to visitors staying in onsite accommodation or at the camping grounds.

Lochmaree

Lochmaree is located near to the Binacrombi Motorbike Park, approximately four hours drive from Sydney. The facility has 2,300 acres of enduro trails, a two kilometre motocross track, and an enduro cross track. Other amenities include a workshop and associated facilities, a bike wash and basic rider amenities.

Lochmaree offers accommodation starting at $150/night, including the cost of a day-ride (day ride fee starts at $35). All participants must sign a waiver and make a booking for track time prior to utilising the track, as the number of bike rider's allowed on the tracks is limited. Both registered and unregistered vehicles are allowed to access the facility.

Louee Enduro and Motocross Complex

The Louee Enduro and Motocross Complex is located on Lue Station, a working sheep and cattle property located 20 minutes east of Mudgee, and three hours drive from Sydney or Newcastle. The Complex has been in operation for over 30 years, and is run by an experienced bike rider.

The Complex offers a wide range of motorbike activities and facilities over 10,000 acres, including four motocross tracks, a freestyle arena, junior track and over 150 kilometres of tracks and trails for off-road racing and riding. Other facilities include one way tracks, special areas for juniors, a workshop and spare parts garage, track marshals, mechanics, bike wash, bike security, kiosk, free hot showers for all participants, and first aid assistance with a basic first aid officer on duty during ride times, a comprehensive first aid kit on site and Emergency Care flight helipads positioned throughout the complex. The Complex focuses on providing a safe and enjoyable motorbiking experience for all participants.

The Complex is specifically designed for motorbikes, and does not allow quads, buggies, odysseys or any other vehicle other than a motorbike. All guests are requires to sign a waiver and adhere to a specific rule-set to ensure safe riding.

The Complex requests bookings be made to ensure the proper care, facilities and support are available to riders on the day. Prior booking of accommodation is required, with the Complex offering a variety of accommodation types ranging from $15 per night for camping grounds to $50 per night for houses. Day-ride fees start at $40 per day.

Motorcycle Facility Summary

There is a significant range of off-road motorcycling facilities featuring various track types and surfaces from sealed bitumen to off-road trails. The organisational structures, charges and range of additional facilities on offer also vary significantly between facilities, influenced by the level of use and market penetration.

In Victoria, the reviewed facilities cover a range of facility types, activities, management structures and price ranges. In general, smaller local tracks are unsealed and cater for motocross type events. These facilities tend to be run on a not-for-profit basis and rely upon members to provide their time in order to staff and maintain the facility. The Victorian facilities tend to be more focussed towards servicing local populations (with some exceptions, such as the more commercial facilities of Phillip Island and Broadford) than the interstate case studies, which were more remote and required additional driving time. This difference was also reflected in the additional services at each site (especially those not directly related to off road activities). The interstate facilities tended to offer accommodation options and a range of recreational activities and supporting amenities reflective of their more remote nature. The interstate facilities were all operated on a commercial basis.

Unlike the unsealed sites, the bitumen facilities reviewed have specifically set out to offer amateur riders the opportunity to ride on the same track as professional racers. They also set out clear and detailed safety requirements and manage the riders more carefully, for example by grading them into groups based on ability and scrutinising riders' bikes and equipment before permitting track access. Off the track, there is also a larger range of services on offer. All tracks examined are managed by companies specialising in managing this type of facility and are significantly more expensive to access.

Of significance, those facilities offering trail bike riding activities are typically expansive, forested sites situated in remote areas with considerable drive times from metropolitan locations. This is not surprising given trail bike riders' preference for discovery and exploring areas that are not easily accessible (Instinct and Reason, 2009). In order to encourage trail bike riders to use a managed facility, it is important that sufficient, forested land area be available to satisfy riders' desires for exploration and discovery.

Key Issues for Riders

Introduction

To develop an overview of the current demands, interests and concerns of riders, five online motorcycle forums were selected for review. These online forums offer an opportunity for riders to discuss any topic related to off-road motorcycle riding. It is understood that while the forums are monitored there is little censorship of content unless offensive and so conversations about unrider activity are unlikely to be edited.

In assessing the outcomes of these reviews, it is important to recognise the shortcomings of this medium, namely that they reflect individual opinions, may not necessarily be indicative of the views of the general rider community and are unvalidated. However, despite these issues, the forums give an unedited insight into prevailing rider issues.

Analysis of Web Forums

The web forums that were reviewed include:

- Dirt Bike World (2009): www.dirtbikeworld.net/forum/;
- Full Noise (2009): www.fullnoise.com.au/;
- Miniriders (2009): www.miniriders.com.au/;
- Motorsports Journal (2009): www.motorsportsjournal.com; and
- Total Racing Solutions (2009): www.totalracingsolutions.com.

The forums seem to be accessed primarily by males of all ages, including unriders and registered off-road facility users. The content of tarmac based racing and tracking blogs was largely related to discussions of race results and equipment reviews.

The review of forum content made note of repeated topics or issues that were raised by riders. Potentially, forum contributors could be located anywhere in the world although most are assumed to be Australian based, few make any mention of their location. The forum review is best taken as an indication of attitudes, interests and concerns of riders rather than an exhaustive overview of all riders' opinions.

Five categories have been developed to aggregate forum content into the main topic areas:

- General interests;
- Rider concerns;
- What makes a successful facility;
- Information requests; and
- Other.

General Interests

This category serves to highlight the key interests of riders using the web forums. While a number of factors of interest appeared more than once in the review of online forum content, some of the factors listed, particularly the hunting rides, appeared only twice. Interest groups appear to be centred around:

- **Convening for annual rides:** Social weekend outings, which combine riding with a weekend away with friends;
- **Exploring:** Many enjoy the novelty of creating their own new tracks (for example following bush fires), with a desire for many riders to illegally form tracks and ride off-road, however, it is not clear if the majority of riders realise this is illegal; and
- **Use of unregulated tracks:** Demand for tracks that are not regulated by police and where participants do not need a registered bike. The use of State Forests to ride is popular, while other tracks are avoided due to regular police presence.

In reviewing the online forums, it was observed that this was a popular means to organise social weekends away or annual rides. Often a venue, date and details would be provided and expressions of interest requested.

The desire for riders to explore unknown and unregulated territory was strong and a repeated theme throughout the forums. Riders frequently discussed new tracks, existing illegal tracks and areas that are out of bounds, but seldom regulated by police.

Rider Concerns

In reviewing the forums, several areas of concern for riders could be identified:

- **Supply of suitable facilities**: Forums highlighted a shortage of suitable tracks, and where these are available the travel time and costs to access them is prohibitive;
- **Legislation**: Many riders indicated they felt their "group" was targeted by the police and that riding areas (number and size) are being reduced. Concerns were also raised about legislation changes and the risk of fines and further police action if caught undertaking unrider activity;
- **Danger**: Many forum participants indicated their concern that some riders are not adhering to rules and regulations, and that this is increasing the danger that other riders and trail users are exposed to;
- **Entry costs**: Riders noted that entrance fees for organised races are increasing, while prize money appears to be declining (this only applied to entrance fees for races, not general admission to facilities);
- **Insurance costs**: Riders highlighted the limitations imposed when clubs have to organise and run under umbrella organisations for insurance reasons (Motorcycling South Australia was quoted as the example); and
- **Governance**: There is a perceived lack of transparency and understanding relating to the use of funding by clubs and Government Departments.

The most commonly repeated concerns among riders contributing to online forum discussions appear to relate to the lack of accessible facilities. There is a perception among forum participants that off-road motorcyclists are being targeted by legislation, that the facilities and space available for their use was diminishing and that regulations of

these spaces had become stricter. Concerns over the danger and the cost of participation also featured numerous times.

What Makes for a Successful Facility?

Some online discussions considered the merits and shortcomings of a range of facilities and the key points raised are outlined below:

- **Organisation and management**: It is important that a facility be appropriately managed and that the organisers provide riders with information about track conditions and techniques as well as managing and ensuring appropriate rider behaviours;
- **Promotion**: Facilities need to be well promoted – riders identified that without adequate promotion it was difficult to find out about the available tracks, the facilities on offer, opening times, fees and regulations;
- **Track condition and maintenance**: It is important that tracks be properly maintained (recognising that part of the attraction of motocross is the variation in track conditions);
- **Competition standard and sponsorship**: Riders engaged in competitions consider the standard of other competitors and the sponsorship and prize money available to be important issues; and
- **Variety**: Variety in track layouts and conditions is important – riders noted a preference to try somewhere new/ different once they become familiar with a track.

It is evident from the review of online forums and discussions that riders consider management of the facility to be important in terms of providing an enjoyable and safe recreational environment. In addition, riders highlighted the importance of variety and a range of track layouts and experiences to provide for continued enjoyment, suggesting that a facility may be more successful where track layouts and features are periodically altered throughout the year to provide new challenges and riding experiences. The need to access sponsors and to promote events and competitions held at the venue were also identified as important elements for a successful facility.

Information Requests

Forums were a popular way for riders to exchange information about popular facilities, legal requirements, events and other issues. In some instances, riders were unsure about legal and safety/eligibility requirements. Similar information requests were repeatedly posted and discussed on the forums and are summarised below:

- **Legal requirements:** Details of getting registration, including specifics such as mirrors on bikes and details surrounding rules and related fines;
- **Eligibility:** What age, ability, license and bike required to ride in general as well as in organised events;
- **Tracks:** Information surrounding available tracks, opening times, good tracks and details of tracks (including tracks suited to different abilities, ages and bikes);
- **Events:** Information on events, including specifics such as events best suited to their bike, age and ability;
- **Safety Equipment:** The most effective guarding (e.g. neck braces, knee guards) that riders can use for protection whilst riding;
- **Weather:** Forecasts for tracks (e.g. events coming up, training) to gauge riding and safety conditions; and
- **Skill Development:** How to improve performance, including off-bike training such as weights and cardio exercises.

Other

Other issues and concerns noted through the review of web forums included:

- **Club membership:** Encouraged by a number of competitions (State, private), requiring riders registering for an event be a member of a club;
- **Integration of information:** Some riders feel there is a lack of integration between peak bodies in race organisation for a number of reasons, particularly in regard to conflicting dates for race events; and
- **Current affairs and general discussion:** Use of forums to discuss the winners following a race and also to predict the winner for upcoming races.

An outline of interests, concerns, information gaps and other related factors found on the forums reviewed, provide an overview of the demand and issues present in off-road motorcycling.

One of the most significant issues evident from the forums is the lack of information available to riders and the associated demand for a more centralised online forum with the option of expert advice.

There also appears to be a significant rider interest in exploring unregulated spaces as this appears to be more exciting and exhilarating.

Concern for the lack of facilities on offer and the over-regulation of spaces made riders feel targeted and as though they were losing their freedom to enjoy the sport.

Appendix B: Rider Survey

As part of the Benefit Cost Assessment of Providing Motorcycle Facilities in Victoria, a rider survey was undertaken of off-road riders in the State to, amongst other areas of interest, gauge rider activity levels, club/ managed facility usage, accident rates, and demand for new club/ managed facilities. This Appendix provides an overview of the off-road motorcycle rider survey, the methodology applied, and a summary of the key findings.

Methodology

Survey Development

The following methodology was utilised in the development of the rider survey:

- Using the findings of the literature review and with assistance from the project steering committee, data requirements and data gaps were identified and detailed questions were developed to fill these data gaps; and
- The survey questionnaire was designed and refined by the project team, in consultation with VicRoads, and incorporated the desired questions to collect information required for the analysis.

Collation of Survey Data

The following methodology was utilised in the collection and collation of rider survey responses:

- Survey questionnaires were disseminated to all Motorcycle Victoria affiliated clubs via email, for distribution to their club members. Surveys were also administered through face-to-face interviews at a Honda Ride Day on 28/06/2009. Riders were also encouraged to participate in the survey through the Department of Sustainability and Environment web forum;
- The survey primarily targeted those riders that currently engage in off-road riding activities and are members of Motorcycle Victoria affiliated clubs. Those riders that only engage in on-road riding activities and are not members of Motorcycle Victoria affiliated clubs were not actively targeted (although these riders were not excluded from undertaking the survey);
- Survey responses were collected, with responses being received via multiple mediums – face-to-face interviews and web based returns. The final cut off date for survey responses was designated as the 21st of August 2009; and
- Once the final cut-off date for the survey had elapsed, all received surveys were collated and data-entered into a survey database designed and generated specifically for this project.

Responses

There was a total of 359 survey responses received with valid data. Assuming an off-road rider population of 58,612 riders (refer **Appendix D**), this provides a 95% confidence level that the rider survey is representative of the total off-road rider population. There were also some outliers for specific questions that were excluded to ensure data integrity[10].

[10] That is, responses for certain questions that were considerably higher or lower than the average were excluded from the analysis to ensure the survey results were not significantly altered by one or two responses. For example, one respondent indicated that they had had "100" crashes resulting in an injury in the past three years, which was approximately five times more than the next highest respondent.

Rider Survey Analysis

The following is a summary of the key findings of the rider survey.

Demographics and Rider Profile

In terms of the demographics of respondents, the following can be noted:

- The majority (68.7%) of respondents were aged between 31 and 50 years, with a further 11.0% aged over 50 years and 10.4% aged 21 to 30 years;
- 96.0% of respondents were male;
- 39.1% of respondents reported an annual income of between $60K and $90K, with a further 26.2% reporting an annual income of between $30K and $60K;
- Over 75% of rider survey respondents indicated that had been riding for over 10 years, while only 7.0% indicated they had been riding for less than 3 years; and
- Over 60% of respondents considered themselves to be of an "advanced" rider level, while only 2% considered their skill level to be "beginner".

Riding Activity

Participation in Riding Activities

The literature review identified four key types of off-road riding which were included in the survey:

- Bitumen track day riding (as provided at Phillip Island and Broadford). Involves completing several laps of a sealed track, usually alongside (but not in completion with) other riders. Several facilities which are used for professional racing offer track days at various times throughout the year so that amateur riders can access these facilities;
- Motocross riding (enclosed circuit with hills, cambers and man-made jumps). Motocross events are held on enclosed and marked circuits and use the terrain's natural features such as hills and cambers with man-made jumps. Circuits are generally between 1.4 and 2.5 kilometres in length and the bikes are not designed for road use;
- Trail riding (designated route usually along paths and/or tracks). Trails riding involves riders following a designated off-road route usually along paths and/or tracks. The length of these tracks is highly variable and can be between 50 and 500 kilometres. Most trails bikes can be road registered; and
- Trials course riding (obstacle course format). Competitors ride through an obstacle course attempting to avoid touching the ground with their feet. Sections are often divided into separate courses to accommodate the different skill level of riders.

In addition to these four types of off-road riding activities, survey respondents were asked to provide details of any other types of off-road riding they undertake. "Other" responses provided were primarily derivatives of the four types of activities identified above, with the exception of riding undertaken on the riders' own farm/ property. This activity has also been included in the rider survey analysis, however, it should be noted that this may include work-related riding and as such these responses have been excluded .

In terms of participation in riding activities, the following can be noted:

- Trail riding is the most popular activity undertaken by rider survey respondents, with 85.7% of respondents indicating they undertake this activity;
- Motocross is also a popular activity with 62.5% of respondents indicating they participate in this activity;
- Bitumen track riding (24.6% of respondents) and trials course riding (20.4% of respondents) are relatively less popular types of activities;

- 2.8% of respondents indicated they undertake riding activities on their own property; and
- 68.9% of respondents indicated that they participate in more than one type of activity.

Table B.1. Percent of Respondents Participating in Riding Activities

Riding Activity	Percent of Respondents Participating
Bitumen track day riding	24.6%
Motocross	62.5%
Trail riding	85.7%
Riding trials courses	20.4%
On own farm/ property	2.8%

Note: Participation does not sum to 100% as respondents can participate in more than one activity.
Source: AEC*group*.

Frequency of Undertaking Activities

In terms of the frequency of undertaking activities, the following can be noted:

- Respondents that indicated they ride on their own farm/ property indicated that they undertake these riding activities 83.8 times per annum on average;
- Trail riding and motocross participants are the next most regular riding participants surveyed, undertaking their respective activities 26.1 and 24.5 times per annum on average, respectively;
- Trials course riders undertake this activity 17.4 times per year on average, while bitumen track riders undertake this activity 5.3 times per year on average;
- The average number of riding activities undertaken per respondent (i.e., total number of riding activities divided by total respondents) was:
  - Trail riding 22.4 times per year;
  - Motocross 15.3 times per year;
  - Trial course riding 3.6 times per year;
  - Riding on own farm/ property 2.3 times per year; and
  - Bitumen track riding 1.3 times per year.

Table B.2. Frequency of Participation in Riding Activities

Riding Activity	Frequency by Participants of Each Activity [a]			Frequency by Total Respondents [b]		
	Per Week	Per Month	Per Year	Per Week	Per Month	Per Year
Bitumen track day riding	0.1	0.4	5.3	0.0	0.1	1.3
Motocross	0.5	2.0	24.5	0.3	1.3	15.3
Trail riding	0.5	2.2	26.1	0.4	1.9	22.4
Riding trials courses	0.3	1.5	17.4	0.1	0.3	3.6
On own farm/ property	1.6	7.0	83.8	0.0	0.2	2.3

Note: (a) This refers to the frequency of respondents undertaking each activity by those respondents that undertake the activity identified, e.g., of those respondents that indicated they participate in bitumen track riding, the average number of times undertaking the activity was 5.2 times per year. (b) This refers to the frequency of respondents undertaking each activity for all respondents.
Source: AEC*group*.

Where Activities Are Undertaken

The rider survey examined how often riding activities were undertaken in a number of different riding environments, including:

- Clubs/ managed facilities;

- Private land;
- Made forest tracks (i.e., formed state forest and national park roads and tracks that form part of the Victorian road network);
- Other forest tracks (i.e., tracks other than formed roads and tracks, including walking tracks, "single tracks", seasonally closed tracks and management vehicle-only tracks); and
- Other open space (e.g., parks and sports fields).

It should be noted that it is illegal to ride a motorcycle on "other forest tracks" or "other open space". Also, it is necessary to obtain a license and have an appropriately registered motorcycle to ride on "made forest tracks", although the rider survey was not designed to distinguish between legal and illegal use of these "made forest tracks".

The most common form and location of riding activities (in terms of number of respondents undertaking the activity at least once during the year) are:

- Trail riding on made forest tracks (77.1% of respondents);
- Motocross on club/ managed facilities (56.8% of respondents);
- Trail riding on other forest tracks (55.4% of respondents);
- Trail riding on private land (42.0% of respondents);
- Motocross on private land (27.8% of respondents); and
- Bitumen track day riding on club/ managed facilities (25.2% of respondents).

Table B.3. Where Respondents Undertake Their Riding Activities

Riding Activity	Club/Managed Facility	Private Land	Made Forest Track	Other Forest Tracks	Other Open Space
Bitumen track day riding	25.2%	0.6%	0.0%	0.0%	0.0%
Motocross	56.8%	27.8%	4.1%	2.9%	3.2%
Trail riding	16.8%	42.0%	77.1%	55.4%	19.7%
Riding trials courses	10.1%	10.7%	4.6%	4.3%	2.6%
On own farm/ property	0.0%	0.9%	0.0%	0.0%	0.3%

Note: The percentages in the table above represent the percentage of all respondents that participate in each activity and type of location. Participation can sum to more than 100% as respondents can undertake more than one activity in more than one type of location.
Source: AEC*group*.

In terms of where activities are undertaken by each type of activity (i.e., the type of land area in which activities are undertaken), the following can be noted[11]:

- Virtually all bitumen track riders indicated that they undertake these activities at club/ managed facilities, with some bitumen track day riders also indicating they participate in these activities on private land;
- 90.7% of motocross riders indicated that they use club/ managed facilities, with a further 44.4% of motocross riders reporting that they undertake motocross activities on private land;
- 88.4% of trail riders reported that they undertake trail riding activities on made forest tracks (i.e., formed State forest and national park roads and tracks accessible to 4WD vehicles) and 48.2% indicated they ride on private land. 63.5% of trail riders indicated that they illegally use other forest tracks, while 19.7% illegally use other open space;
- Over 50% of trials course riders indicated that they undertake these activities on private property (58.7% of trials course riders) and at club/ managed facilities (55.6% of trials course riders); and
- Private land (75.0%) and other open space (25.0%) are the most common locations for own farm/ property riding activities.

[11] Participation in each activity can equal more than 100% as respondents can undertake each activity in more than one type of location.

Table B.4. Where Respondents Undertake Riding Activities, by Activity

Riding Activity	Club/Managed Facility	Private Land	Made Forest Track	Other Forest Tracks	Other Open Space
Bitumen track day riding	100.0%	2.3%	0.0%	0.0%	0.0%
Motocross	90.7%	44.4%	6.5%	4.6%	5.1%
Trail riding	19.3%	48.2%	88.4%	63.5%	22.6%
Riding trials courses	55.6%	58.7%	25.4%	23.8%	14.3%
On own farm/ property	0.0%	75.0%	0.0%	0.0%	25.0%

Note: The percentages in the table above should be read across, and represent the percentage of riders that undertake the corresponding activity in each type of location for those respondents that indicated they participate in the corresponding activity. Participation in each activity can sum to more than 100% as respondents can undertake each activity in more than one type of location.
Source: AEC*group*.

In terms of the proportion of riding episodes undertaken within and outside of managed facilities by riding activity, it is estimated that:

- In total, 44.1% of riding episodes are undertaken at a club/ managed facility;
- 99.7% of bitumen track riding is undertaken at club/ managed facilities;
- 80.4% of motocross riding is undertaken at club/ managed facilities;
- 11.2% of trail riding is undertaken at club/ managed facilities;
- 46.2% of trials course riding is undertaken at club/ managed facilities; and
- Riding episodes on own farm/ property is all undertaken outside of club/ managed facilities.

Table B.5. Proportion of Riding Activities Undertaken Inside/ Outside of Club/ Managed Facilities, by Activity

Riding Activity	% Undertaken Inside of Club/ Managed Facilities	% Undertaken Outside of Club/ Managed Facilities
Bitumen track day riding	99.7%	0.3%
Motocross	80.4%	19.6%
Trail riding	11.2%	88.8%
Riding trials courses	46.2%	53.8%
On own farm/ property	0.0%	100.0%
Total	**44.1%**	**55.9%**

Source: AEC*group*.

Reducing Illegal Off-Road Riding

Respondents indicated that the most effective measures for reducing illegal off-road motorcycle riding would be:

- Providing more club/ managed facilities (77.6% of respondents);
- Reducing the cost of using club/ managed facilities (53.5% of respondents); and
- Providing better quality club/ managed facilities (52.4%).

Table B.6. Most Effective Measures for Reducing Illegal Off-Road Riding

Measure	Percent of Respondents
Providing more club/ managed motorcycle facilities	77.6%
Providing better quality club/ managed motorcycle facilities	52.4%
Reducing the cost of using club/ managed motorcycle facilities	53.5%
More police patrols	20.4%
None	2.8%
Other	48.4%
More areas/trails to ride, including specialised (e.g., family) areas	*11.3%*
Separate licensing conditions for junior riders	*9.1%*
Lower legal requirements [(a)]	*5.1%*
Restrict access of other users (e.g., 4WD, pit bikes)	*3.4%*
Reduce cost of registration [(b)]	*1.4%*
Education	*6.5%*
Provide greater responsibility/support to organised riders/clubs	*1.1%*
Greater penalties for illegal riders	*1.4%*
Increased Government support [(c)]	*2.8%*
Allow clubs to manage facilities independently	*0.6%*
Keep existing facilities in operation	*4.2%*
Allow people to have tracks on their own property	*0.8%*
Improved non-riding facilities at designated tracks/ riding facilities	*0.3%*

Note: This was a multiple response question and does not sum to 100%. (a) e.g., provide "permits" rather than license for use of some trails or provide more areas that don't require license or rego. (b) e.g., introduce "special" registration for vehicles used only for off-road. (c) e.g., insurance for managed facilities, start-up and other financial assistance.
Source: AEC*group*.

Respondents believe that the main reasons why some riders do not use club/ managed facilities are:

- Costs of using the facility (including registration, entry and travel expenses);
- The distance required to travel to the facility; and
- Club/ managed facilities do not provide the preferred experiences for riders.

Table B.7. Main Reasons Why Some Riders Do Not Use Club/ Managed Facilities

Reason	Percent of Respondents
Cost (registration/ entry/ travel)	70.5%
Distance from home	58.1%
Motorbike/ equipment does not meet facility standard	24.4%
Facilities do not offer my preferred riding experience	47.2%
Not aware of any club/ managed facilities which meet my requirements	29.5%
Facilities are boring/ unchallenging	22.8%
Facilities are too crowded	29.5%
Other users too old/ young	6.7%
No areas for parents to ride with their children at club/ managed facilities	15.4%
Other	12.6%
Not enough facilities	*4.2%*
Accessibility (in particular for children that can't drive to the facilities)	*2.0%*
Don't provide facilities that cater to beginners	*2.5%*
Ill-discipline	*1.1%*
Hours of operation not suitable	*0.8%*
Lack of support from Government	*1.1%*
Poor management of facilities	*0.6%*

Note: This was a multiple response question and does not sum to 100%.
Source: AEC*group*.

Off-Road Riding Crashes

Rider survey respondents were asked to identify the number of crashes they had in the past three years that resulted in an injury. Three degrees of injury severity were examined:

- **Minor**: No medical treatment required/ minor first-aid required;
- **Moderate**: Medical treatment required, including outpatient hospital care; and
- **Severe**: Required admittance to hospital.

The following can be noted regarding rider crashes and the severity of injury:

- 46.2% of respondents indicated they have had a crash while riding off-road in the past three years, with 53.8% indicating they had not had a crash;
- 84.7% of respondents that indicated that they have had a crash in the past three years indicated that they had had a crash that resulted in a "minor" injury, 42.7% had had a crash that resulted in a "moderate" injury and 21.0% had had a crash that resulted in a "severe" injury; and
- 69.1% of all crashes experienced by respondents were identified as resulting in a "minor" injury, 21.9% as resulting in a "moderate" injury and 9.0% as resulting in a "severe" injury.

Crashes Per Rider

In terms of crashes per rider that resulted in an injury, the following can be noted:

- Crashes are most common for riders undertaking activities on their own farm/ property, with participants of this type of activity identifying that they had had 3.56 crashes resulting in an injury in the past three years on average;
- Participants of riding on own farm/ property also reported the highest rates of crashes resulting in "moderate" or "severe" injuries;
- Crashes are also relatively common for participants of motocross and trail riding, with respondents undertaking these activities reporting an average of approximately 0.90 crashes resulting in an injury in the past three years per rider for motocross and approximately 0.80 crashes resulting in an injury per rider for trail riding;
- Crashes resulting in "moderate" and "severe" injuries are more common while undertaking trail riding and motocross than bitumen track day riding and trials course riding;
- Approximately 83.5% of respondents indicating that they have had a crash that resulted in an injury identified that they have had a crash while trail riding; and
- A further 50.0% of respondents that have had a crash resulting in an injury in the past three years identified that they have had a crash while participating in motocross activities.

Table B.8. Crashes Per Rider by Severity of Injury, by Activity

Riding Activity	Minor	Moderate	Severe	Total
Bitumen track day riding	0.14	0.01	0.04	0.19
Motocross	0.60	0.22	0.08	0.90
Trail riding	0.55	0.17	0.08	0.80
Riding trials courses	0.16	0.09	0.01	0.26
On own farm/ property	3.00	0.44	0.11	3.56
Total	**1.06**	**0.31**	**0.13**	**1.50**

Note: The number of crashes per rider outlined in the table above has been calculated based on the number of crashes reported by respondents divided by the number of respondents indicating they undertake each activity.
Source: AEC*group*.

Crashes Per Riding Episode

In terms of crashes per "riding episode"[12] by riding activity, the following can be noted:

- In the past three years, crashes resulting in injuries are most common per riding episode for bitumen track day riding (1.3 crashes per 100 riding episodes), motocross (1.2 crashes per 100 riding episodes) and trail riding (1.1 crashes per 100 riding episodes); and
- On average, respondents indicated that they have crashes that result in minor injuries more often when riding in a club/ managed facility than when riding outside of a club/ managed facility. Crash rates resulting and moderate and severe injuries were relatively similar for riding inside or outside of club/ managed facilities.

While the finding that crashes resulting in injuries are more common when riding inside a club/ managed facility than outside appears somewhat counter-intuitive (with club/ managed facilities widely considered to be a safer off-road riding environment), it should be noted that the majority of respondents are relatively experienced riders that are more able to accurately judge the risks involved in their riding activities and adjust their behavior accordingly. It is likely these riders exert greater caution while riding outside managed facilities, which is supported by anecdotal evidence that suggests the presence of medical assistance at the club/ managed facility provides an incentive for riders to "push their limits" to a greater extent at these facilities than outside a facility, with the knowledge that they can be attended to swiftly acting to reduce the perceived risk of having a crash while at a club/ managed facility. The incentive to "push their limits" may also be driven by the increased exposure to other riders when riding at a facility, with riders potentially seeking to demonstrate their skills to their peers or not wanting to appear less competent than other riders.

[12] For the purposes of this report, a "riding episode" is considered to be any one rider undertaking any one riding activity, once. For example, if two respondents indicated that they both undertake trail riding 5 times per year, this is equivalent to 10 (2 x 5) trail riding episodes.

Table B.9. Frequency of Crashes Per Riding Episode by Severity of Injury, by Activity

Riding Activity	Minor	Moderate	Severe	Total
Within Club/ Managed Facilities				
Bitumen track day riding	1.0%	0.1%	0.2%	1.3%
Motocross	0.9%	0.2%	0.1%	1.3%
Trail riding	1.5%	0.2%	0.1%	1.8%
Riding trials courses	0.5%	0.4%	0.0%	0.8%
On own farm/ property	N/a	N/a	N/a	N/a
Total	**1.1%**	**0.2%**	**0.1%**	**1.5%**
Outside Club/ Managed Facilities				
Bitumen track day riding	0.0%	0.0%	0.0%	0.0%
Motocross	0.4%	0.3%	0.0%	0.7%
Trail riding	0.6%	0.2%	0.1%	0.9%
Riding trials courses	0.2%	0.0%	0.1%	0.2%
On own farm/ property	0.0%	0.2%	0.0%	0.2%
Total	**0.5%**	**0.2%**	**0.1%**	**0.8%**
Total				
Bitumen track day riding	1.0%	0.1%	0.2%	1.3%
Motocross	0.8%	0.3%	0.1%	1.2%
Trail riding	0.7%	0.2%	0.1%	1.0%
Riding trials courses	0.3%	0.2%	0.0%	0.5%
On own farm/ property	1.2%	0.2%	0.0%	1.4%
Total	**0.7%**	**0.2%**	**0.1%**	**1.0%**

Note: The frequency of crashes per riding episode outlined in the table above has been calculated based on the number of crashes reported by respondents divided by the number of riding activities undertaken for each activity.
Source: AEC*group*.

Crashes Per Riding Episode by Experience/ Skill Level

The table below outlines the frequency of crashes per riding episode by severity of injury and by level of riding experience. The table shows that riders with over 10 years riding experience reported approximately half as many crashes resulting in an injury (0.9 crashes per 100 riding episodes) than were reported by respondents with between 1 and 3 years riding experience (1.8 crashes per 100 riding episodes) and between 3 and 10 years riding experience (1.9 crashes per 100 riding episodes).

Riders with less than one year riding experience reported the lowest frequency of crashes per riding episode, however, it should be noted that there were only two respondents in this category.

Table B.10. Frequency of Crashes Per Riding Episode by Severity of Injury, by Experience

Experience Level	Minor	Moderate	Severe	Total
< 1 Year	0.6%	0.0%	0.0%	0.6%
1 – 3 Years	1.5%	0.2%	0.1%	1.8%
3 – 10 Years	1.4%	0.4%	0.1%	1.9%
> 10 Years	0.6%	0.2%	0.1%	0.9%
Total	**0.8%**	**0.2%**	**0.1%**	**1.1%**

Source: AEC*group*.

Similarly, the frequency of crashes resulting in an injury is lower for riders that consider themselves to be of an advanced skill level (0.9 crashes per 100 riding episodes) than for riders of an intermediate skill level (1.6 crashes per 100 riding episodes).

Respondents reporting their skill level as "beginner" actually recorded the fewest crashes per riding episode (0.8 crashes per 100 riding episodes), however, it should be noted that there were only eight respondents in this category.

Table B.11. Frequency of Crashes Per Riding Episode by Severity of Injury, by Skill Level

Skill Level	Minor	Moderate	Severe	Total
Beginner	0.7%	0.1%	0.0%	0.8%
Intermediate	1.2%	0.3%	0.1%	1.6%
Advanced	0.6%	0.2%	0.1%	0.9%
Total	**0.8%**	**0.2%**	**0.1%**	**1.1%**

Source: AEC*group*.

Features of Popular Club/ Managed Facilities

In line with the higher proportion of trail riding and motocross participants, over 70% of respondents indicated that trail routes are an important riding experience at club/ managed facilities for them, with 54.7% indicating that motocross is an important riding experience for them.

Table B.12. Important Riding Experiences at a Club/ Managed Facility

Riding Activity	Percent of Respondents
Bitumen track day riding	19.9%
Motocross	54.7%
Trail riding	70.7%
Riding trials courses	19.9%
Other	14.0%
Coaching/ learning areas	*4.6%*
Enduro course	*4.3%*
Flat track racing	*1.4%*
Ride days/ training days/ special events	*0.9%*
Grass track	*0.9%*
Supercross	*0.6%*
Open terrain	*0.6%*
Dragrace strip	*0.6%*
Stunt area	*0.3%*

Note: Participation does not sum to 100% as respondents can participate in more than one activity.
Source: AEC*group*.

Approximately 82.7% of respondents indicated that technically challenging track features are important at club/ managed facilities, while 79.3% of respondents indicated that multiple track types/ layouts are important track features at club/ managed facilities.

Table B.13. Important Track Features at a Club/ Managed Facility

Track Feature	Percent of Respondents
Technically challenging	82.7%
High speed sections	34.3%
Multiple track types/ layouts	79.3%
Appropriate run-off areas	39.1%
Other	13.6%
Multiple tracks/ challenges for variety in skill level	*5.7%*
High quality/ well maintained track surface/ features	*2.3%*
Safety features	*1.7%*
Challenging natural environment	*1.4%*
Flowing track design/ layout	*0.8%*
Ongoing variation in track design/ layout	*0.6%*
Length of track/ size of riding area	*0.6%*
Jumps/ stunts	*0.6%*

Note: This was a multiple response question and sums to greater than 100%.
Source: AEC*group*.

Respondents indicated that important non-riding related features for club/ managed facilities include:

- Short travel time (62.0% of respondents);
- Availability of food and drink (57.3% of respondents);
- Availability of change/ shower blocks/ amenities (51.5% of respondents);
- Viewing areas (45.3%); and
- Access to coaching (41.8%).

Table B.14. Important Non-Riding Features at a Club/ Managed Facility

Non-Riding Feature	Percent of Respondents
Change/ shower blocks/ amenities	51.5%
Food and drink	57.3%
Service/ repairs/ fuel/ washdown	19.0%
Hire service	9.1%
Coaching	41.8%
Viewing areas	45.3%
Short travel time	62.0%
Overnight accommodation	28.4%
Other	10.2%
Well managed/ maintained/ supervised	*3.2%*
Parking	*1.8%*
Medical/ first aid	*1.5%*
Social/ family atmosphere	*1.5%*
Storage areas/ lockers	*0.6%*
Shelter	*0.6%*
Availability of staff	*0.6%*
Picnic/ BBQ area	*0.3%*
Lighting	*0.3%*

Note: This was a multiple response question and sums to greater than 100%.
Source: AEC*group*.

Desired Characteristics of a New Facility

Location

Approximately 47.3% of respondents thought that a new facility should be located near Melbourne (within 1 to 2 hours drive), including 22.9% of respondents that indicated east Melbourne was the preferred location of a new facility (including both south and north eastern Melbourne suburbs).

Geelong and the surrounding Barwon SD was also identified as an area of high demand, with 28.3% of respondents indicating that a facility near Geelong would be desirable.

Approximately 10.8% of respondents indicated that keeping existing facilities in operation and developing these facilities was as important as providing new facilities.

A comparison of preferred location of facilities to postcode of respondent identified that 94.7% of rider survey respondents would prefer a facility with 1 to 2 hours of where they reside (identified by a postcode within 125km of preferred facility location).

Features That Would Encourage Use of a New Facility

Approximately 97.0% of respondents indicated that they would use a new facility (assuming it met their requirements), with these respondents indicating they would use the facility approximately 33.6 times per year, on average.

The most commonly identified aspects that would encourage respondents to use a new facility include:

- Ease of access/ location (24.9% of respondents);
- Low/ reasonable cost (22.3%);
- Provision of preferred type of tracks/ layouts/ riding experience (19.3%);
- Provision of quality/ reputable riding facilities (16.4%);
- Well managed/ maintained facilities (16.0%);
- Availability/ opening hours (15.6%);
- Suitable for younger/ less experienced riders (12.3%);
- Variety of/ multiple tracks/ layouts (12.3%);
- Safety (11.5%); and
- Technically challenging (10.8%).

Preferred Payment Method

In terms of respondents preferred method for paying to access a new facility, the following can be noted:

- Approximately 55.9% of respondents indicated that their preferred method for payment to access a new facility would be a combination of a membership fee with a reduced access fee;
- Approximately 40.0% indicated that an entrance fee each visit was their preferred method of payment; and
- Approximately 35.9% indicated that an annual membership fee (with no charge for subsequent visits) was their preferred method of payment.

In terms of the quantum respondents are willing to pay to access a new facility that meets their ideal specifications, the following can be noted:

- Approximately 30.5% of respondents indicated they would be willing to pay an annual access fee of between $101 and $200, with a further 30.2% willing to pay an annual access fee of between $51 and $100; and
- Approximately 41.2% of respondents indicated they would be willing to pay an entrance fee of between $11 and $20 per visit. Approximately 23.8% indicated they would be willing to pay between $5 and $10, while a further 21.3% indicated they would be willing to pay between $21 and $50.

Table B.15. Amount Willing to Pay to Access a New Facility Which Met Ideal Specifications

Annual Access Fee	% of Respondents	Entrance Fee	% of Respondents
$0-$50	13.4%	$5-$10	23.8%
$51-$100	30.2%	$11-$20	41.2%
$101-$200	30.5%	$21-$50	21.3%
$201-$300	17.1%	$51-$100	2.5%
>$300	8.7%	>$100	11.2%
Total	**100%**	**Total**	**100%**

Note: The percent of respondents for annual access fee and entrance fee have been assessed separately.
Source: AEC*group*.

Appendix C: Cost of Rider Crashes

For many riders, the element of risk associated with off-road riding is an integral component of the activity's attraction. Instinct and Reason (2009) found that the two (of four) segments most likely to have needed medical treatment were the two groups which most emphasised the element of danger as a motivation for riding.

There are a range of costs when riders are involved in accidents, which can be affected by severity and location. From an economic perspective the main costs relate to:

- **Direct expenditure:** the costs of medical treatment, including to immediate primary care and all secondary rehabilitation and treatment costs including where this treatment may be needed on an ongoing basis;
- **Morbidity costs:** the value of lost output as a result of accidents. These costs include both the lost output from paid and domestic work; and
- **Mortality costs:** the lost value of output on death. These costs reflect the output that would have been anticipated had the accident victim continued to generate output until the age of 75.

A Monash University (Watson & Ozanne-Smith, 1997) report estimated the economic cost of accidents to Victoria. Costs were presented for thirteen accident groups as well as an average cost across all accident types. The costs per 'Motor Vehicle' and 'Other Transport' accident are set out in the table below (indexed to 2009 values based on CPI) as well as the 'All Accident' cost.

Table C.1. Economic Costs of Accidents in Victoria

Accident Cost	Motor Vehicles			Other Transport			All Accidents		
	Male	Female	All	Male	Female	All	Male	Female	All
Direct	$6,088	$5,056	$5,652	$2,891	$2,425	$2,707	$2,274	$2,683	$2,431
Morbidity	$7,264	$6,864	$7,094	$3,870	$3,955	$3,905	$3,107	$3,473	$3,248
Mortality	$862,131	$851,777	$859,352	$704,059	$737,290	$708,591	$768,934	$685,808	$745,665
Lifetime Cost	$29,761	$20,046	$25,654	$9,229	$7,009	$8,356	$8,513	$7,890	$8,274

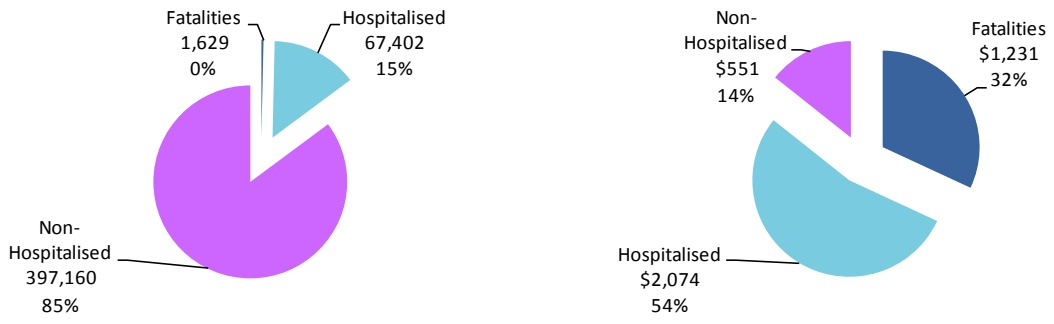
Source: Watson & Ozanne-Smith (1997)

It is observed the large number of people attending hospital for relatively minor treatment moderates the average lifetime costs compared to the much higher, but far less frequent, mortality costs.

From the table, it appears that the costs of 'Motor Vehicle' and 'Other Transport' accidents are higher than the 'All Accident' comparators. 'Motor Vehicle' accidents had the highest aggregate cost of the thirteen categories used for men and in total, however, 'Falls' were slightly higher for women.

As well as the variation between accident costs by sex and accident type, there are also cost differences associated with age and accident severity. The following figure plots the distribution of accidents by severity and aggregate cost.

Figure C.1. Distribution of Accident Severity and Costs ($2009 million)



Source: Watson & Ozanne-Smith (1997)

Fatalities accounted for less than one percent of all accidents but 32 percent of the costs, mainly associated with mortality rather than direct treatment costs. Despite accounting for 85 percent of accident victim numbers, non-hospitalised cases accounted for 54 percent of costs.

The economic costs of accidents also vary with age. The age of the victim can impact the length of treatment required and the length of time over which the costs of morbidity and mortality costs are calculated. The table below sets out 'All Accident' costs by severity for age ranges between 5 and 64 years of age.

Table C.2. Total Lifetime Costs of Accidents by Severity and Age ($2009)

Severity	Age Ranges			
	5-14	15-24	25-44	45-64
Fatalities	$818,062	$1,222,990	$1,142,596	$646,041
Hospitalised	$24,938	$36,428	$36,314	$30,836
Non-Hospitalised	$357	$2,150	$1,986	$1,445
Total	**$2,716**	**$10,293**	**$10,637**	**$10,585**

Source: Watson & Ozanne-Smith (1997)

The data shows some variations between the age ranges including the lower cost of fatalities as remaining working life diminishes.

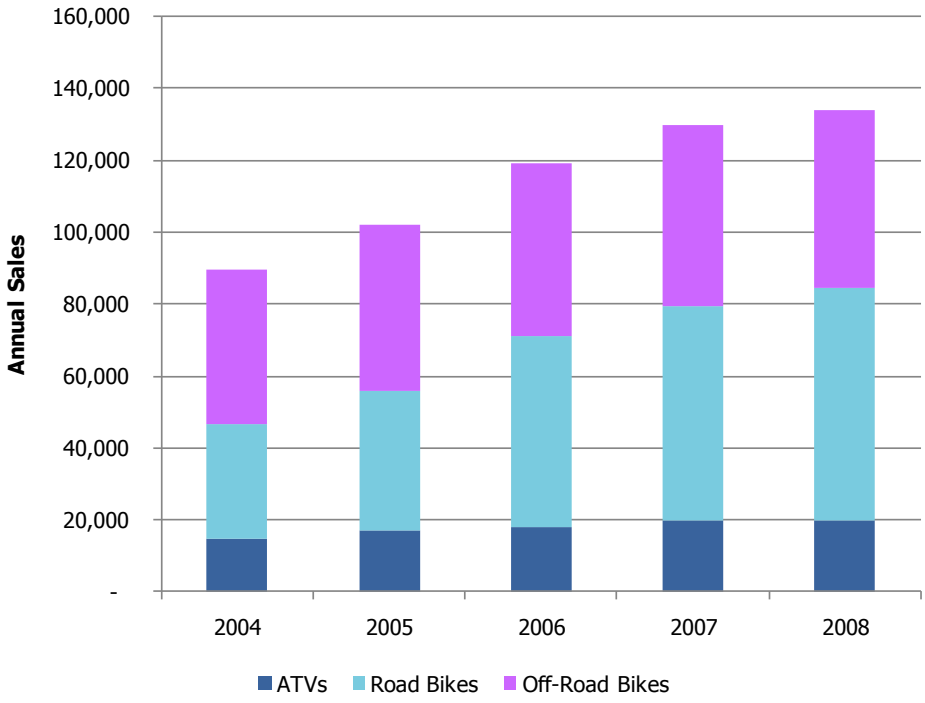
Appendix D: Demand Scenarios & Market Penetration

Estimating the Number of Off-Road Motorcycles in Victoria

National Motorcycle Sales

Motorcycle sales data breaks sales down across three categories – all terrain vehicles (ATVs), road bikes and off-road bikes.

Figure D.1. Australian Motorcycle Sales by Type, 2004-2008



Source: FCAI 2009

Between 2004 and 2008, sales of new motorcycles in Australia increased from 89,373 to 134,112, an average annual increase of 10.7% per annum. Off-road bike sales increased by an average of 3.7% per annum, the lowest annual increase of the three categories. However this still equated to an additional 6,738 motorbikes sold in 2008 compared to 2004. The average annual Australian population growth rate over the same period was 2.0% (Australian Bureau of Statistics, 2009b).

Motorcycle Sales in Victoria

Data on the breakdown of sales between the States and Territories is not available for off-road motorcycles. In order to estimate off-road motorcycle sales in Victoria, sales have been allocated on a per capita basis. On average between June 2004 and June 2008 Victoria accounted for 24.8% of the Australian population (Australian Bureau of Statistics, 2009b), which equates to an estimated total off-road motorcycle sales of 10,568 in 2004 and 12,202 in 2008.

Off-Road Motorcycles in Victoria

Sales of new off-road motorbikes only account for a small proportion of the total number of off-road motorcycles. By establishing the average age of off-road motorcycles, it is possible to estimate the total off-road fleet.

The Australian Bureau of Statistics motor vehicle Census (2009a) found the average age of motorcycles in Victoria was 9.1 years. However, consultation suggests that the average age of off-road motorcycles entering a managed facility is considerably less than 9.1 years, which may partly be attributed to the higher wear and tear of off-road use. For the purposes of this analysis it has been assumed that the average age of off-road motorcycles is 5.0 years and this has been used to estimate the total number of the off-road motorcycles in the State. It is estimated that in 2008 there were approximately 58,612 off-road motorcycles in Victoria, equivalent to 1.13 off-road motorcycles for every 100 residents.

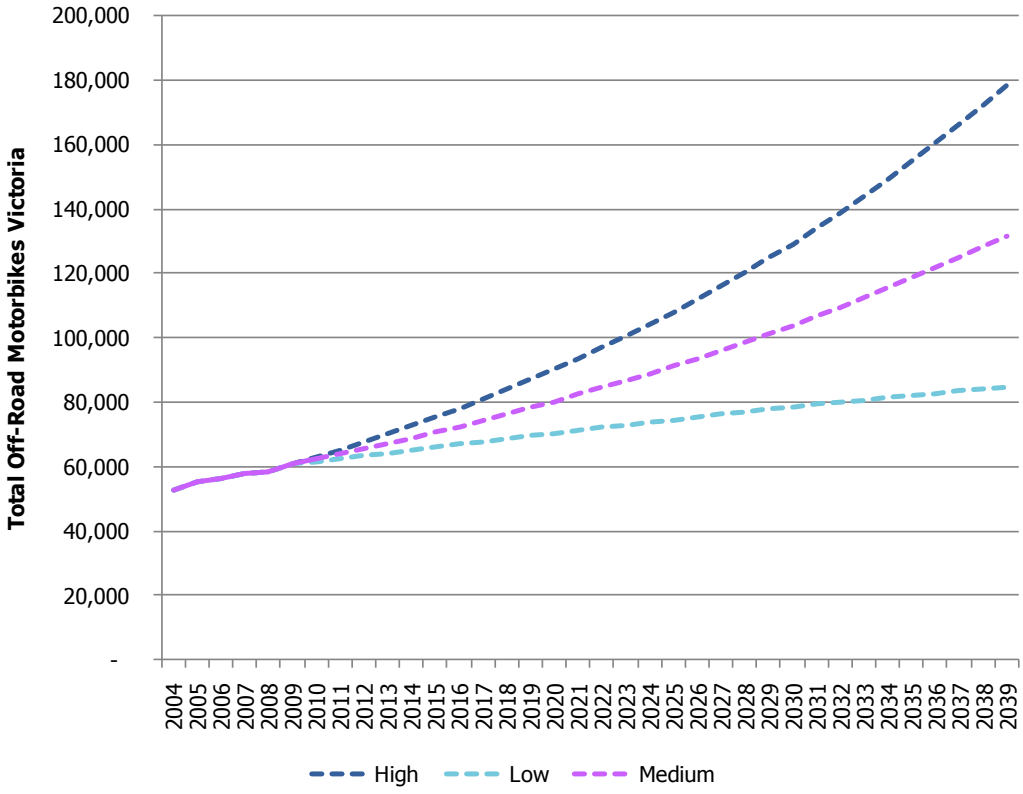
Future Changes in the Number of Off-Road Motorcycles

Having established an estimate of the current number of off-road motorcycles in Victoria, it is possible to estimate how this is likely to change over time. Three scenarios have been developed:

- **Low growth scenario:** Off-road motorcycle numbers increase in line with medium population growth forecasts for Victoria (Australian Bureau of Statistics, 2008a);
- **High growth scenario:** Off-road motorcycle numbers increase in line with the increase in sales between 2004 and 2008; and
- **Medium scenario:** Off-road motorcycle numbers increase in line with the midpoint between the medium population growth and recent sales increases.

The following figure shows the range of outcomes between 2004 and 2039 based on these scenarios.

Figure D.2. Off-Road Motorcycle Fleet Growth Scenarios (Victoria 2004-2039)



Source: AEC*group*

The medium growth scenario has been used in the analysis, incorporating population growth forecasts and anticipated continued growth across all motorcycle sectors, including off-road, as factors including rising fuel costs and urban congestion encourage increased demand.

Participation in Off-Road Riding in Victoria

Participation in Off-Road Recreational Activities

Not all off-road bikes are used only for recreational pursuits and some may not be used off-road at all. Enduro bikes are designed to be street legal and can be used in the same way as a traditional road bike while other off-road bikes may be used in the agriculture sector or other off-road non-recreational uses.

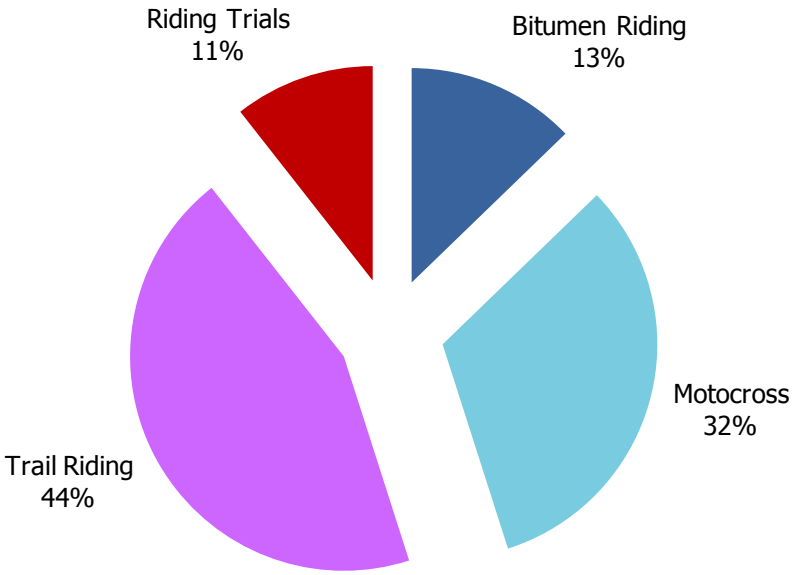
In order to determine the total number of off-road motorcycles used for off-road recreational activities, those off-road motorcycles that are not used for recreational pursuits (e.g. used in agriculture, for commuting to work, etc.) must be discounted. Anecdotal evidence suggests that, whilst varying significantly across regions, approximately 50% of all off-road motorbikes are not used in off-road leisure activities. This is likely to over estimate the number of off-road bikes which are not used in recreational pursuits, and as such is considered a conservative assumption.

On this basis, the total number of off-road motorbikes used in off-road recreational activities in Victoria is estimated to have been 29,306 in 2008.

Participation in Different Off-Road Activities

Based on the rider survey responses, it is possible to identify the types of off-road recreational activities undertaken. The figure below provides a breakdown of the proportion of total riding activities across the four off-road riding pursuits examined in this analysis, including bitumen riding, motocross, trail riding and trials courses.

Figure D.3. Distribution of Recreational Off-Road Riding Activities Undertaken



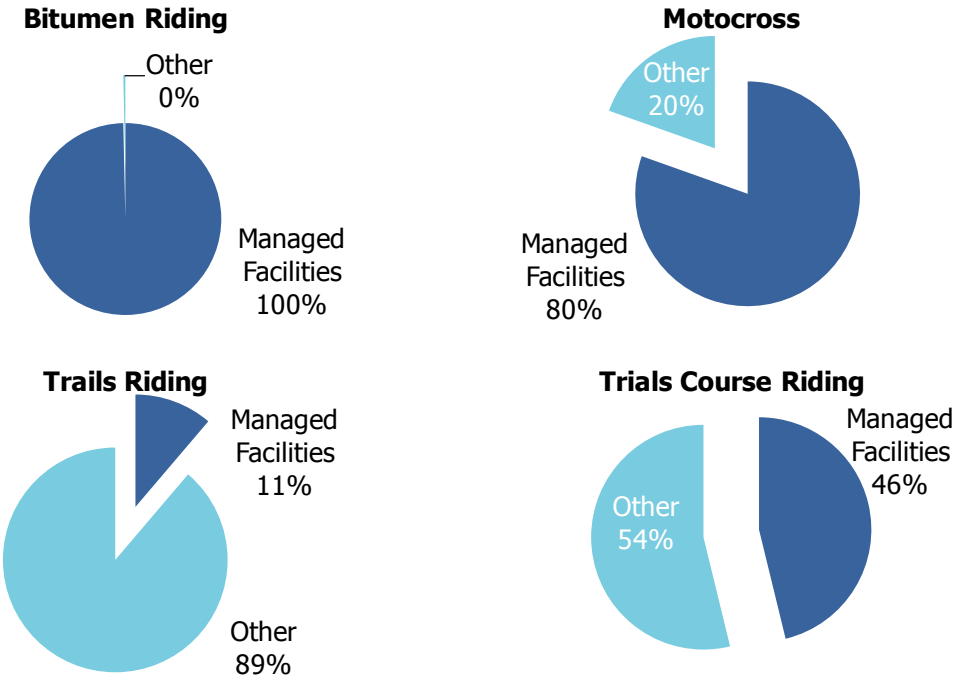
Note: Several respondents undertook more than one off-road riding activity, these results are included as one participant in each activity nominated.
Source: AEC*group*

Trail riding is clearly the most popular activity undertaken and when combined with motocross activities accounts for approximately 76% of all off-road recreational activities. Bitumen riding and riding trials are less widely practised.

Off-Road Recreational Activity Locations

Off-road recreational activities are undertaken in a range of locations. The following figure highlights the distribution of off-road activities between those undertaken at managed facilities and those undertaken elsewhere and is based on findings from the rider survey.

Figure D.4. Location of Off-Road Recreational Activities (Managed Facilities vs Other)



Source: AEC*group*

Bitumen riding and motocross both require a clearly defined circuit, and this is reflected in the relatively high proportion of activities undertaken in managed facilities. However, analysis of the motivations of trails riders identified by Instinct and Reason (2009) highlighted:

> *'… Trail bike riding fulfilled powerful human needs ranging from freedom through to the feeling of being in control. The gratification of these needs by the trail bike riding experience, especially the single track riding experience, was almost complete. It gratified these human needs like almost no other experience!'*

The Instinct and Reason (2009) report found that single track trail bike riding in particular provided riders with a sense of freedom, self indulgence and most powerful of all a sense of control. The findings appear to confirm the rider survey results which show a much lower proportion of riding episodes undertaken within management facilities, where riders must meet the terms and conditions of the facility before being allowed to ride.

The rider survey undertaken for this project was completed predominantly by riders that can be considered "avid riders", with a large proportion indicating they use managed facilities for at least some of their riding activities. This is considered to over represent the off-road recreational riding population, and as such, it is assumed approximately half (50%) of off-road motorbike owners have no desire to use a managed facility for their recreational pursuits regardless of the riding experiences offered.

Riding Frequency

The rider survey indicates that, on average, respondents undertook 43.4 riding activities in the past year. Of the 43.4 riding episodes per rider, the rider survey indicates that the average rider undertook 18.1 (41.7%) riding episodes in a managed facility (with the remainder undertaken outside of a managed facility).

The rider survey was predominantly completed by riders that should be considered as "avid riders". In terms of the average number of riding episodes undertaken per annum, the rider survey is anticipated to over represent the overall rider population. To counter this it is assumed those completing the rider survey undertake approximately double the number of riding episodes per annum than the average rider (21.7 riding episodes per annum, with 9.1 in a managed facility).

The table below outlines the estimated number of riding episodes per annum for the "average" rider (i.e., adjusted for the "avid riders" who were identified as the predominant respondents to the rider survey for this project), distributed by riding pursuit, for all riding episodes as well as those undertaken in a managed facility based on the breakdown of riding location outlined in Figure B.4. Of total riding episodes, 52.6% are estimated to be trail riding episodes and 36.0% motocross riding episodes. Of those riding episodes in a managed facility, 69.3% are estimated to be motocross riding episodes and 14.1% trail riding episodes.

Table D.1. Frequency of Riding Episodes per Annum

Riding Pursuit	Total Riding Episodes		In Managed Facilities	
	Average Riding Episodes Per Rider Per Annum	Proportion of Total (%)	Average Riding Episodes Per Rider Per Annum	Proportion of Total (%)
Bitumen Riding	0.7	3.0%	0.7	7.3%
Motocross	7.8	36.0%	6.3	69.3%
Trails Riding	11.4	52.6%	1.3	14.1%
Trials Course Riding	1.8	8.4%	0.8	9.3%
Total	**21.7**	**100.0%**	**9.1**	**100.0%**

Source: AEC*group*.

Trials course riding and bitumen track riding are estimated to be the least common riding activities at a managed facility, although contribute a greater percentage of riding activities in a managed facility than of total riding activities.

Demand for a New Facility

Potential Facility Locations and Catchment Population

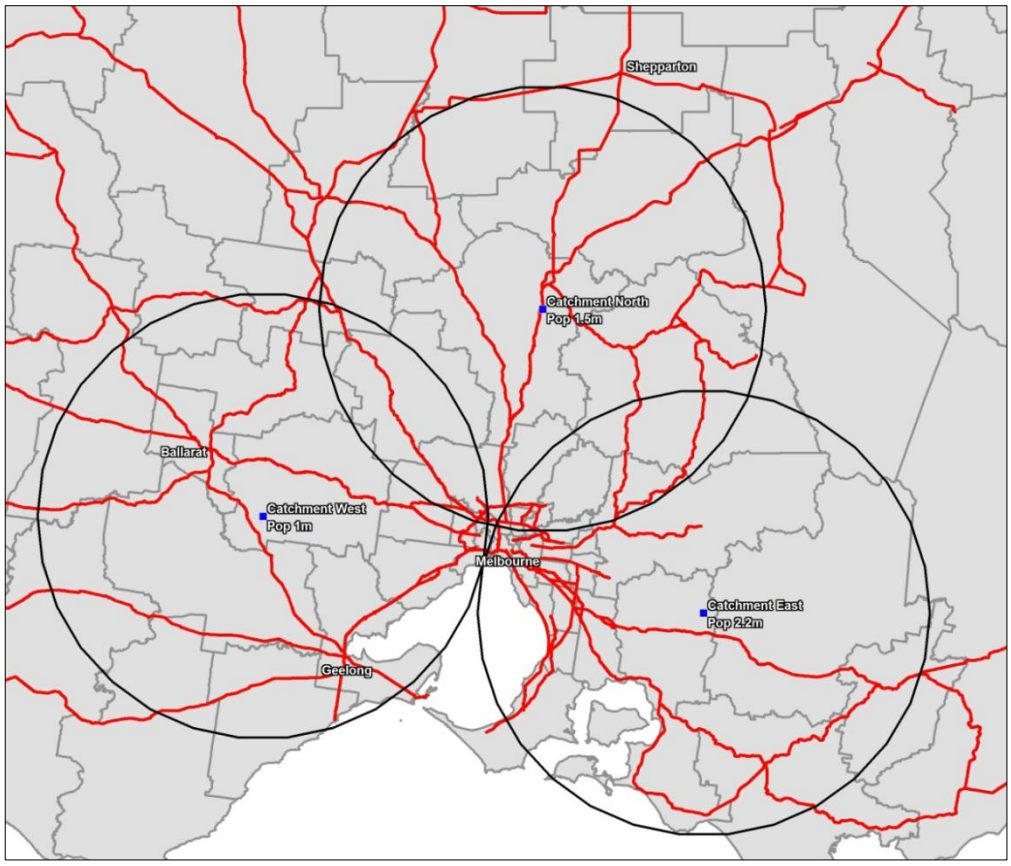
The location of any new facility is likely to be critical to both its safety impact and financial sustainability. Survey respondents identified ease of access as one of the most important features of any new facility. Unless the facility has a national or international reputation, for example Phillip Island, it is unlikely that off-road riders would consider travelling significant distances to access the facility. Almost half of those surveyed believed any new facility in Victoria should be located within one to two hours road travel time of Melbourne.

Of those indicating a new facility should be located near Melbourne, approximately half indicated that east Melbourne would be the preferred location. A further 28.3% of rider survey respondents indicated that facilities are required near Geelong.

This report does not make any comment or recommendations on an actual location for a new facility, rather examines the potential catchment and likelihood of successfully supporting a viable off-road motorcycle managed facility. Location decisions would be the responsibility of a facility owner and influenced by the relevant State, regional and local planning schemes as well as land values and availability.

For the purposes of this analysis, an estimate of the catchment populations surrounding a new facility was developed based on the facility being located on the outskirts of Melbourne. The figure below outlines the estimated population catchments for a facility located 75km east, north and west of Melbourne (catchments based on a 75km radius from the facility location). As can be seen, facilities in these locations serve populations ranging from approximately 1 million (Catchment West) to 2.2 million (Catchment East).

Figure D.5. Estimated Population Catchments for a Facility 75km Outside of Melbourne



Source: AEC*group*.

Based on the above, it is conservatively estimated that a facility on the outskirts of Melbourne could service a population of approximately 1,000,000 people (in 2008) within a one to two hours drive of the facility (or 19.2% of the Victorian population).

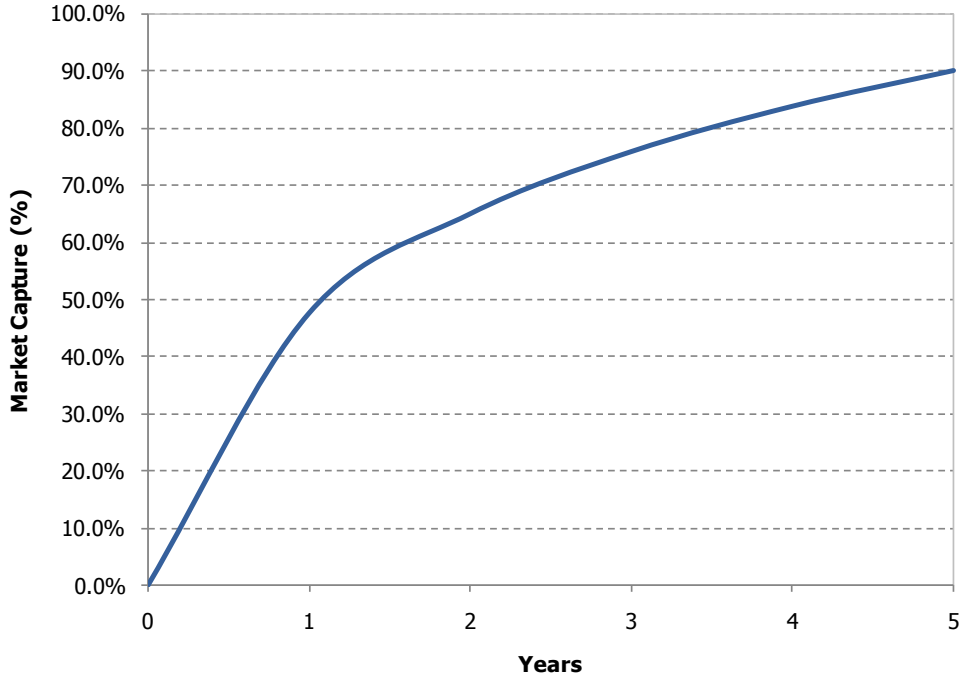
Based on this catchment size, and assuming the same profile of recreational off-road motorbikes per 100 people exhibited by the State, this equates to an estimated 5,630 off-road motorcycles in the catchment that are regularly used for recreational pursuits in 2008. Growth in off-road recreational motorbikes in the catchment is assumed to grow as per the medium growth scenario outlined in Figure D.2. To present a conservative assessment, it has been assumed that the provision of a new off-road motorcycle facility will not result in an increase in overall off-road riding demand in Victoria.

Market Capture of New Facility

Of the 5,630 off-road motorbikes in the catchment in 2008 that are used for recreational purposes, it is assumed that half (50%) of the owners of these motorbikes have no desire to use a managed facility regardless of the riding experiences offered. Of the remaining 50% (2,815 off-road motorbikes), it is assumed that 10% of riding activities that could be undertaken in a managed facility are undertaken at an alternative facility outside the catchment (i.e., the new facility has a maximum market capture of 90% of the potential riding episodes at managed facilities in the catchment).

Demand for the new facility is assumed to take approximately five years to reach maximum market capture, with the growth rate to maximum market capture outlined in the figure below.

Figure D.6. Market Capture Curve for New Facility



Source: AEC*group*.

Riding Frequency at New Facility

The results of the rider survey indicate that respondents would be interested in using a new facility that met their riding experience needs 32.6 times per year on average. As with estimates of riding frequency outlined in Table D.1, it is assumed that respondents to the rider survey are twice as likely to undertake off-road riding activities compared to the "average" rider (16.3 times per year on average).

Where a new facility is designed to meet rider requirements across each of the four main activity types, it is likely that the percentage splits of riding frequency by riding pursuit will shift from that currently identified for existing managed facilities towards the total riding frequency (i.e., including riding undertaken in managed facilities and outside managed facilities). A comparison of the percentage splits of riding activities at managed facilities and in total is provided in the table below (as outlined in Table D.1). The average of these has been used to identify the average number of riding episodes per rider per annum at the new facility.

Table D.2. Riding Frequency at New Facility

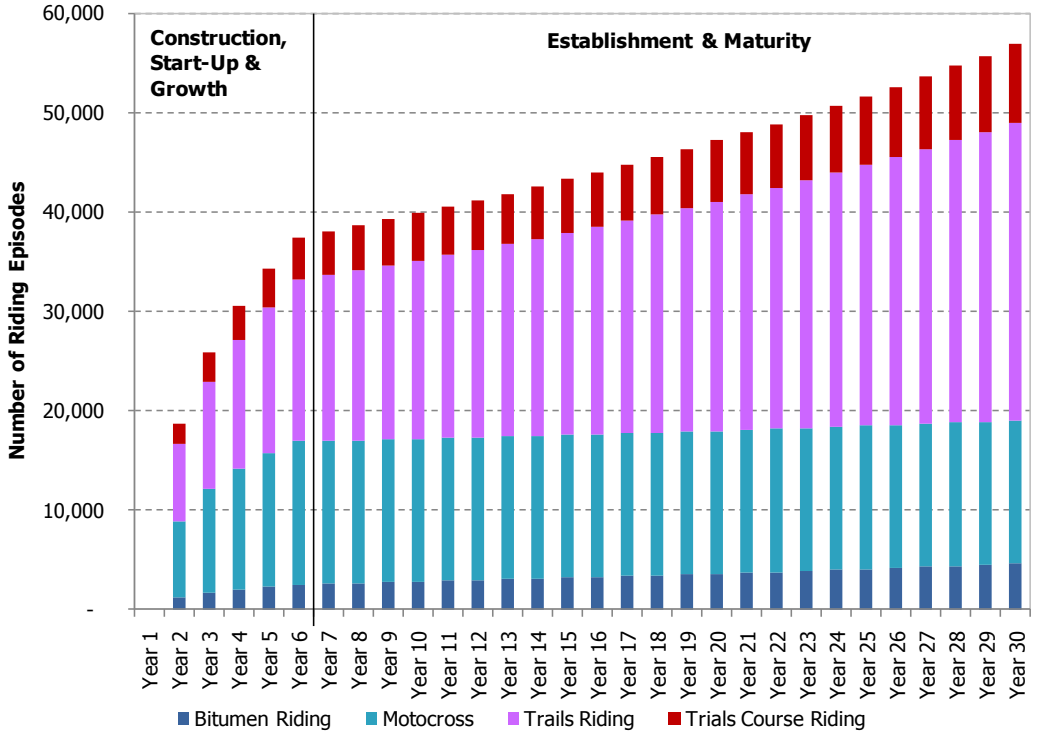
Riding Pursuit	Total Riding Episodes (% of Total)	Managed Facilities (% of Total)	Average (% of Total)	Average Riding Episodes Per Rider Per Annum At New Facility
Bitumen Riding	3.0%	7.3%	5.1%	0.8
Motocross	36.0%	69.3%	52.7%	8.6
Trails Riding	52.6%	14.1%	33.4%	5.4
Trials Course Riding	8.4%	9.3%	8.8%	1.4
Total	**100.0%**	**100.0%**	**100.0%**	**16.3**

Source: AEC*group*.

Estimated Recreational Off-Road Riding Participation at New Facility

Estimates of recreational off-road riding participation at the new managed facility over a 30 year period, including one year for construction, are outlined in the following figure based on the assumptions outlined above. These estimates have been developed in consideration of the maximum track capacities outlined in section 4.3.

Figure D.7. Estimated Off-Road Recreational Riding Episodes Within the New Managed Facility



Source: AEC*group*

The demand estimates outlined in the figure have been used on the feasibility assessment and benefit cost analysis as the base scenario, with sensitivity analysis used to examine the impacts of different demand scenarios.

Appendix E: BCA Methodology

This Appendix outlines the Benefit Cost Analysis (BCA) framework used in this assessment.

Methodology

Overview

A Benefit Cost Analysis (BCA) framework is utilised in this analysis to identify if the benefits delivered by the proposed development of a new managed off-road motorcycle facility are anticipated to outweigh the costs of the development.

BCA is an analytical tool that identifies and attempts to quantify the relative costs and benefits of a project and converts available data into manageable and comparable information units. BCA uses a discounted cash flow (DCF) framework and applies this framework across the entire range of benefits and costs that may accrue as a result of a project to a community or group of stakeholders. The strength of the method is that it provides a framework for analysing complex and sometimes confusing data in a logical and consistent way.

BCA assesses the impact of a development by comparing the "with" and "without" scenarios, and is useful in assessing the net benefits accruing to society as a whole as a result of a project. The BCA method considers the effect of real resource costs and benefits, and excludes, for example, taxes and subsidies, which are regarded as transfer payments from one part of the economy to another.

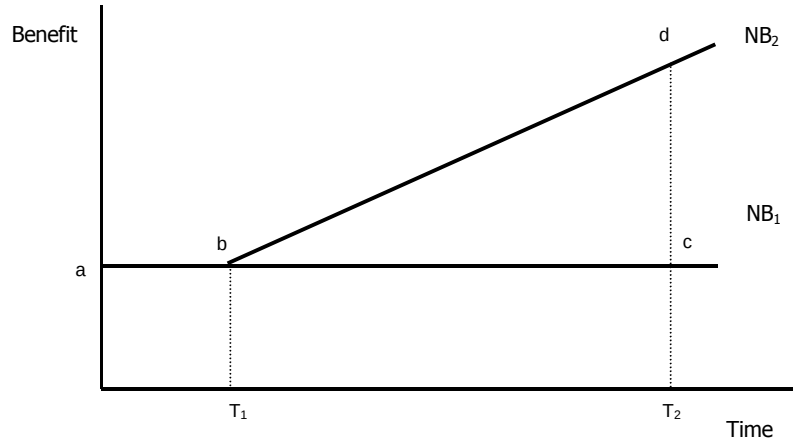
A detailed overview of the steps undertaken in the BCA process is discussed below, and is consistent with accepted BCA methodologies as outlined in Campbell and Brown (2003), Sinden and Thampapillai (1995), Australian Government Department of Finance and Administration (2006) and Queensland Government Department of Infrastructure and Planning (2008).

Step 1: Define the Scope and Boundary

To enable a robust determination of the net benefits of undertaking a given project, it is necessary to specify base case and alternative case scenarios. The base case scenario represents the "without project" scenario and the alternative or "with project" scenario examines the impact with the project in place.

The base case (without) scenario is represented by line NB_1 (bc) over time T_1 to T_2 in the figure below. The investment in the project at time T_1 is likely to generate a benefit, which is represented by line NB_2 (bd). Therefore the net benefit flowing from investment in the project is identified by calculating the area (bcd) between NB_1 and NB_2.

Figure E.1. With and Without Scenarios



Source: AEC*group*

In this assessment the BCA is conducted over a 30 year time frame. 30 years has been selected as the generally acceptable point at which future flows of benefits and costs approximate zero due to discounting.

Step 2: Identify Costs and Benefits

A comprehensive quantitative specification of the benefits and costs included in the evaluation and their various timings is required and includes a clear outline of all major underlying assumptions. These impacts both positive and negative are then tabulated and where possible valued in dollar terms.

Some impacts may not be quantifiable. Where this occurs the impacts and their respective magnitudes will be examined qualitatively for consideration in the overall analysis.

Financing costs are not included in a BCA. As a method of project appraisal, BCA examines a project's profitability independently of the terms on which debt finance is arranged. This does not mean, however, that the cost of capital is not considered in BCA, as the capital expenses are included in the year in which the transaction occurs, and the discount rate (discussed below in Step 5) should be selected to provide a good indication of the opportunity cost of funds, as determined by the capital market.

Step 3: Quantify and Value Costs and Benefits

BCA attempts to measure the value of all costs and benefits that are expected to result from the activity in economic terms. It includes estimating costs and benefits that are 'unpriced' and not the subject of normal market transactions but which nevertheless entail the use of real resources. These attributes are referred to as 'non-market' goods or impacts. In each of these cases, quantification of the effects in money terms is an important part of the evaluation.

However, projects frequently offer non-market benefits and costs that can be difficult to quantify. Where the impact does not have a readily identifiable dollar value, proxies and other measures should be developed as these issues represent real costs and benefits. Some commonly utilised techniques for valuing non-market impacts are outlined in the table below.

Table E.1. Valuation Techniques

Type of Valuation	Valuation Technique	Description
Stated Preference Valuation	Contingent Valuation (CVM)	This technique uses a simulated or hypothetical market to directly assess the willingness to pay (WTP) or the willingness to accept compensation (WTAC) for a particular environmental outcome. The survey-based approach can be used to measure both use and non-use values, and is generally applied in assessing a dollar value to a change in or preservation of environmental quality.
	Choice Modelling (CM)	Similar to CVM, choice modelling (CM) utilises stated preferences of respondents to rank or rate different scenarios. Respondents must choose between specific options presented to them. CM can produce independent values for the specific attributes of an environmental program.
Revealed Preference Valuation (surrogate market based)	Hedonic Pricing	Hedonic pricing employs the use of surrogate markets to value environmental quality. Property and labour markets are widely used for this technique.
	Travel Cost	This valuation technique is based on the assumption that demand for an asset is revealed by a willingness to spend money and time travelling to the particular site. It is also assumed that expenditure is higher for travel to more valuable sites. This methodology is best used in assessing amenity or recreational value.
Revealed Preference Valuation (market based)	Factor of Production	The factor of production technique is limited to assets that are used in the production process of goods and services within the market, as it uses the direct value in production as an indicator of the environmental worth.
	Producer/ Consumer surplus	This technique is a calculation of both producer and consumer surplus.
	Defensive Expenditure	This valuation technique is based on expenditure that is made on behalf of the public or specific industry in prevention or counteraction of environmental damage (such as pollution).

One commonly used method of approximating values for non-market impacts is 'benefit transfer'. Benefit transfer (BT) means taking already calculated values from previously conducted studies and applying them to different study sites and situations. In light of the significant costs and technical skills needed in using the methodologies outlined in the table above, for many policy makers utilising BT techniques can provide an adequate solution.

Context is extremely important when deciding which values to transfer and from where. Factors such as population, number of households, and regional characteristics should be considered when undertaking benefit transfer. For example, as population density increases over time, individual households may value nearby open space and parks more highly. Other factors to be considered include, depending on the location of the original study, utilising foreign exchange rates, demographic data, and respective inflation rates.

Benefit transfer should only be regarded as an approximation. Transferring values from similar regions with similar markets is important, and results can be misleading if values are transferred between countries that have starkly different economies (for example a benefit transfer from the Solomon Islands to Vancouver would likely provide limited accuracy of results). However, sometimes only an indicative value for environmental assets is all that is required.

Step 4: Tabulate Annual Costs and Benefits

All identified and quantified benefits and costs are tabulated to identify where and how often they occur. Tabulation provides an easy method for checking that all the issues and outcomes identified have been addressed and provides a picture of the flow of costs, benefits and their sources.

Step 5: Calculate the Net Benefit in Dollar Terms

As costs and benefits are specified over time it is necessary to reduce the stream of benefits and costs to present values. The present value concept is based on the time value of money – the idea that a dollar received today is worth more than a dollar to be received in the future. The present value of a cash flow is the value today that is equivalent to a cash flow in the future. The time value of money is determined by the given discount rate to enable the comparison of options by a common measure.

The selection of appropriate discount rates is of particular importance because they apply to much of the decision criteria and consequently the interpretation of results. The higher the discount rate, the less weight or importance is placed on future cash flows.

The choice of discount rates should reflect the weighted average cost of capital (WACC). For this analysis, a base discount rate of 10.0% has been used to represent the minimum commercial rate of return. As all values used in the BCA are in real terms (i.e., in 2009 dollar values), the discount rate does not incorporate inflation (i.e., it is a real discount rate, as opposed to a nominal discount rate).

It could be argued, however, that an off-road motorcycle facility should be assessed at a lower discount rate to better reflect the longer term social benefits generated by the facility rather than the short term commercial returns. Conversely, as an off-road motorcycle facility may require considerable private sector investment, it could be argued that a higher discount rate should be used to better reflect the risk involved and commercial rates of return required by the private sector.

To assess the sensitivity of the project to the discount rate used, one discount rate either side of the base discount rate (10.0%) has also been examined (7.5% and 12.5%).

The formula for determining the present value is:

$$PV = \frac{FV_n}{(1+r)^n}$$

Where:

PV = present value today

FV = future value n periods from now

r = discount rate per period

n = number of periods

Extending this to a series of cash flows the present value is calculated as:

$$PV = \frac{FV_1}{(1+r)^1} + \frac{FV_2}{(1+r)^2} + \cdots + \frac{FV_n}{(1+r)^n}$$

Once the stream of costs and benefits have been reduced to their present values the Net Present Value (NPV) can be calculated as the difference between the present value of benefits and present value of costs. If the present value of benefits is greater than the present value of costs then the option or project would have a net economic benefit.

In addition to the NPV, the internal rate of return (IRR) and benefit-cost ratio (BCR) can provide useful information regarding the attractiveness of a project. The IRR provides an estimate of the discount rate at which the NPV of the project equals zero, i.e., it represents the maximum WACC at which the project would be deemed desirable. However, in terms of whether a project is considered desirable or not, the IRR will always return the same result as the NPV decision criterion.

Because the NPV can result from the combination of any magnitude of revenues and costs it is not all that useful when comparing projects, particularly where projects are mutually exclusive. A useful measure to use to compare between two different projects is the benefit cost ratio (BCR). The BCR is calculated by dividing the present value of revenues (benefits) by the present value of costs. If the resulting BCR is greater than one (1) then the project has a net benefit. The higher the BCR the greater the quantified benefits compared to the quantified costs.

As this report is not examining competing projects, the NPV has been used as the decision rule on whether an off-road motorcycle facility should be considered desirable.

Step 6: Senstivity Analysis

Sensitivity analysis allows for the testing of the key assumptions and the identification of the critical variables within the analysis to gain greater insight into the drivers to the case being examined.

For this project, sensitivity analysis has been conducted by examining the change in NPV and BCR as a result of a variance in key inputs, *ceteris paribus* (i.e., assuming that all other key inputs to the BCA remain as per the base analysis).

Appendix F: BCA of Commercial Viability

This Appendix outlines the attractiveness of developing an off-road recreational motorcycle facility from the perspective of the facility operator using a BCA framework.

Method/ Approach

A BCA was undertaken to assess the expected viability of developing a new managed off-road motorcycle facility from the point of view of the facility operator. The assessment of the viability differed from the BCA presented in Chapter 6 in that it only includes those benefits and costs that will accrue to those developing and operating such a facility (i.e., does not include impacts to the external community).

It should be noted that this is a generic case developed to identify and assess the range of benefits and costs associated with the development of such a facility and that VicRoads does not intend on developing said facility.

A detailed description of the methodology applied in the BCA is provided in **Appendix E**.

Key assumptions behind the development of the BCA include:

- The planning period is 30 years due to the impact of discounting on values beyond this time scale; and
- All values are expressed in 2009 dollars.

Decision Criteria:

The Net Present Value (NPV) and Benefit Cost Ratio (BCR) will be the primary decision criteria for the BCA. The NPV of a project expresses the difference between the present value (PV) of future benefits and PV of future costs, i.e.: NPV = PV (Benefits) – PV (Costs). The BCR of a project is calculated by dividing the PV of benefits by the PV of costs.

Where the BCA results in a:

- Positive NPV and BCR above 1: the development of a new managed off-road motorcycle facility will be deemed as being desirable.
- NPV equal to zero and BCR of 1: the development of a new off-road motorcycle managed facility will be deemed as being neutral (i.e., neither desirable nor undesirable).
- Negative NPV and BCR of less than 1: the development of a new off-road motorcycle managed facility will be deemed undesirable.

Model Drivers

The BCA of commercial viability uses the facility specifications and the demand estimates set out in Chapter 4 and Chapter 5 to assess the feasibility of a new managed off-road motorcycle facility. These model drivers are summarised below.

Rider Demand Drivers

Rider demand for the new facility has been set out in section 5.3. This estimated rider demand for the new facility has been used in the BCA of commercial viability.

Benefit Drivers

The following benefit drivers are used as outlined in Chapter 5:

- An average rider charge (including some combination of entry charges and membership fees) of $40 each time a rider enters the facility;
- Retail revenues of $12.50 per rider entering the facility;
- Surplus from hosting events of $30,000 per annum; and

- Camping fees of $15 per night stayed, with 2% of visitors assumed to stay overnight with an average length of stay of two nights.

Cost Drivers

The following cost drivers have been used as outlined in Chapter 5:

- Initial construction cost of $14.1 million. As noted in **Appendix E**, BCA does not include financing cash flows, but rather assesses the profitability of a project irrespective of the way in which the project is funded. As such, the construction cost is included as an upfront expenditure in the first year of the analysis;
- The facility will begin operations in the second year of the analysis, with the following operating expenses:
  - Fixed operating costs of $666,800 per annum; and
  - Variable operating costs of $6.69 per rider entering the facility.

Results

Present Value of Benefits

The table below outlines the present value (PV) of the identified revenues associated with the development and operation of a new managed off-road motorcycle facility at discount rates of 7.5%, 10.0% and 12.5%.

The PV of total revenues is estimated to be approximately $15.7 million at a discount rate of 10.0%, with rider revenues (including entry charges and membership fees) contributing over 70% of total benefits, at $11.6 million.

Table F.2. Present Value of Benefits of a New Managed Off-Road Motorcycle Facility

Revenue	PV ($M) – Discount Rate		
	7.5%	10.0%	12.5%
Rider Revenues (Entry & Membership)	$15.1	$11.6	$9.3
Retail Revenues	$4.7	$3.6	$2.9
Event Surplus	$0.4	$0.3	$0.2
Camping Revenues	$0.2	$0.2	$0.1
Total Revenues	**$20.3**	**$15.7**	**$12.6**

Note: Totals may not sum due to rounding.
Source: AEC*group*.

Present Value of Costs

The table below outlines the present value (PV) of the identified costs associated with the development and operation of a new managed off-road motorcycle facility at discount rates of 7.5%, 10.0% and 12.5%.

The PV of total costs over the 30-year analysis is estimated to total approximately $22.2 million at a discount rate of 10.0%, with the initial capital cost of $14.1 million comprising the largest component of total costs, followed by fixed operating costs ($6.2 million at a 10.0% discount rate).

Table F.1. Present Value of Costs of a New Managed Off-Road Motorcycle Facility

Cost	PV ($M) – Discount Rate		
	7.5%	10.0%	12.5%
Initial Capital Costs	$14.1	$14.1	$14.1
Fixed Operating Costs	$7.8	$6.2	$5.2
Variable Operating Costs	$2.4	$1.9	$1.5
Total Costs	**$24.3**	**$22.2**	**$20.8**

Note: Totals may not sum due to rounding.
Source: AEC*group*.

Summary

Assuming a discount rate of 10.0%, the Net Present Value (NPV) of a new managed off-road motorcycle facility is estimated to be negative $6.5 million, with a benefit to cost ratio (BCR) of 0.71, which implies a return, in present value terms, of $0.71 for each dollar invested. The NPV of a new facility (at a 10.0% discount rate) is comprised of:

- A PV of benefits of $15.7 million; and
- A PV of costs of $22.2 million.

The NPV to the facility operator is negative across each of the discount rates used. This is reflective of the relatively high capital cost of the facility in the first year and extended timeframe of revenues from the facility into the future.

Table F.3. NPV and BCR of a New Managed Off-Road Motorcycle Facility in Victoria

Real Discount Rate	PV of Benefits ($M)	PV of Costs ($M)	Total NPV ($M)	BCR
7.5%	$20.3	$24.3	-$4.0	0.84
10.0%	$15.7	$22.2	-$6.5	0.71
12.5%	$12.6	$20.8	-$8.2	0.60

Note: Totals may not sum due to rounding.
Source: AEC*group*.

As the NPV is negative across all discount rates used, the BCA identifies the development of a new managed off-road motorcycle facility is **undesirable** with the PV of costs outweighing the PV of revenues. The internal rate of return (IRR) for the project is estimated to be 4.9%, which reflects the maximum discount rate (or WACC) at which the project would be deemed desirable. That is, if a developers borrowing rate and risk margin exceeds 4.9% then they should not proceed with the development. The minimum rate of return acceptable to a private developer is likely to be between 10% and 12.5%, suggesting that an off-road motorcycle facility is unlikely to be a commercially attractive investment.

Sensitivity Analysis

There are three key inputs used in the BCA of commercial viability that have been tested for their influence on the model:

- Purchase of land for $7.5 million;
- Charges levied on riders (average rider charges) at the new managed facility (including per use entry charges and annual membership fees); and
- Demand for the new managed facility (in terms of riders and riding episodes per annum).

Sensitivity assessment of these key inputs has been conducted across a range of input values at a discount rate of 10.0%. Findings from the sensitivity assessment are provided in the sub-sections below.

Purchase of Land

The base assumption used in the BCA is that the land in which the new off-road motorcycle facility is developed is purchased for $7.5 million. The table below examines the impact on the results of the BCA if the land used is either "gifted" or "donated" for the development of the facility (i.e., there is no associated cost to the developer from the purchase of land).

As the table shows, the "donation" of the land for use as an off-road motorcycle facility would significantly improve the profitability of the project, with the NPV becoming positive ($1.0 million) and the BCR increasing to 1.07. Additionally, the IRR of the development excluding the purchase of land increases from 4.9% to 11.3%.

Table F.4. Sensitivity Analysis of Purchase of Land

Purchase of Land	PV of Benefits ($M)	PV of Costs ($M)	Total NPV ($M)	BCR
Land Purchased	$15.7	$22.2	-$6.5	0.71
Land "Donated"	$15.7	$14.7	$1.0	1.07

Note: Totals may not sum due to rounding.
Source: AEC*group*.

Rider Charges

Based on the findings of the rider survey and a comparison to other managed off-road motorcycle facilities it is estimated that the new facility would aim to recover an average of approximately $40 per rider entering the facility, through some combination of entry charges and membership fees.

The table below provides a summary of the sensitivity analysis from a variation in rider charges (i.e., from $20 through to $75 on average recovered from each rider through some combination of entry charges and membership fees).

An increase in rider charges to $75 would result in a positive NPV and BCR of above one assuming demand for the facility were as per that used in the base analysis. The breakeven rider charge (i.e., the rider charge that returns an NPV of $0 and a BCR of 1) is calculated to be $62. As outlined in section 6.4, it is considered extremely unlikely that an increase in rider charges of this magnitude would correspond with the level of demand assumed in the base analysis.

Table F.5. Sensitivity Analysis of Average Rider Charges (Entry Charge + Membership)

Rider Charges	PV of Benefits ($M)	PV of Costs ($M)	Total NPV ($M)	BCR
$20	$9.9	$22.2	-$12.3	0.45
$30	$12.8	$22.2	-$9.4	0.58
$40	$15.7	$22.2	-$6.5	0.71
$50	$18.6	$22.2	-$3.6	0.84
$60	$21.5	$22.2	-$0.7	0.97
$75	$25.9	$22.2	$3.7	1.16

Note: Totals may not sum due to rounding.
Source: AEC*group*.

Demand for the New Managed Facility

The assumed demand profile for the new managed facility is outlined in section 5.3, and is based on estimates of the number of off-road motorcycles available in the catchment that are used at managed facilities and the number of riding episodes per rider based on the findings from the rider survey.

The assessment has been conservative in the estimate of the number of potential riding episodes at the new facility, and there is limited data and information available to provide a high degree of certainty regarding the number that may actually occur.

Sensitivity analysis was conducted for variations in demand for the new facility ranging from 50% to 200% of that used in the base analysis. The table below provides a summary of the sensitivity analysis from a variation in demand and shows that at demand of 150% of that used in the base analysis the new facility would still return a negative NPV and BCR of less than one. The breakeven demand is calculated to be 175% of that used in the base analysis.

Table F.6. Sensitivity Analysis of Demand for the New Managed Facility

% Change in Demand	PV of Benefits ($M)	PV of Costs ($M)	Total NPV ($M)	BCR
50%	$10.4	$21.6	-$11.2	0.48
75%	$13.2	$21.9	-$8.7	0.60
100%	$15.7	$22.2	-$6.5	0.71
150%	$20.7	$22.8	-$2.1	0.91
200%	$25.6	$23.4	$2.2	1.09

Note: Totals may not sum due to rounding.
Source: AEC*group*.

Appendix G: Financial Analysis

Method/ Approach

An analysis of financial flows has been undertaken to examine the operational viability of the project from the standpoint of an investor's equity capital (i.e., can the project generate sufficient short term cash revenues to cover start-up and operating expenses, including financing). The financial modelling undertaken in this section applies similar principles as those used in the BCA of commercial viability, with the exception that:

- All cash inflows and outflows of the investor are used, including assumptions regarding debt financing such as disbursements and loan repayments. As with the BCA, the financial modelling is undertaken pre-tax, so tax assumptions have not been incorporated; and
- Cash flows are not discounted.

An analysis of financial flows provides useful information regarding an investment's profitability on an annual basis, as well as the time requirement for an investment to breakeven (i.e., the point in time in which the sum of all revenues equals the sum of all costs).

Model Drivers

The financial analysis uses the facility specifications and the demand estimates set out in Chapter 4 and Chapter 5 to assess the financial position of a new managed off-road motorcycle facility over ten years. These model drivers are summarised below.

Two scenarios have been examined:

- **Scenario 1: The Base Case Including Land Purchase Cost**: Examines the financial flows associated with the development and operation of the new managed facility examined in Chapter 5, with the rider demand scenario outlined in section 5.3; and
- **Scenario 2: Excluding Land Purchase Costs**: This alternative scenario examines the financial viability of the new managed facility using the same assumptions as used in the base case, with the exception of land costs which are assumed to be zero (as compared to $7.5 million in the base case).

Rider Demand Drivers

Rider demand for the new facility has been set out in section 5.3. The estimated rider demand for the first ten years for the new facility has been used in the financial analysis.

Benefit Drivers

The following benefit drivers are used as outlined in Chapter 5:

- An average rider charge (including some combination of entry charges and membership fees) of $40 each time a rider enters the facility. This includes any revenues from those riders paying for and receiving coaching and training;
- Retail revenues of $12.50 per rider entering the facility;
- Surplus from hosting events of $30,000 per annum; and
- Camping fees of $15 per night stayed, with 2% of visitors assumed to stay overnight and an average length of stay of two nights.

Cost Drivers

The following cost drivers have been used as outlined in Chapter 5:

- It has been assumed the facility owner borrows 100% of the capital costs of the facility ($14.1 million in Scenario 1, $6.6 million in Scenario 2), and would do so over

a ten year term at an interest rate of 8.0%. This equates to an annual principal and interest repayment of approximately:

- $2.1 million in Scenario 1; and
- $965,000 in Scenario 2.

- The facility will begin operations in the second year of the analysis, with the following operating expenses:
  - Fixed operating costs of $666,800 per annum; and
  - Variable operating costs of $6.69 per rider entering the facility.

Results

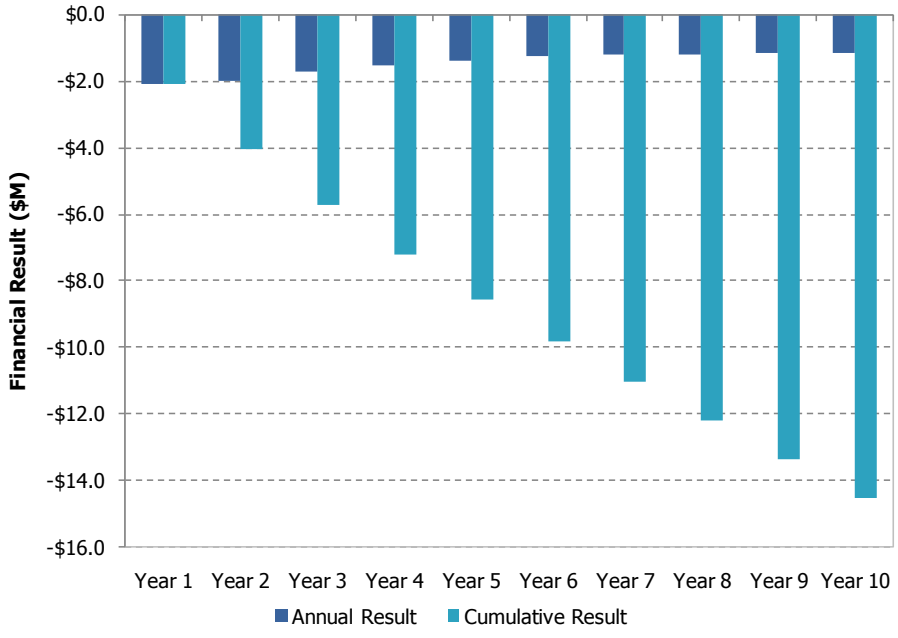
This section provides an overview of the financial analysis results for Scenario 1 and Scenario 2, including annual costs, annual revenues, the overall annual financial position, and the cumulative financial position in each year over a ten-year period.

Scenario 1: The Base Case Including Land Purchase Costs

Financial Result of Scenario 1

The figure below outlines the annual and cumulative financial result over the 10-year period where an investor uses 100% finance to purchase the land and construct a new off-road riding facility. As can be seen, where an investor uses 100% finance to purchase the land and construct the new off-road riding facility, the annual financial position will be negative over the entire 10-year repayment period, with the cumulative financial position peaking at negative $14.5 million in the tenth year. This is indicative of the considerable start-up costs involved in developing the facility, in particular the purchase of land.

Figure G.1. Ten-Year Financial Result for the New Managed Facility, Scenario 1

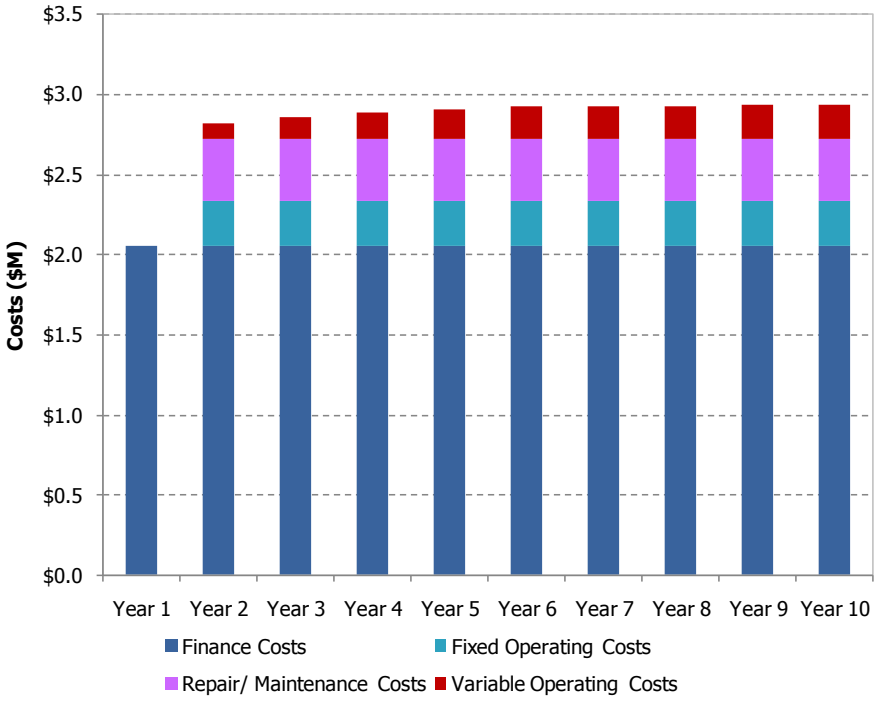


Source: AEC*group*

The annual and cumulative financial result depicted above is based on the following annual cost and revenue streams.

Figure G.2 below depicts the expected cost structure for the new managed facility over a 10-year period based on the assumptions and information presented in Chapter 5. This cost structure includes financing costs for the entire $14.1 million construction and development, with an assumed loan period of 10 years and an interest rate of 8.0%.

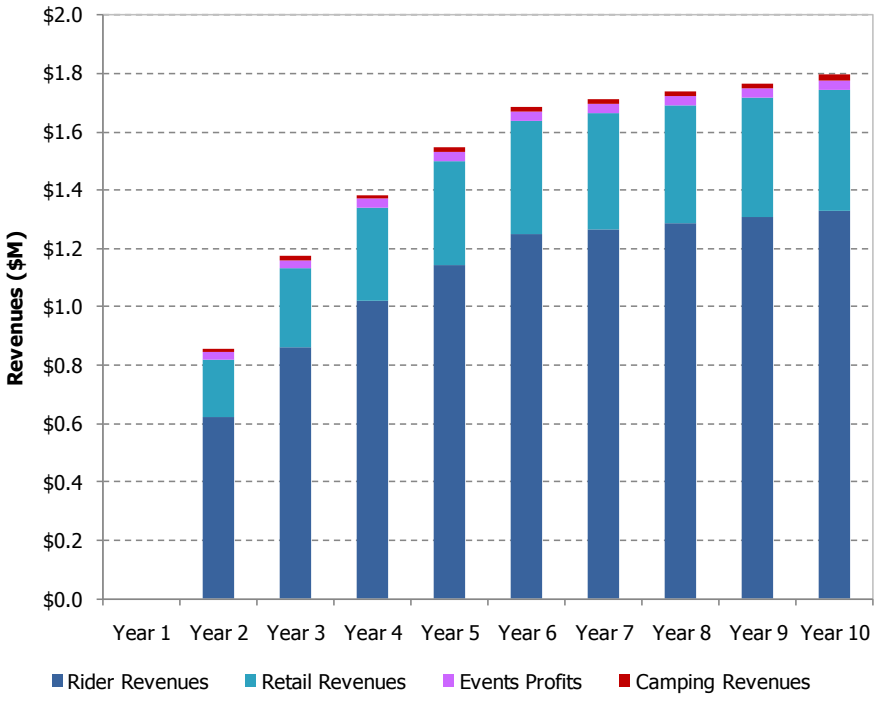
Figure G.2. Annual Costs Associated with the New Managed Facility, Scenario 1



Source: AEC*group*

Figure G.3 outlines the anticipated revenues associated with the development of the new managed facility over a 10-year period based on the assumptions and information presented in Chapter 5.

Figure G.3. Annual Revenues Associated with the New Managed Facility, Scenario 1



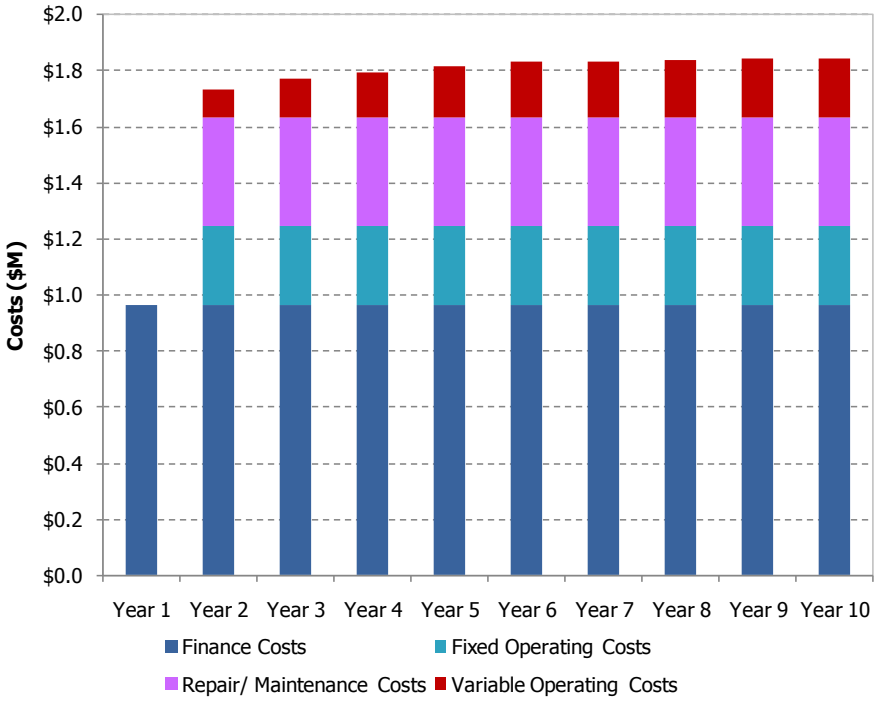
Source: AEC*group*

Scenario 2: Excluding Land Purchase Costs

Financial Result of Scenario 2

If the cost of the land is excluded from the assessment (for example, if the land were to be "gifted" for use as an off-road motorcycle facility), which accounts for over half of the initial capital expense for the development of the facility, the cost structure for the facility is changed considerably, as outlined in the figure below. The exclusion of the cost of land would have no bearing on the revenues received.

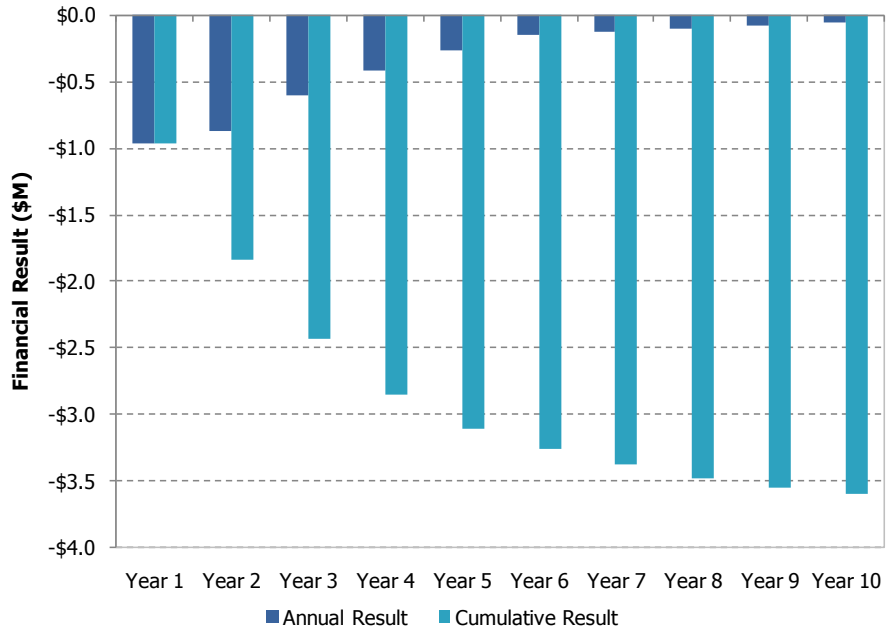
Figure G.4. Annual Costs Associated with the New Managed Facility, Scenario 2



Source: AEC*group*

The figure below shows that the exclusion of land costs would still result in the new facility reporting a negative annual financial position over the entire 10-year repayment period, with the cumulative financial position peaking at negative $3.6 million in the tenth year. Of note, the annual financial result also remains negative over the entire 10-year repayment period, indicating that revenues generated by the facility are less than the combination of ongoing operating expenses and annual loan repayments over this period.

Figure G.5. Ten-Year Financial Result for the New Managed Facility, Scenario 2



Source: AEC*group*

The financial analysis suggests that a new off-road motorcycle facility is not likely to be commercially viable, with annual revenues estimated to be insufficient to offset ongoing operating expenses and returns on capital even where initial land costs are excluded. As such, even if the development of an off-road motorcycle facility were considered desirable from a wider community perspective, it would probably need to be undertaken by a not-for-profit organisation.

Appendix H: BCA of Facility Excluding Trail Bike Riding

This Appendix examines the net benefit of providing an off-road motorcycle facility that does not include an area for trail bike riding.

Facility Specification

Trail bike riding requires expansive areas of land to provide sufficient interest to attract riders. Where a new managed facility is developed that does not provide a trail bike riding area, a considerably smaller area of land would be required than that identified in the base scenario. Assuming a facility similar in size to Broadford, the land requirement could be reduced from the 500 hectares used in the base scenario to approximately 100 hectares accommodating bitumen track riding, motocross tracks, trials course riding and a minibike area.

Excluding trail bike riding removes the requirement for expenditure on developing suitable tracks, and will result in a reduction in overall rider demand for the facility. With fewer riders entering the facility, the number of car park spaces, area available for camping and change room requirements are all assumed to be lower than that used in the base case.

Facility Costs & Revenues

Costs

Establishment Costs

The table below outlines the assumed facility requirements and capital costs for a facility that does not provide trail bike riding.

Table H.1. Facility Establishment Costs Excluding Trail Bike Riding

Item	Units		Unit Cost	Total Cost
Land Purchase (site located within 75km radius of Melbourne)	Ha	100	$15,000	$1,500,000
Preliminary Earthworks	Ha	50	$2,660	$133,000
Bitumen Track	sqm	30,000	$50	$1,500,000
Motocross Track	sqm	24,000	$15	$360,000
Trials Course	sqm	2,500	$20	$50,000
Minibike	sqm	1,000	$15	$15,000
Car Parks (open, unpaved area with drainage)	cars	100	$540	$54,000
Internal Roads (paved)	sqm	4,000	$20	$80,000
Camp Ground (cleared, leveled and landscaped)	sqm	250	$20	$5,000
Administration Building	sqm	100	$2,120	$212,000
First Aid Facility	sqm	50	$2,120	$106,000
Public Toilets	sqm	40	$4,420	$176,800
Club House & Changing Rooms	People	100	$2,215	$221,500
Viewing Area (single-tier stepped deck)	People	100	$785	$78,500
Retail Building	sqm	100	$660	$66,000
Machinery Shed	sqm	200	$195	$39,000
Testing Area (bitumen)	sqm	200	$50	$10,040
Track Maintenance & Service Equipment	Vehicles	1	$150,000	$150,000
Professional Fees	10%			$475,684
Contingency	10%			$523,252
Total				**$5,755,776**

Source: Rawlinsons (2009).

Operating Costs

Fixed Operating Costs

Fixed operating costs for the above specified off-road motorcycle facility are assumed to be equivalent to those outlined in section 5.1.3.1, with the exception of repair/ maintenance costs. The $150,000 assumed in the base scenario for repair and maintenance of the trail riding route would not be required, resulting in a total fixed operating cost of approximately $516,800.

Variable Operating Costs

Variable costs are assumed to be the same as outlined in section 5.1.3.2.

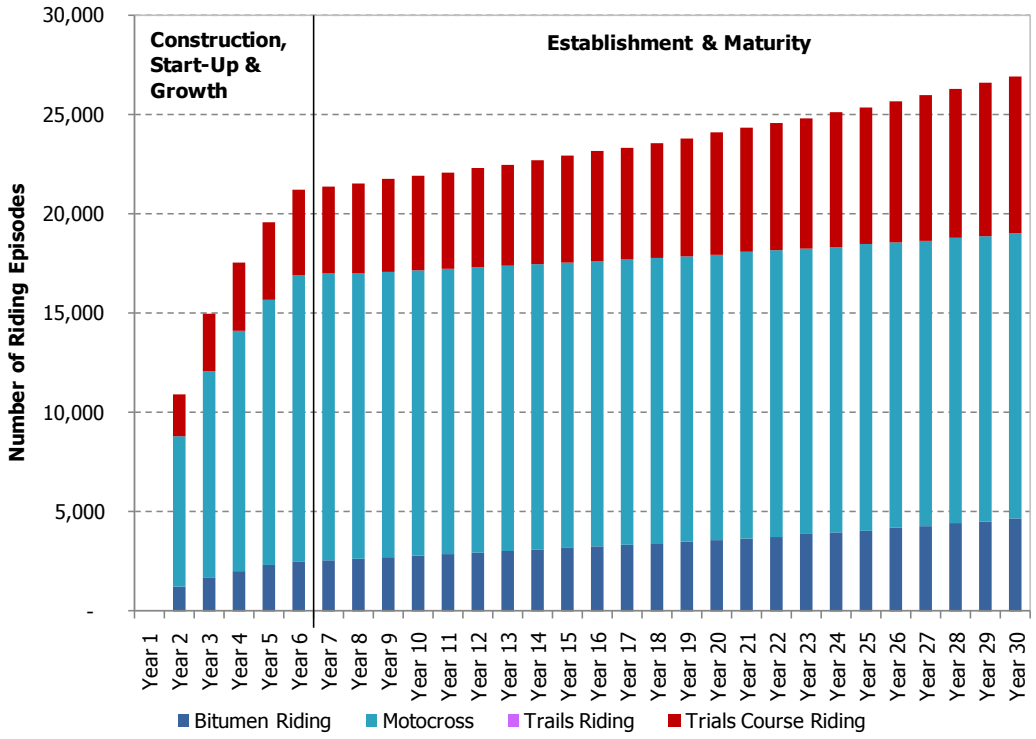
Revenues

Revenues per rider are assumed to be the same as outlined in section 5.2.

Rider Demand

Rider demand for bitumen track, motocross and trials course riding are assumed to be the same as in the base scenario, but demand for trails riding has been excluded. This is depicted in the figure below.

Figure H.1. Estimated Off-Road Recreational Riding Episodes Within the New Managed Facility, Excluding Trail Bike Riding



Source: AEC*group*.

BCA Results

Present Value of Benefits

The table below outlines the present value (PV) of the identified benefits associated with the development and operation of a new managed off-road motorcycle facility in Victoria at discount rates of 7.5%, 10.0% and 12.5%.

Table H.3. Present Value of Benefits of a New Managed Off-Road Motorcycle Facility, Excluding Trail Bike Riding

Benefit	PV ($M) – Discount Rate		
	7.5%	10.0%	12.5%
Facility Benefits			
Rider Revenues (Entry & Membership)	$8.1	$6.3	$5.1
Retail Revenues	$2.5	$2.0	$1.6
Event Surplus	$0.4	$0.3	$0.2
Camping Revenues	$0.1	$0.1	$0.1
Total Facility Benefits	*$11.1*	*$8.7*	*$7.0*
External Community Benefits			
Construction Value Added Activity	$1.1	$1.1	$1.1
Professional Services Value Added Activity	$0.2	$0.2	$0.2
Employee Compensation	$2.7	$2.2	$1.8
Avoided Costs from Crashes (through improved safety)	N/a	N/a	N/a
Avoided Social Costs of Noise Disturbance	N/a	N/a	N/a
Avoided Costs of Open Space Conflicts	N/a	N/a	N/a
Reduced Degradation of Natural Habitat	N/a	N/a	N/a
Total External Community Benefits	*$4.1*	*$3.5*	*$3.1*
Total Benefits	**$15.2**	**$12.2**	**$10.1**

Note: Totals may not sum due to rounding.
Source: AEC*group*.

Present Value of Costs

The table below outlines the present value (PV) of the identified costs associated with the development and operation of a new managed off-road motorcycle facility in Victoria at discount rates of 7.5%, 10.0% and 12.5%.

Table H.2. Present Value of Costs of a New Managed Off-Road Motorcycle Facility, Excluding Trail Bike Riding

Cost	PV ($M) – Discount Rate		
	7.5%	10.0%	12.5%
Facility Costs			
Initial Capital Costs	$5.8	$5.8	$5.8
Fixed Operating Costs	$6.0	$4.8	$4.0
Variable Operating Costs	$1.3	$1.0	$0.8
Total Facility Costs	*$13.1*	*$11.6*	*$10.6*
External Community Costs			
Lost Retail Revenues from Elsewhere in Victoria	$2.5	$2.0	$1.6
Lost Rider Revenues at Other Managed Facilities	$2.2	$1.7	$1.3
Total External Community Costs	*$4.7*	*$3.6*	*$2.9*
Total Costs	**$17.8**	**$15.3**	**$13.5**

Note: Totals may not sum due to rounding.
Source: AEC*group*.

Summary of BCA Results

Assuming a discount rate of 10.0%, the Net Present Value (NPV) of a proposed new managed off-road motorcycle facility to Victoria, excluding trail bike riding, is estimated to be negative $3.1 million, with a benefit to cost ratio (BCR) of 0.80. The NPV of the proposed new facility (at a 10.0% discount rate) is comprised of:

- A PV of benefits of $12.2 million; and
- A PV of costs of $15.3 million.

Development of an off-road motorcycle facility excluding trail bike riding is estimated to return a negative NPV across discount rates ranging between 7.5% and 12.5%.

Table H.4. NPV and BCR of a New Off-Road Motorcycle Facility in Victoria, Excluding Trail Bike Riding

Real Discount Rate	PV of Benefits ($M)	PV of Costs ($M)	Total NPV ($M)	BCR
7.5%	$15.2	$17.8	-$2.6	0.85
10.0%	$12.2	$15.3	-$3.1	0.80
12.5%	$10.1	$13.5	-$3.4	0.75

Note: Totals may not sum due to rounding.
Source: AEC*group*.

The benefit cost analysis identifies that the development of a new managed off-road motorcycle facility that excludes trail bike riding would be **undesirable** with the costs outweighing the benefits at all discount rates examined.

Comparing the results of the BCA of an off-road motorcycle facility that includes trail bike riding with the above results highlights there is little difference in terms of overall desirability of developing an off-road motorcycle facility regardless of whether trail bike riding is included or not, with the BCR relatively comparable.

It should be recognised these BCA results do not include valuations of environmental and social benefits of an off-road managed facility. Trail bike riding is more commonly undertaken in high-risk environments than any other form of motorcycle riding, and as such the provision of an off-road motorcycle facility catering to trail bike riding would be expected to deliver considerably greater benefits through avoided environmental and social costs. As such, the inclusion of environmental and social benefits in the analyses may result in a higher NPV and BCR for a facility that caters to trail bike riding than one that does not.

Appendix I: Australian Clubs Affiliated With Motorcycling Australia

Motorcycling Victoria

Affiliated Clubs				
Albury/Wodonga MCC	Cobram Border Junior MCC	Historic Motorcycle Racing Association of Victoria	Oakleigh MCC	Swan Hill MCC
Alexandra & District MCC	Colac MCC	Horsham MCC	Phillip Island & District MCC	Tarra Motorcycle Club
Alpine MCC	Corner Inlet MCC	Koo Wee Rup MCC	Portland Junior MCC	Trials Club of Victoria
Ararat MCC	Dandenong MCC	Korumburra MCC	Preston MCC	Traralgon MCC
Australian Sidecar-Cross Association Inc.	Diamond Valley MCC	Lakes Entrance MCC	Quad Riders Club of Victoria	Upper Murray MCC
Bairnsdale & District MCC	East Malvern MCC	Leongatha MCC	Redline MCC	Victoria Police MSC
Ballarat Rovers MCC	Full Throttle Sports	Maffra Sale MCC	Robinvale & District MCC	Warragul MCC
Bendigo MCC	Geelong Jnr Motocross Club	Mansfield MCC	Rosebud & District MCC	Marrnambool MXC
Blue Rock MCC	Gippsland Speedway	Melton MCC	Sidecar Racing Club of Victoria (SCRCV)	Whittlesea District MCC
Broadford & District MCC	Goulburn Valley MCC and	Mildura MCC	Sandringham MCC	Winton MCC
Casterton Sporting MCC	Goulburn Valley Jnr MCC	Motorcycle Racing Club of Victoria (MCRCV)	Seymour MCC	Yarram MCC
Castlemaine & District MCC	Green Triangle Enduro MCc	Myrtleford MSC	South West Mini Moto Club	
Central Victorian Junior MXC	Harley Club	Newport Braybrook MCC	Sporting MCC	
Classic Scramble MCC	Hartwell MCC	North West Victorian MCC	Speedway Sidecar Riders Association of Victoria (SSRAV)	

Motorcycling NSW

Affiliated Clubs				
ACT Motorcycle Club	Cooma Off-Road Club Inc	Ku-ring-Gai MWTC	Norton Owners Club	Tamworth Junior MX Club
Annandale Leichhardt MCC	Cowra MC Racing Club Inc	Kurri Kurri Junior MCC	Nowra DMCC Limited	Tamworth MCC
Armidale MCSC	Deniliquin Motorcycle Association Inc	Kurri Kurri MCC Inc	NSW Police & Emergency Services Offroad MCC Inc	Taree MCC
Australian Racing Drivers Club Ltd	Denman MCC Inc	Kyogle Dirt Bike Club	NSW Quad Bike Park & Training Asc	Temora Motorcycle Club
Balranald MCC Inc	Dubbo Dirt Bike Club	Lake Macquarie MBC	NSW Speedway Riders Association Inc	The Vincent HRD Owners Club
Bankstown Wiley Park MCC	Ducati Owners Club of NSW	Leeton MCC	NSW Speedway Sidecar Riders	Tottenham MCC
Baulkham Hills JMCTC	Dungog MCC Inc	Lower Mountains MCC	Oakdale JMCC	Trials Club of Canberra
Bears Australia MCRC Inc	Eastern Suburbs MCC	Macarthur DMCS	Oroadsports Inc	Triumph M/C Register of Aust
Belmont & District MCC	Far South Coast MCC	Maclean DBC	Oyster Bay MCC	Tumbarumba Motorcycle Sports Club
Blacktown Minibike Club	Forbes Auto Sports Club Inc	Macleay DMCC	Pacific Park Trials Club	Upper Hunter Motorcycle Club
Broken Hill Speedway Club	Gosford DMCC	Maitland District MCC	Panorama MCC	Villawood MCC
BSA Motorcycle Club of NSW Inc	Goulburn MCC	Manly Warringah MCC Inc	Penrith PCYC Minibike Club	Vintage MCC of Australia (NSW) Inc
Bullinda Bike Busters	Griffith MCSC	MCC Racing Club of NSW;	Post Classic Racing Assn of NSW	Wagga Wagga MCSC
Canobolas MCC	Gunnedah MCC	Sportsmans Club of ACT;	Quirindi MCC	West Maitland MCC Inc
Central Coast Dirt Riders	Hastings Valley MCC	Moree MCC Inc;	Richmond River MCC Inc	Western Suburbs MCC
Central Coast Junior MCC	Heaven VMX Inc	Morgan Owners Club of Aust.	Ryde District MCC	Willoughby DMCC Inc
Cessnock Motorcycle Club	Historic Racing Register	Mudgee & Districts MCC	Shoalhaven Classic MCC Inc	Wollongong MCC
Cessnock Mini Bike Club	Holbrook MCSC	Nambucca Valley Dirtbike Club	Sidecar Owners Club of Sydney Inc	Yass Junior Motorcycle Club
City of Penrith MCC Inc	Hornsby Junior DBC Inc	Narrabri Dirt Bike Club Inc	Silver City Motorcycle Club	Yellow Rock Minicycle Club Inc
Classic & Enthusiasts MCC of NSW	Hunter MCC	Nepean MSC	St George MCC	Young MCC
Cobar Auto Club Ltd	Indian & Harley Vintage Club Inc	North Coast Road Racers	Sth Grafton Ex-Services MCC	Tamworth Junior MX Club
Coffs Harbour MCC	Inverell MCSC Inc	Northern Districts MCC	Surfair MSC Inc	Tamworth MCC
Condobolin ASC	Junior Trials Minicycle Club Inc	Northern Dists Ducati Owners	Sutherland PCYC MB Club	Taree MCC

Motorcycling Queensland

Affiliated Clubs				
Albert & District MCC	Curtis Coast Trail Riders Club	Julia Creek Off Roaders	Mt. Isa Dirt Bike Club	Roma & District MCC
Ayr MCC	Dalby MCC	Keppel Coast MCC	MTCQ	Roma & Districts MCC
Biloela Dirt Riders MCC	Douglas Shire Motor Sports Association	Kilcoy MCC	MTRCB	Rum City MCC
Blackwater MCC	Downs Motorcycle Sporting Club	Kingaroy & District MCC	North Brisbane Junior MCC	Savannah MCC
Brisbane MCC	Dysart Junior Motocross Club	Lockyer Valley Speedway Association	North Queensland Speedway Riders Association	Southside MCC
Bundaberg Historic & Classic MCC	Emerald MCC	Logan River Motorcycle Trials Club	Northern Districts Enduro & Trials Club	Speedway Clubs/Tracks
Bushrangers Classic Sidecar Association	Fassifern MCC	Longreach MCC	Pioneer Valley Enduro Club	Suncoast Junior MCC
Cairns MCC	Gladstone District Dirt Riders	Mackay & District Motocross Club	QEMSC	Sunshine Coast MCC
Cairns Speedway Riders Association	Gladstone District Dirt Riders Club	Maleny Trail Riders Club	Quad Clubs & Tracks	Toowoomba MCC
Cape York MCC	Gold Coast Motorcycle Sporting Club	Mareeba MCC	Queensland Flag Marshalls League	Toowoomba Motocross Club
Capricorn Dirt Riders Club	Gold Coast MX Club	Maryborough Motorcyclist Club	Queensland Quad Riders Association Inc	Townsville MCC
Central Burnett MCC	Goondiwindi & District Dirt Bike Club	Middlemount Junior Motocross Club	Queensland Stadium Motocross Club	Tully MCC
Central Queensland MiniMoto	Gum Valley Veterans & Natural Terrain MCC	Mike Hatcher Junior MCC	Queensland Vintage motocross Club	Warwick & District Dirt Bike Club
Charters Towers MCC	Gympie MCC	Moranbah Motocross Club	Ravenshoe MCC	Western Districts Trials Club
Chinchilla Motocross Club	Hervey Bay Mini Bike Club	Moreton Districts Motocross Club	Recreational Trail Ride Clubs	Whitsunday Dirt Riders
Clermont MCC	Hughenden MCC	Motorcycle Sportsmen	Richmond Dirt Bike Club	
Cloncurry Motorsports Club	Ipswich MCC	Moura Junior Motorcycle Club Inc	Rockhampton & District Motocross Club	

Motorcycling Northern Territory

Affiliated Clubs		
Alice Springs MCC Inc.	Finke Desert Race Inc.	Top End Road Race Association Inc.
Darwin MCC Inc.	Top End MCC Inc.	Nhulunbuy Speedway Inc

Motorcycling SA

Affiliated Clubs				
24 Hour Trial Organising Committee	Gawler MCC	Meningie MCC	Port Augusta MCC	Sidewinders U16 Speedway Club
Adelaide Hills MCC	Historic MCRR of SA	Morgan MCC	Port Lincoln MCC	South Coast Motorcross Club
AJS Moto Trials Club of SA	Juventus MCC	Motorcross Riders Association	Port Pirie MCC	Speedway Riders Association
Atujara MCC	Keith & District MCC	Mount Gambier Motocross Club	Quad Riders Association of SA	Tea Tree Gully MXC
Café Racer Club of SA	Keyneton MCC	Mount Gambier MC & LCC	Riverland JMCC	Velocette MCC
Clare MCC	Kimba MCC	Mud n Tars MCC	Roadskills Training	Wayville Speedway Promotions
Crystal Brook MCC	Levis MCC	Murray Bridge MCC & SCC	SA Classic Speedway Association	West Coast MCC
Ducati Owners Club of SA	Mallala Motorsport Park	Phoenix MCC	SAPMAC	Whyalla MCC

Motorcycling WA

Affiliated Clubs				
AJS Motorcycle Club	Collie Motorcycle Club	Historic Competition Motorcycle Club	Pathfinders Trials Motorcycle Club	Wanneroo Junior Motocross Club
Albany Motorcycle Club Inc	Denmark Motocross Club	Kununurra Motocross Club	Recreational Trailbike Riders Association	West Australian Junior MC
Beverley & Districts MC	Denmark Motorcycle Club	Lightweight Motorcycle Club	Rockingham/Kwinana MC	
Broome Jnr/Snr MC	Derby 4 Kids Motorcycle Club	Manjimup Motorcycle Club	Southern Capes Motorcycle Club	
BSA HD Motorcycle Club	Esperance Motorcycle Club	Motorcycle Racing Club of WA	Southern Cross Motorcycle Club	
Bunbury Motorcycle Club	Gascoyne Off Road Racing Club	Murray Motorcycle Club	Speedway Motorcycle Club WA	
Carnarvon Motorcycle Club Inc	Geraldton Jnr/Snr Motorcycle Club	Norseman Motorcycle Club	Supermoto WA	
Coastal Motorcycle Club	Goldfields Motorcycle Club	Northam Districts Motorcycle Club	Vintage Motocross Club	

Motorcycling Tasmania

Affiliated Clubs				
Braaap Club	Coastal Motocross Club	Launceston Motocross & Scramble Club	Speedway Riders Association of Tasmania	STMCA "Southern Tas Motorcycle Ass."
Circular Head Motorcycle Club	East Coast Motocross Club Inc	MERC "Motorcycle Enduro Riders (for a practice day – level 2 first aid officer (can be part of management), for open or inter-club event need St John's, SES or rural ambulance."	Sports Riders Club of Tasmania	Tasmanian Motorcycle Club

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