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Cost benefit analysis of extending the Heavy Vehicle Access Management System to Special Purpose Vehicles

A final report for the Department of State Growth

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Executive summary

The Heavy Vehicle Access Management System (HVAMS) was introduced into Tasmania to help:

- road managers make access decisions and manage risk; and
- the heavy vehicle industry to understand where it is permissible to operate on the road network on demand.

The System was first introduced to the Oversize Overmass (OSOM) sector in 2016 and was then extended to include Special Purpose Vehicles (SPVs) in August 2019. Cranes fall within the SPV heavy vehicle category.

The Department of State Growth (the Department) is interested in understanding the costs and benefits of expanding HVAMS to SPVs. To this end, the Department has engaged HoustonKemp to undertake a cost benefit analysis (CBA). This report sets out the findings of our CBA.

The need for HVAMS

Vehicles over a certain size or mass, including SPVs, have restricted access to the road network as some parts of the road network may not have been designed to accommodate these vehicles. Road managers, including local road managers, are responsible for assessing whether these vehicles can travel on certain parts of the road network.

HVAMS provides engineering-based access decisions automatically and these are available to industry in real time, on demand at all times. To achieve this, HVAMS involved:

- a very high level of fleet configuration granulation;
- the development of evaluation methodologies;
- the mass collection of necessary asset data required;
- a road network wide approach; and
- a partnership and collaboration with all Tasmanian local road managers and the mobile crane industry and their association, the Crane Industry Council of Australia.

The benefits of extending HVAMS to SPVs

We have identified seven benefit categories associated with extending HVAMS to SPVs. These benefit categories are summarised in Table 1 below.

Table 1: Identified benefit categories arising from extending HVAMS to SPVs

Benefit categories	Description of benefit categories
Avoided time delays from no longer needing a permit	A significant proportion of the tasks supported by SPVs is time sensitive, eg, cranes are required on-site for other activities to continue. No longer needing to apply and wait for a permit means avoided delays in completing tasks.
Improved operational efficiency and flexibility	Permits are often vehicle and route specific. Significant fleet configuration granulation and a road network wide approach provides operators with flexibility to use an alternative vehicle or route.
Improved network access for SPVs from improved decision making	Road managers may not have the necessary asset information and/or technical expertise to make informed access decisions. Road managers may (not unreasonably) restrict access when it is unclear if access can be accommodated. HVAMS means access provision is made automatically based on asset capability, thereby increasing network access for SPVs.
Improved ability to respond to state emergencies	Cranes are needed to respond to certain states of emergency and disaster recovery activities. Emergency services can waive the requirement for a permit in these scenarios, however, it is important to contain the event by making a safe access decision. Operators and road managers still need to assess how a crane can get to and from its destination safely which can take time and resources. HVAMS provides on demand safe access provision in real time to support this need.
Reduced stress for operators and compliance benefits	Permit access decisions can take longer than 14 days and may be rejected. This is often beyond the control of SPV operators and may mean that an operator is unable to deliver on client and contractual commitments. This creates avoidable stress for operators and clients and can provide a perverse incentive to travel without a permit.
Improved ability for operators and road managers to plan for the future	HVAMS allows operators to understand the level of access they can have for multiple different vehicle configurations. Operators could use this information to decide which vehicles they purchase in the future. HVAMS provides road managers with a network view of their assets and their associated capabilities. This information could be used to inform future investment decisions.
Admin savings from reduced permit applications	The permit process is time consuming for operators and road managers. It follows that a significantly reduced number of permit applications leads to admin savings for both road managers and operators.

HVAMS is expected to deliver significant benefits to the SPV sector

Overall, our analysis suggests that extending HVAMS to SPVs is expected to deliver significant economic benefits. Over the evaluation period and in PV terms, we estimate that extending HVAMS to SPVs:

- is expected to deliver economic benefits of between $74.1 million and $212.2 million;
- is expected to cost $4.6 million; and
- is expected to deliver a net present value of between $69.5 million and $207.6 million, with a benefit cost ratio of between 16.2 to 46.3.

In our view, the results of our CBA are conservative because we have only quantified three of the seven benefit categories identified. Further, where possible, we have used what we consider to be conservative assumptions to estimate benefits and costs. Table 2 summarises the results of our analysis.

Table 2: Overall economic results ($ million, PV)

Benefit/cost category	Low scenario	High scenario
Avoided time delays from no longer needing permits – business-as-usual activities	33.2	66.3
Avoided time delays from no longer needing permits – major events	32.4	129.8
Operational efficiency and flexibility	6.3	12.6
Admin savings from reduced permit applications	2.1	3.4
Present value of benefits	74.1	212.2
Present value of costs	4.6	4.6
Net benefits	**69.5**	**207.6**
BCR	**16.2**	**46.3**

1. Introduction

The Heavy Vehicle Access Management System (HVAMS) was introduced in 2016 into Tasmania to help:

- road managers make access decisions and manage associated risk; and
- the heavy vehicle industry to understand where it is permissible to operate on the road network on demand.

The establishment of HVAMS has been achieved through close collaboration with the heavy vehicle industry and its Associations, the Tasmanian Transport Association (TTA) and the Crane Industry Council of Australia (CICA), and with local road managers and their Association, the Local Government Association of Tasmania (LGAT).

Vehicles currently covered by HVAMS include:

- oversize overmass (OSOM), introduced in 2016;
- special purpose vehicles (SPVs), introduced in 2019; and
- Australian Defence Force (ADF) Land 121 fleet, introduced in 2019.

The Department is interested in understanding the economic benefits and costs associated with the introduction of HVAMS for SPVs in August 2019. To this end, the Department has engaged HoustonKemp to undertake a cost benefit analysis (CBA) of including SPVs into HVAMS.

This report presents the findings of our analysis. It is structured as follows:

- section 2 provides a contextual background, including an overview of HVAMS;
- section 3 sets out our approach to the analysis, including how we have defined the counterfactual base case and realised project case;
- section 4 describes the economic benefits we have quantified as part of this study;
- section 5 provides a discussion of the economic benefits of HVAMS we have identified but have not quantified in this analysis;
- section 6 describes the economic costs of including SPVs in HVAMS; and
- section 7 sets out the overall results of our analysis.

Appendix A.1 describes the assumptions that we have used in our CBA.

2. The need for HVAMS and what HVAMS has delivered

2.1 The need for HVAMS

Restricted access vehicles (RAVs) are heavy vehicles that require particular permission to travel on certain parts of the road network, due to their size and/or mass not originally being allowed for at the design phase. These RAVs include Special Purpose Vehicles (SPVs), Oversize Overmass (OSOM) vehicles as well as higher productivity freight vehicles, such as some Performance Based Standards (PBS) vehicles and road trains.

Road managers, including local road managers, are responsible for assessing where and how RAVs can travel on their road network. Road managers can provide RAVs access to their road network by:

- including a road in a gazettal notice – a gazettal notice sets out the road network that a RAV can access; and
- approving a permit application – heavy vehicle operators can apply for a permit to access roads that are not included in a notice.

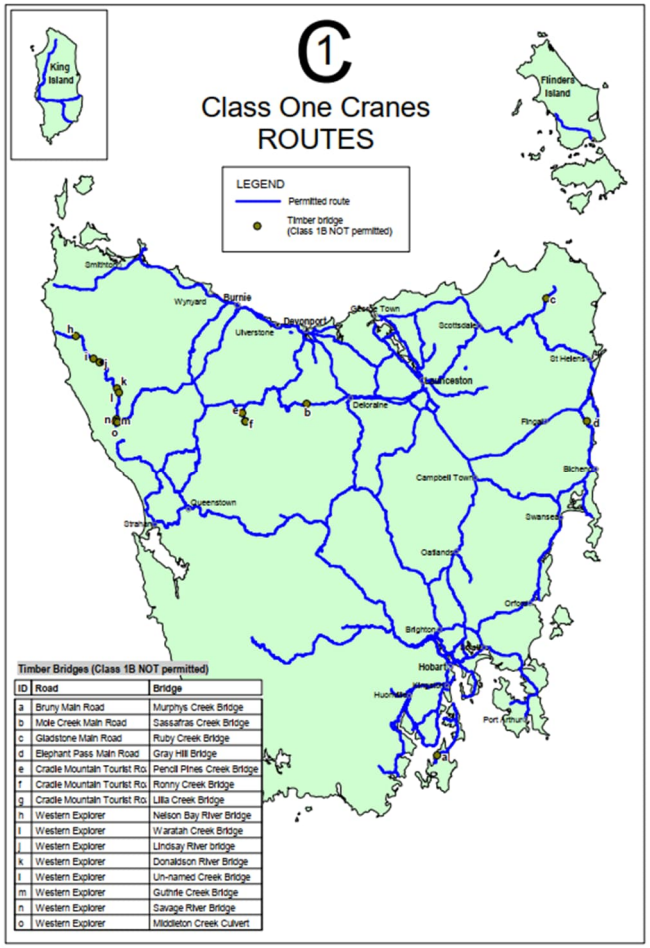
The introduction of the Heavy Vehicle National Law (HVNL) in 2014 has brought about better-defined roles and responsibilities for road managers when making access decisions for restricted access vehicles. This includes a requirement for road managers to consider the road network infrastructure requirements and risks when making access decisions.

However, there have been several challenges facing road managers in discharging this function in a way that supports the efficiency of access and heavy vehicle productivity. These challenges can be summarised as follows:

- heavy vehicle fleet innovation, productivity and access demand evolving at a quicker pace than cycle times for road transport infrastructure renewal;
- providing increased productivity consistent with the capacity of the infrastructure, without compromising safety, and optimising asset preservation;
- managing heavy vehicle impacts on amenity in a location where there are stakeholders with differing demands;
- limited personnel and financial resources, including skill and capability sets, and time dedicated to heavy vehicle access management (noting that this is not a dedicated role for many road manager organisations);
- infrastructure asset datasets are often incomplete and not always well understood; and
- the processes for assessing infrastructure are often necessarily complicated, time consuming and not automated.

These challenges meant that road managers may restrict access when it is unclear if access can be accommodated and may be disinclined to include roads in notices. By way of example, Figure 1 provides the road network that was available to class one cranes via notice prior to HVAMS. The figure shows that the road network included in notices prior to HVAMS had good coverage of state and major roads but had very limited coverage of the local road network.

Figure 1: Class one crane notice – prior to HVAMS



ID	Road	Bridge
a	Bruny Main Road	Murphys Creek Bridge
b	Mole Creek Main Road	Sassafras Creek Bridge
c	Gladstone Main Road	Ruby Creek Bridge
d	Elephant Pass Main Road	Gray Hill Bridge
e	Cradle Mountain Tourist Ro.	Pencil Pines Creek Bridge
f	Cradle Mountain Tourist Ro.	Ronny Creek Bridge
g	Cradle Mountain Tourist Ro.	Lilla Creek Bridge
h	Western Explorer	Nelson Bay River Bridge
i	Western Explorer	Waratah Creek Bridge
j	Western Explorer	Lindsay River bridge
k	Western Explorer	Donaldson River Bridge
l	Western Explorer	Un-named Creek Bridge
m	Western Explorer	Guthrie Creek Bridge
n	Western Explorer	Savage River Bridge
o	Western Explorer	Middleton Creek Culvert

A consequence of having limited coverage of local roads in notices is that operators often need to rely on permits to complete the 'first and/or last mile' of the journey. The reliance on permits leads to the following issues:

- need to apply and wait for approval and permit to complete jobs – the crane is needed before this in many cases;
- access uncertainty – it is unclear whether an access permit application would be accepted or rejected;
- inconsistent access decision making – each road manager would have their own process and approach to making access decisions, leading to potential inconsistent decision making on a single trip;
- operational inflexibility as permit applications are often vehicle and route specific – operators can only use the vehicle and route specified on the permit, thereby creating inflexibility in how operators can complete the job;
- admin burden associated with permits –time and resources are required by operators to apply for permits and by road managers to assess permit applications.

Many of these limits were highlighted in the recent Austroads '*Options Evaluation for a National Heavy Vehicle Access Assessment System'* report. The report involved a poll of heavy vehicle industry's priorities for improvements to heavy vehicle access. The top four priorities were *shortened turn-around times*, *increased access certainty, end to end networks* and *a consistent approach to road access*. [1]

[1] Austroads, *Options Evaluation for a National Heavy Vehicle Access Assessment System*, May 2022, p 46

2.2 HVAMS and what it has delivered

HVAMS was introduced to help:

- road managers make access decisions and manage associated risks; and
- the heavy vehicle industry to understand where it is permissible to operate on the road network on demand.

HVAMS was first introduced in Tasmania to OSOM vehicles in 2016. HVAMS was subsequently expanded to include SPVs and the ADF Land 121 fleet in August 2019 and will be expanded to include some PBS freight vehicles in 2023.

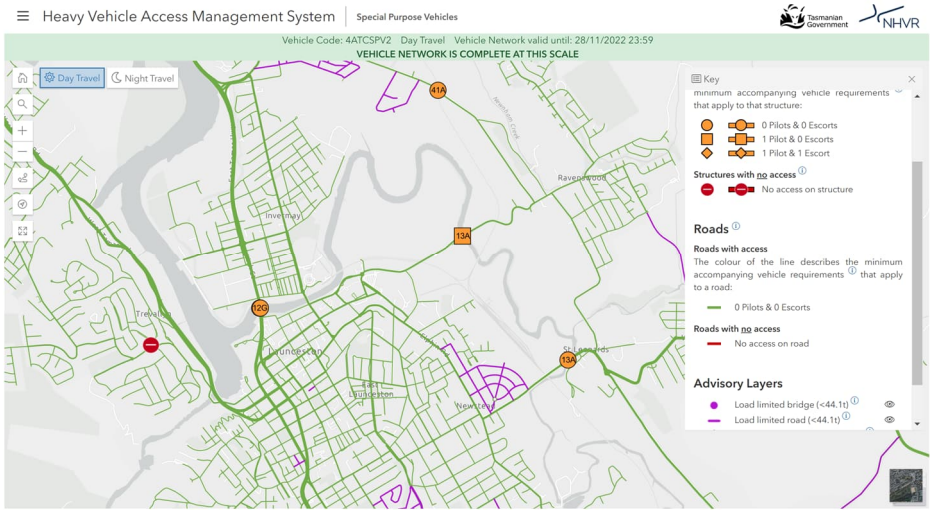
HVAMS helps road managers to make access decisions. In practice, when an operator requests access for a given vehicle, HVAMS automatically provides an access decision for effectively the entire road network of Tasmania, with the results provided to the operator in real time on demand.

To achieve this, HVAMS involved:

- a very high level of fleet configuration granulation.
- the development of evaluation methodologies;
- the mass collection of necessary asset data required;
- a road network wide approach; and
- a partnership and collaboration with all Tasmanian local road managers and the mobile crane industry and their association, the Crane Industry Council of Australia.

Figure 2 provides the road network that is available to an example individual four axle crane.

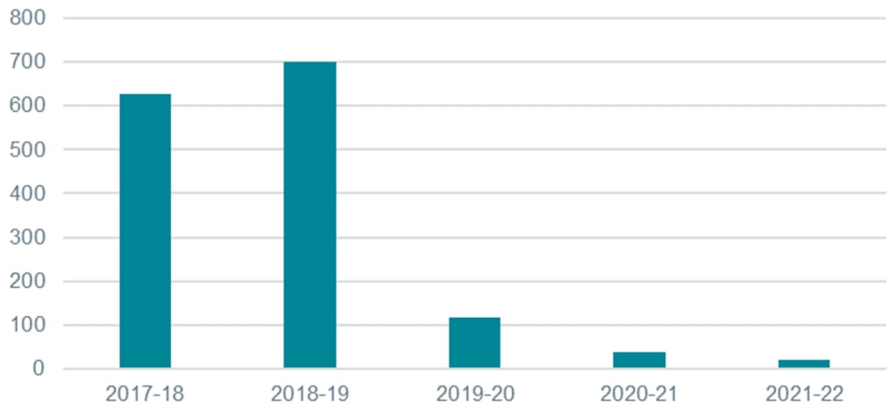
Figure 2: Road network available to an illustrative 4 axle crane near Hobart



The introduction of HVAMS in August 2019 led to a significant reduction in number of SPV permit applications. For example, the number of SPV permit applications systematically went from 700 in FY2018-19 to 20 in FY2021-22, a reduction of around 97 per cent. The significant reduction in permit numbers for SPVs indicate that permits are now required as an exception rather than being part of an operator's daily operation.

Figure 3 below shows the number of SPV permit applications made between FY2017-12 to FY2021-22.

Figure 3: Number of SPV permit applications (FY2017-18 to FY2021-22)



3. Our approach to the analysis

This section provides an overview of our approach to undertaking the cost benefit analysis, including how we have defined the base case and the project case.

3.1 Overview of approach

Our analysis is on the benefits that HVAMS has delivered for SPVs. SPVs are vehicles that are built for a purpose other than carrying goods and are defined as follows under the HVNL:[2]

- a motor or trailer, other than an agricultural vehicle or a tow truck, built for a purpose other than carrying goods; or
- a concrete pump or fire truck.

The approach we have used to identify and quantify the costs and benefits are as followed:

- define the counterfactual base case – what would have likely happened if HVAMS wasn't extended to include SPVs;
- define the realised project case – what has happened since HVAMS was extended to include SPVs;
- identify and quantify the benefits (section 4) and costs (section 6) associated with extending HVAMS to SPVs;
- discuss the benefits that have been identified but have not been quantified in this analysis (section 5); and
- calculate overall economic results (section 7), including benefit cost ratio (BCR) and net present value (NPV).

We held several consultations with stakeholders to understand the effects of extending HVAMS into SPVs and the associated costs and benefits. The stakeholders consulted include:

- industry operators, including SPV and OSOM operators;
- Central Coast Council;
- Tasmanian Transport Association;
- The Crane Industry Council of Australia;
- Local Government Association of Tasmania; and
- relevant staff at the Department.

We have used the consultation process to test the reasonableness of the assumptions that we have used in the cost benefit analysis and case studies. We would like to thank and acknowledge the stakeholders for their time and invaluable insight into the benefits and costs of HVAMS.

[2] NHVR, *National Heavy Vehicle Standards (Special Purpose Vehicles) Exemption Notice 2021 Operator's Guide*, August 2021, p 3

3.2 Counterfactual base case – what would have happened without HVAMS

Assessing the costs and benefits of extending HVAMS to SPVs requires us to consider what would have happened if this did not occur (the counterfactual base case). For the purposes of this analysis, we have assumed that outcomes and arrangements that existed before HVAMS would continue to prevail.

We discuss the situation before HVAMS was extended into SPVs in section 2.1. By way of summary, we have assumed that:

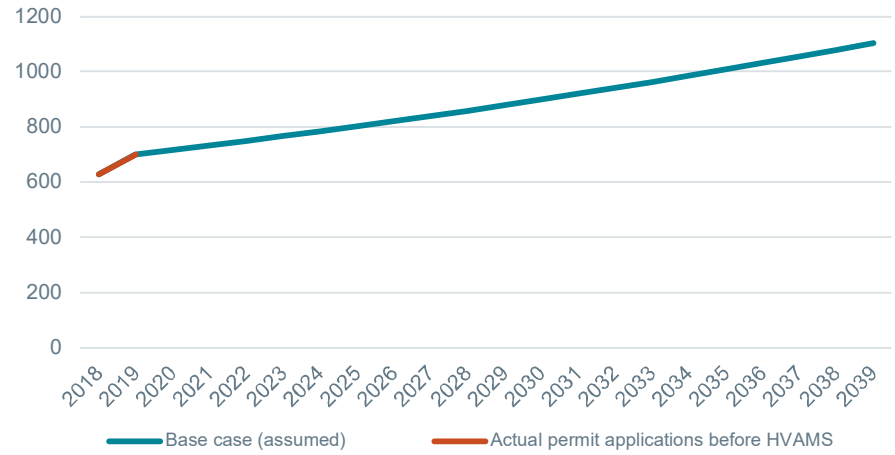
- SPVs would continue to have 'reduced' access to the network, given the uncertainty as to whether road assets can accommodate SPVs; and
- there would continue to be a reliance on permits to obtain access for roads that are not covered by notices.

In the base case, permit applications continue to be a 'business-as-usual' activity. Permit applications are then reviewed by the relevant road managers and have an average turnaround time of two weeks, which is broadly consistent with data published by the National Heavy Vehicle Regulator (NHVR).[3]

We have received data from the Department of State Growth on the number of SPV permit applications per year in the 2017-18 and 2018-19 (ie, before HVAMS was extended to SPVs).

We have assumed that without HVAMS, the number of permit applications would grow in line with Tasmanian GSP growth into the future.[4] Figure 4 sets out the total SPV permit applications in the counterfactual base case.

Figure 4: Total SPV permit applications per year in counterfactual base case



Source: Actual data sourced from Department of State Growth (Tas). Note: in the 2020 financial year, HVAMS was first applied to SPVs in August.

[3] Average end to end turnaround time for permits was 12.87 days in 2021-22 and 13.82 days in 2020-21. Source: NHVR, *Annual Report 2021-22*, p 67.

[4] We have used 2.3 per cent, which is the 30 year average, to June 2021, of annual GSP growth for Tasmania. See ABS, *Australian national accounts: state accounts*, series ID A2336360J, 19 November 2021.

3.3 Realised project case – what has happened since HVAMS was extended to SPVs

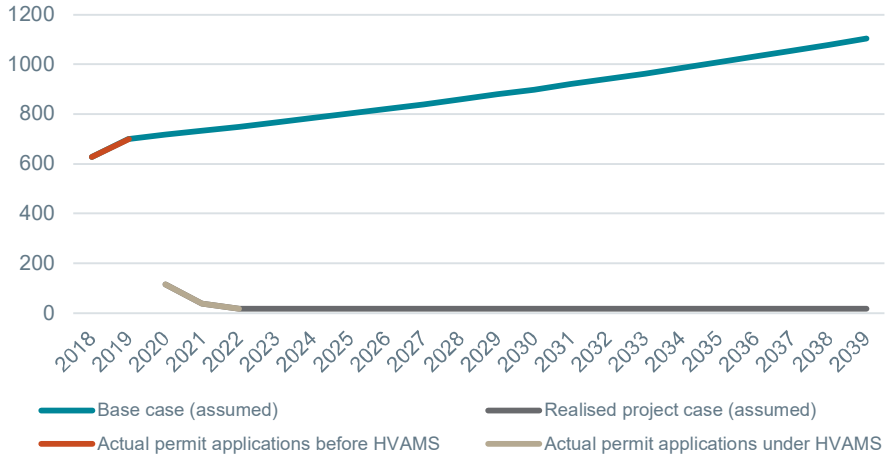
In section 2.2, we discuss what has happened since HVAMS was extended into SPVs. We have defined our realised project case as the continuation of outcomes that have been achieved since HVAMS was extended into SPVs.

We have assumed that road managers will continue to use HVAMS to facilitate access decisions. In the realised project case, permits will be required as an exception rather than as part of business-as-usual activity. This means that in most cases, operators can complete the job without needing to apply and wait for a permit.

We have assumed that the number of permit applications will be at a similar level as those observed in FY2021-22, with permit application numbers growing in line with Tasmanian GSP growth into the future. [5]

Figure 5 sets out our forecast number of permit applications in the realised project case. The number of permit applications are 97 per cent lower in the realised project case when compared to the counterfactual base case, which is consistent with what has been observed since HVAMS was extended to SPVs.

Figure 5: Total SPV permit applications per year in realised project case and counterfactual base case



[5] This is based on the 30 year average, to June 2021, of annual GSP growth for Tasmania. See ABS, *Australian national accounts: state accounts*, series ID A2336360J, 19 November 2021.

3.4 Benefits arising from extending HVAMS into SPVs

We have identified the key benefit categories associated with extending HVAMS into SPVs. Identifying benefit categories allows us to provide a clear, logical link between outcomes delivered by HVAMS and how they have delivered benefits. It also helps avoid the double counting of benefits.

We have identified the following benefit categories:

1. avoided time delays from no longer needing a permit to complete a task
2. improved operational efficiency and flexibility
3. improved network access for SPVs from improved access decision making
4. improved ability to respond to state of emergencies
5. reduced stress for operators and compliance benefits
6. Improved ability for operators and road managers to plan for the future
7. administrative savings from reduced number of permit applications

Table 3 sets out benefit categories we have identified, including a description for each benefit category.

Quantifying the benefits of extending HVAMS to SPVs requires us to make certain assumptions about the SPV industry and the likely effect HVAMS has delivered. It follows that there is some uncertainty regarding the exact economic benefits of extending HVAMS to SPVs.

To capture the uncertainty, we have developed a **low benefits** scenario and a **high benefits** scenario. Doing so provides a sense of magnitude of what the likely benefits from HVAMS are while also incorporating the uncertainty regarding the quantum of benefits. Where possible, we have made what we believe to be realistic and conservative assumptions to estimate the benefits.

Table 3: Benefit categories arising from HVAMS

Benefit categories	Description of benefit categories
Avoided time delays from no longer needing a permit	A significant proportion of the tasks supported by SPVs is time sensitive, eg, cranes are required on-site for other activities to continue. No longer needing to apply and wait for permits means avoided delays of completing tasks. We have quantified business-as-usual activities (eg, common tasks supported by SPVs) and 'major events' (high impact events that occur infrequently but there would be significant economic losses if there are delays) separately given the distinction between the two.
Improved operational efficiency and flexibility	Permits are often vehicle and route specific. Significant fleet configuration granulation and a road network approach provides operators with flexibility to use an alternative vehicle or route.
Improved network access for SPVs from improved decision making	Road managers may not have the necessary asset information and/or technical expertise to make informed access decisions. Road managers may (not unreasonably) restrict access when it is unclear if access can be accommodated. HVAMS means access provision is made automatically based on asset capability, thereby increasing network access for SPVs.
Improved ability to respond to state emergencies	Cranes are needed to respond to certain states of emergency and disaster recovery activities. Emergency services can waive the requirement for a permit in these scenarios, however, it is important to contain the event by making a safe access decision. Operators and road managers still need to assess how a crane can get to and from its destination safely which can take time and resources. HVAMS provides on demand safe access provision in real time to support this need.
Reduced stress for operators and compliance benefits	Permit access decisions can take longer than 14 days and may be rejected. This is often beyond the control of SPV operators and may mean that an operator is unable to deliver on client and contractual commitments. This creates avoidable stress for operators and clients and can provide a perverse incentive to travel without a permit.
Improved ability for operators and road managers to plan for the future	HVAMS allows operators to understand the level of access they can have for multiple different vehicle configurations. Operators could use this information to decide which vehicles they purchase in the future. HVAMS provides road managers with a network view of their assets and their associated capabilities. This information could be used to inform future investment decisions.
Admin savings from reduced permit applications	The permit process is time consuming for operators and road managers. It follows that a significantly reduced number of permit applications leads to admin savings for both road managers and operators.

4. Economic benefits of HVAMS quantified in this analysis

For the purpose of this study, we have quantified the following benefits associated with extending HVAMS into SPVs:

- avoided time delays from no longer needing a permit for business-as-usual activities;
- avoided time delays from no longer needing a permit when there is a 'major event';
- improved operational efficiency and flexibility; and
- admin savings from reduced number of permit applications.

'Business-as-usual' activities refer to common/daily activities supported by SPVs, eg, requiring cranes for residential or commercial construction. 'Major events' are defined as events that occur infrequently but are associated with significant economic loss if there is a delay in dispatching the required SPV. We have quantified the benefits of avoided delays for business-as-usual activities and for 'major events' separately given the distinctions between the two.

We discuss the economic benefits that we have identified but have not quantified in this study in section 5. In total, of the benefits listed directly above, we have quantified three out of the seven benefit categories we have identified in section 3.4.

4.1 Avoided time delays from no longer needing a permit – business-as-usual activities

Our discussions with industry highlighted that a significant portion of business-as-usual tasks that require a crane are time sensitive or critical. That is, waiting two weeks for a permit will lead to delays in completing other tasks or the end task.

We understand that some tasks require an SPV to be dispatched as soon as possible. Examples given by the industry of this include:

- lifting a heavy vehicle that has had an accident and rolled-over; and
- fixing heavy equipment that has failed, such as air-conditioning units in a hospital or a cinema.

These tasks are referred to colloquially as a 'milk run'.

We also understand that some jobs require a crane to be dispatched in the next couple of days or within a week. For example, it is common for clients to ring up and require a crane in the next couple of days to facilitate residential or commercial construction tasks.

Industry feedback suggest that some tasks are booked more than two weeks in advance. However, we understand that even these tasks could benefit from not needing to apply and wait for permits as:

- there could be a change in circumstance as to when a SPV in needed, eg, a crane may be required earlier than anticipated in a construction project to take advantage of good weather conditions; and
- permit approval process may take longer than 2 weeks (particularly when it involves multiple road managers) which could result in delays for the end task.

Overall, industry operators we spoke to estimated that approximately 70 per cent of tasks would require a dispatch of a crane within the typical average turnaround time for a permit. It follows that waiting for permits would lead to delays to the end task, leading to significant economic costs.

We have developed a case study to understand the potential economic costs associated with applying and waiting for a permit – see vehicle roll over case study below. The case study suggests that waiting 14 days for a permit would cost the trucking operator $9,000 in total, or around $640 per day.

Vehicle roll over case study

A 6-axle articulated truck has rolled over and needs a crane so it can be loaded into a tow truck for repair. The truck does not present a safety hazard and is not blocking traffic. As such, it does not constitute a state of emergency where permit requirements are waived.

Without HVAMS, the SPV operator would need to apply for a permit as the accident occurred on a road not covered by notices. In contrast, HVAMS means that an SPV operator can dispatch a crane to the site straight away, which means the truck can be repaired without delay.

While the truck is being repaired, the truck operator will need to hire a truck to continue with daily operations. To quantify the economic costs of waiting for a permit, we have assumed that:

- the wait time for a permit is 14 days, consistent with current processing times;
- the costs of hiring a truck without driver and fuel is $900 per day ($90 per hour multiplied by 10 hours per day); and
- the operator operates between Monday to Friday, so needs to hire a truck for 5 days per week.

Based on assumptions above, the costs of waiting 14 days (or 2 weeks) for a permit will cost the truck operator $9,000, or around $640 per day.

To quantify benefits associated with avoided time delays from no longer needing a permit for business-as-usual activities, we have:

- calculated the reduction in number of permit applications approved that are no longer required;
- assumed that 70 per cent of task are 'time sensitive' – waiting two weeks for permits would lead to delays in completing the end task;
- assumed that:
  - in the high benefits scenario, the economic costs of delays are $9,000 per permit, based on the case study we have developed; and
  - in the low scenario, the economic costs of delay are $4,500 per permit, which is half of what the case study suggests.

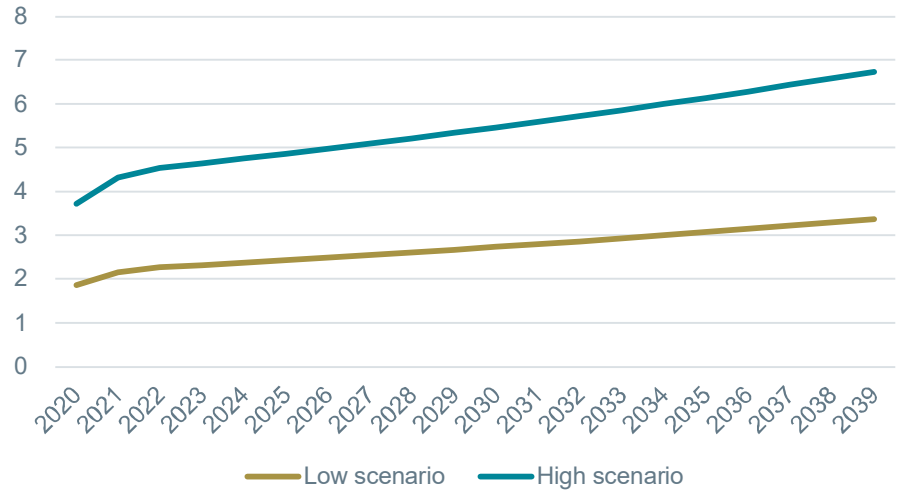
Table 5 summaries the key assumptions we have used to estimate benefits of avoided delays for business-as-usual activities.

Table 4: Key assumptions used to estimate benefits of avoided delays for business-as-usual activities

Assumption	Low scenario	High scenario
Proportion of SPV jobs where waiting for permits would lead to delays in the end task	**70%**	**70%**
Benefits per permit	**$4,500**	**$9000**

Figure 6 presents the benefits expected to be achieved from avoided delays on time critical projects each year in the low and high scenario.

Figure 6: Benefits from avoided delays for business-as-usual activities over time, undiscounted, $ million



The increase in nominal benefits through time reflects the assumed growth rate in permit applications of 2.3 per cent discussed in section 3, above.

Over the evaluation period, we estimate that the benefits of avoided time delays for business-as-usual activities to be between $33.2 and $66.3 million in present value (PV) terms. Major events are analysed separately in section 4.2, below.

4.2 Avoided time delays from no longer a needing permit – major events

Police can waive the requirement for permits in a state of emergency. For example, if a crane is needed to help clear damage caused by natural disasters.

Our discussions with stakeholders have highlighted that SPVs are needed to help with 'major events' that are not states of emergency. We have defined 'major events' as infrequent events where time delays could result in significant economic losses but permit requirements would not be waived. As these 'major events' are not state of emergencies, SPV operators would still be required to apply for a permit and await an approval before they can send an SPV.

Discussions with stakeholders suggests that in the past two to three years there have been several incidents that could be classified as 'major events'. Examples include:

- private companies needing to move large equipment to safe locations to avoid damage from flooding or bushfires;
- responding to a major equipment failure at a salmon farm, which was time critical to avoid the loss of an estimated 2 million salmon – see salmon farm case study; and
- moving large back-up electricity generators following the failure of electricity transmission infrastructure in Tasmania.

We understand from industry operators that there have been around four to five of these events per year occurring in the past three to four years. In some cases, it is possible that some of these events would have been related to a state of emergency where permit requirements would have been waived.

Notwithstanding, discussion with stakeholders indicate that permit requirements would not have been waived for some of the examples above, such as equipment failure at the salmon farm and private companies needing to move large equipment to safe locations. Further discussions with stakeholders indicate that there have been one to two 'major events' tend to occur once or twice per year on average.

To understand the potential economic losses associated with delays in response to major events, we have asked stakeholders for details regarding the major equipment failure at the salmon farm. We have used this information to develop the salmon farm case study below.

Salmon farm case study

A salmon farm in Southern Tasmania experienced a significant aeriation plant/equipment failure at its facility.

The lack of aeriation meant that the salmon at the farm was in danger of dying from insufficient oxygen content in the water. An estimated 2 million plus salmon were potentially at risk with an estimated market value of $14 million at the time, considering the level of development of the salmon. The value of salmon to the business would be around $60 each at full maturation.

The plant/equipment replacement was time critical – the salmon would have perished without an 'immediate' fix. It follows that the salmon would have perished if the SPV operator needed to apply and wait for a permit before completing this task. With HVAMS in place, the necessary crane was dispatched without the need for a permit.

We have adopted what we consider to be conservative assumptions to estimate the benefits associated with avoided time delays for 'major events'. We have assumed that:

- there are 0.5 to 1 'major events' per year that benefit from HVAMS – this compares with industry feedback that suggests that there are around one to two 'major events' per year; and
- the economic loss per major event from delays is between $5 to $10 million, recognising that benefits may vary significantly by event – this compares to the $14 million of the economic benefits arising from the salmon farm case study.

Using the assumptions above, we calculate that the benefits of arising from avoided time delays for 'major events' is $2.5 to $10 million per year. Table 5 summaries the key assumptions we have used to estimate benefits of avoided delays for major events.

Over the evaluation period, we estimate that the benefits of avoided time delays for major events to be between $32.4 and $129.8 million in PV terms.

Table 5: Key assumptions used to estimate benefits of avoided time delays for major events

Assumption	Low scenario	High scenario
Number of 'major events' per year that benefit from HVAMS	**0.5**	**1**
Benefit of single major event	**$5 million**	**$10 million**
Benefits per year	**2.5 million**	**10 million**

4.3 Operational efficiency and flexibility

Operational efficiency and flexibility refer to the benefits associated an SPV operator being able to use an alternative vehicle and/or route to complete a particular task. Permits are often route and vehicle specific. In other words, an operator cannot use an alternative route or vehicle when operating under a permit, thereby reducing an operator's flexibility in completing a task.

HVAMS generates a network access map for any vehicle configuration in real time. This allows operators to select a vehicle and/or route to complete a task. The importance of this benefit was emphasised by the industry representatives with whom we spoke with.

Examples provided by operators of benefits of improved flexibility include:

- if a particular crane is held up for longer than expected at a construction site due to weather or other delays, operators do not need to apply and wait for a permit for an alternative crane to complete the new task;
- if a task changes, such that a smaller crane could be used, operators can dispatch the more appropriate crane instead;
- if a crane is dispatched to complete a task in a different part of the state and is far away from its next scheduled job, an operator can choose to dispatch a crane that is closer instead; and
- an operator can access a variety of different route options, allowing an operator to select the most efficient route, depending on traffic, weather and other conditions.

Given the wide range of tasks serviced by the SPV industry and the myriad of ways in which operational flexibility benefits may be realised, it is challenging to quantify the full extent of this benefit. The ability to modify the vehicle or route choice to improve efficiency is likely to lead to more efficiency used of the SPV fleet and/or time saving for the majority of tasks.

To quantify the benefits associated with improved operational efficiency and flexibility, we have:

- calculated the reduction in number of permit applications approved that are no longer required;
- assumed that improved operational flexibility and efficiency leads to a one to two hour saving for SPVs per task; and
- assumed that value of time for an SPV is $600 per hour[6].

Using the assumptions above, we calculate that the benefits of improved operational flexibility and efficiency to be between $600 to $1,200 per task. Table 6 provides a summary of the key assumptions we have used to estimate benefits arising from improved operational efficiency and flexibility.

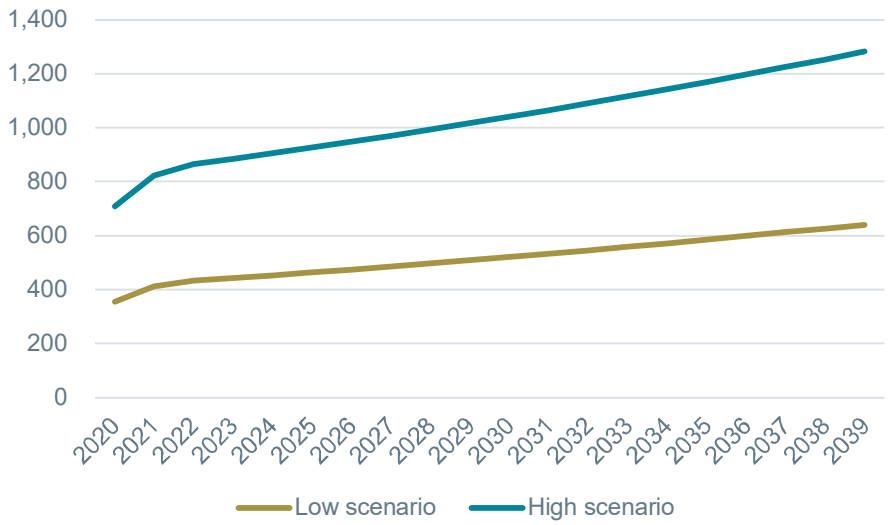
Table 6: Key assumptions used to estimate operational flexibility benefits

Assumption	Low scenario	High scenario
Average time saving per task due to operational efficiency	**1 hour**	**2 hours**
Hourly SPV hire rate	**$600/hour**	**$600/hour**
Benefits per task	**$600**	**$1,200**

Figure 7 presents the benefits expected to be achieved from operational flexibility each year in the low and high benefits scenario.

Over the evaluation period, we estimate that the benefits of improved operational efficiency and flexibility to be between $6.3 and $12.6 million in PV terms.

Figure 7: Benefits from operational flexibility over time, undiscounted, $ thousand



[6] This reflects the market hourly rate of hiring a five axle crane, including driver. This estimate has been provided by industry.

4.4 Admin savings from reduced permit applications

The process of submitting and assessing permit applications is time consuming for operators and road managers. This benefit category captures the permit application admin costs that are avoided from the reduced number of permit applications. It is distinct from avoided delays on time critical projects and major events, which captures the benefits of avoided delays associated with waiting for a permit application to be approved.

HVAMS has led to a significant reduction in permit applications, thereby leading to admin savings for operators and road managers.

To calculate the costs of processing a permit, we have assumed that:

- calculated the reduction in number of permit applications and associated number of assessments by road managers; [7]
- assumed that:
  - it would take 0.5 to 1 hour for industry to complete a permit application at a cost of $25 per hour;
  - it would take road managers 1 to 2 hours to assess a permit application at a cost of $64 per hour[8]; and
  - operators will need to pay a permit application fee of $78 per permit to the NHVR. [9]

Table 7 provides an overview of the assumptions we have used.

Table 7: Assumptions used to estimate benefits from admin savings on permit applications

Assumption	Low scenario	High scenario
Time to prepare permit application (industry)	**0.5 hours**	**1 hour**
Time to assess permit application (road manager)	**1 hour**	**2 hours**
Hourly rate – industry admin	**$25**	**$25**
Hourly rate – road manager	**$64**	**$64**
NHVR permit application fee	**$78**	**$78**

Total admin savings per year are equal to the sum of the industry and road managers admin savings. Figure 8 presents the benefits expected to be achieved from admin savings on permit applications each year in the low and high benefits scenario.

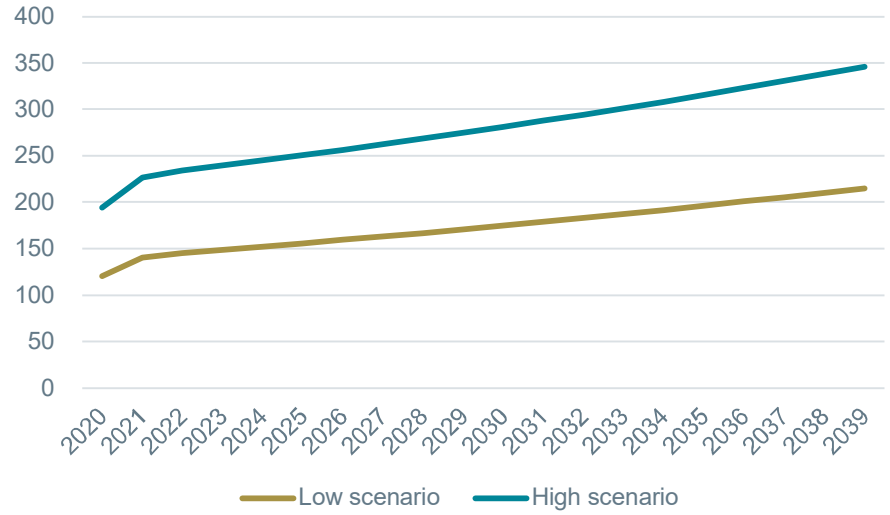
Overall, we estimate that admin saving benefits from the reduced number of permit applications to be between $2.1 and $3.4 million the evaluation period in PV terms.

[7] There are more road manager assessments than permit applications because one permit application may require consent from more than one road manager. We have obtained data from the Department of State Growth on road manager assessments, and assumed that the assessments would grow at 2.3 per cent each year, to be consistent with our approach for permit applications.

[8] This is based on average hourly rate of a transport manager in Australia. See https://au.talent.com/salary?job=transport+manager.

[9] See NHVR website, available at https://www.nhvr.gov.au/law-policies/fee-schedule, accessed 4 November 2022.

Figure 8: Benefits from admin savings over time, undiscounted, $ thousand



5. Economic benefits of HVAMS not quantified in this analysis

In section 3.4, we discuss the seven benefit categories we have identified that are associated with extending HVAMS to SPVs. in section 4, we quantify three of the benefit categories that we have identified. This section discusses the remaining four benefit categories that we have identified but have not quantified in this analysis, namely:

- improved network access for SPVs from improved access decision making;
- improved ability to respond to state of emergencies;
- reduced stress for operators and compliance benefits; and
- Improved ability for operators and road managers to plan for the future.

5.1 Improved network access for SPVs

Prior to HVAMS, local road managers did not necessarily have the asset information and/or technical expertise, or ability to procure, to make informed access decisions. It follows that local road managers may (not unreasonably) restrict access when it is unclear if access can be accommodated. The adoption of HVAMS means that access decisions are made automatically based on asset capability, thereby increasing network access for SPVs.

HVAMS has also likely improved access for SPVs in other ways. For example, prior to HVAMS, operators had limited transparency on what roads could potentially be available via permit. In other words, an operator may not be fully aware of the roads that are potentially available to them. HVAMS has resolved this by providing operators with a comprehensive network that corresponds to the nominated vehicle.

Another way in which HVAMS has improved network access for SPVs is through its granularity. By way of example, cranes operated under only five different classes of notices prior to HVAMS. Road managers would need to consider whether a road can accommodate the most impactful crane within a class before including a road into a notice. In other words, road managers needed to consider the 'worse case' scenario.

In contrast, HVAMS's approach is to provide up to approximately 5,000 SPV potential configurations, thereby avoiding higher impact vehicles determining the network and conditions of access available to other, less impact vehicles.

5.2 Improved ability to respond to state emergencies

As mentioned in section 4.2, police can waive the need for permits if a crane is required to help respond to a state emergency, such as dealing with flooding or bushfires.

Although there is no longer a need to apply for a permit, we understand that it is common for local road managers, the Department, and industry operators to work together to discuss how SPVs can move to where they are required in a safe manner and without causing excessive damage to the road network. It follows that road managers and the Department are effectively making access decisions to determine how SPVs can travel to the required location.

Prior to HVAMS, these access decisions would have been done manually and under time 'pressure' with potentially limited available and accurate information, thereby requiring time for assessment to be completed and then communicated to SPV operators.

In contrast, HVAMS means that these decisions can be automated and communicated to emergency managers and SPV operators in real time on

demand. This improves the ability for SPV operators to respond to state emergencies in a timelier manner, which could reduce and likely 'contain' the damage caused by these emergencies.

5.3 Reduced stress for operators and compliance benefits

A theme that came up regularly in our discussions with industry was the personal and business stress arising from dealing with access issues prior to HVAMS. As a significant proportion of tasks are required within two weeks (the average turnaround time for permits), and meeting and managing client expectations can be difficult and challenging.

Further, permit applications can take longer than 14 days to be approved and may be rejected. This is beyond the control of SPV operators and may mean that SPV operators are unable to deliver on client and contractual commitments. This creates stress for SPV operators and can provide a perverse incentive to travel without the required permit.

HVAMS means that permits are no longer required for the vast majority of tasks, which means SPVs can be dispatched without needing to apply and wait for a permit. This reduces stress faced by operators and improves compliance with the HVNL.

5.4 Improved ability for operators and road managers to plan for the future

Prior to HVAMS, a whole of network view of the varying capability of numerous road assets did not exist. HVAMS provides road managers and investment decision makers with a holistic view of the deficiencies of the road network, including where the potential capability gaps are against SPV demand through telematics. This information could be used to inform future investment decisions, such as bridge and structure upgrade and strengthening investments.

Similarly, prior to HVAMS, industry did not have a holistic view of the level of access associated with different vehicle configurations, particularly for innovative vehicles that are heavier and/or larger than existing vehicles. A key risk of investing in innovative vehicles is that it may have very limited and uncertain access to the road network.

HVAMS provides industry with transparency on the level of access and conditions associated with different vehicle configurations. Operators can use this information to determine whether or not to invest in more innovative vehicles.

6. Economic costs of including SPVs into HVAMS

This section discusses the total costs of introducing HVAMS into Tasmania and the costs associated with including SPVs into HVAMS.

6.1 Overall costs of HVAMS

The Department has provided us with information on the total costs of implementing HVAMS. Overall, the Department estimates that total costs associated with HVAMS is around $9.9 million between 2014 to 2023. These costs relate to:

- the costs of engaging external consultants to collect the required asset data; and
- the salary and on-costs of Department staff to build, implement and operate HVAMS.

Further, the Department has provided information on the cost drivers of its expenditure:

- costs incurred between 2014 and 2016 relate to introducing HVAMS to the OSOM industry – around $2.7 million was incurred during this period;
- costs incurred between 2017 and 2019 relate to extending HVAMS to SPVs and ADF – around $2.3 million was incurred during this period; and
- costs incurred between 2020 and 2023 relate to extending HVAMS to some PBS vehicles – around $4.9 million is expected to be incurred during this period.

The Department has advised that one full time equivalent staff (FTE) will be required to operate and maintain HVAMS in its current state for SPV's from 2024 onwards. The Department has further advised that the costs associated with one FTE staff is estimated to be $120,000 per year.

6.2 Costs of extending HVAMS to SPVs

Based on the information provided by the Department, we have assumed that the upfront, capital costs associated with extending HVAMS to SPVs is around $2.3 million. We note that some of these costs could reasonably be allocated to extending HVAMS into ADF. However, to be conservative we have assumed that the entirety of the $2.3 million is related to SPVs. Table 8 provides a breakdown of these upfront costs by year.

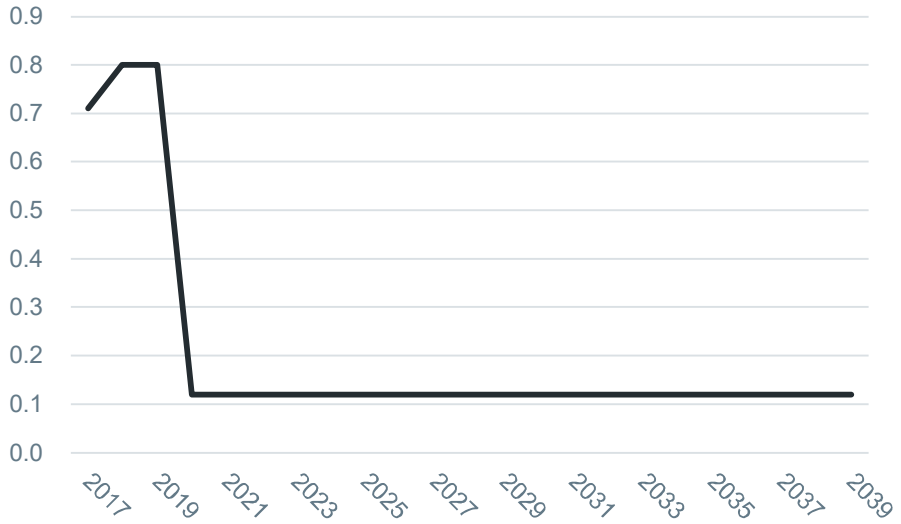
Table 8: HVAMS upfront costs, $ million

	2017	2018	2019
HVAMS cost (nominal)	0.7	0.8	0.8

In addition to the upfront costs, there are ongoing costs associated with maintaining HVAMS for SPVs. We note that the Department has advised that one FTE is sufficient to operate HVAMS in its current state in its entirety. It follows that only a proportion of this FTE would be related to extending HVAMS to include SPVs. However, to be conservative, we have assumed that extending HVAMS to include SPVs would require the Department to hire one additional FTE, at a cost of $120,000, per year.

Figure 9 sets out the estimated cost profile from 2017 to 2039, including upfront and ongoing costs.

Figure 9: Cost profile for inclusion of SPVs in HVAMS, undiscounted, $ million



In total, we estimate the costs of extending HVAMS to SPVs is $4.6 million over the evaluation in PV terms.

7. Overall results

This section sets out the overall results of the cost-benefit analysis.

Our analysis suggests that extending HVAMS to SPVs is expected to deliver significant economic benefits. Over the evaluation period and in PV terms, we estimate that extending HVAMS into SPVs:

- is expected to deliver economic benefits of between $74.1 million and $212.2 million, where:
  - the largest benefit is avoided time delays from major events, with benefits ranging from $32.4 million to $129.8 million;
  - the second largest benefit is avoided time delays for business-as-usual activities, with benefits ranging from $33.2 million to $66.3 million;
  - the third largest benefit is improved operational efficiency and flexibility, with benefits ranging from $6.3 million to $12.6 million; and
  - benefits from admin savings from reduced permit applications ranges from $2.1 million to $3.4 million;
- is expected to cost $4.6 million; and
- is expected to deliver a net present value of between $69.5 million and $207.6 million, with a benefit cost ratio of between 16.2 to 46.3.

In our view, the results of our CBA are conversative because:

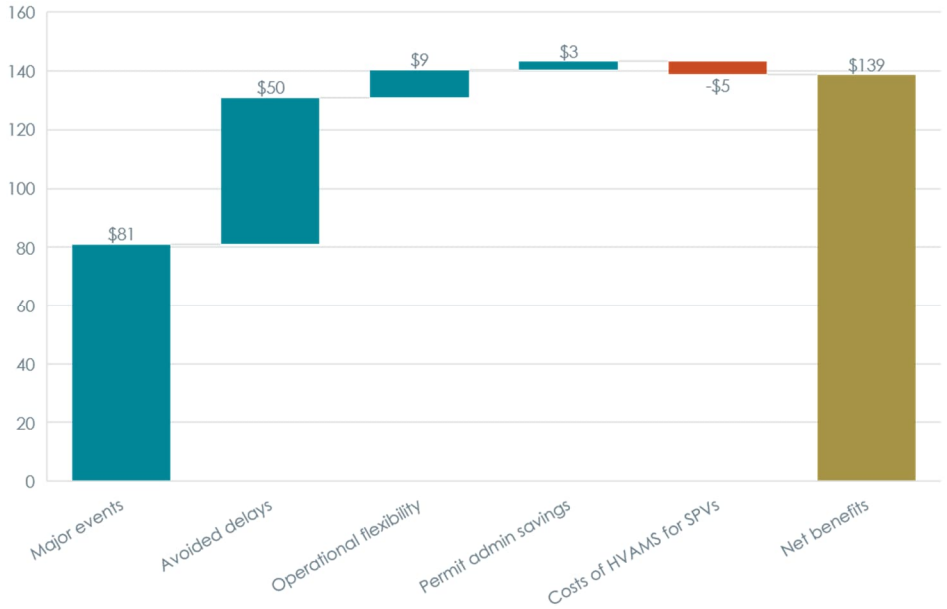
- we have only quantified three of the seven benefit categories identified; and
- where possible, we have used what we consider to be conservative assumptions to estimate the benefits and costs.

Table 9 and Figure 10 summarises the results of our analysis.

Table 9: Benefits and costs of extending HVAMS to Special Purpose Vehicles over the evaluation period ($ million, PV)

Benefit/cost category	Low scenario	High scenario
Avoided time delays from no longer needing permits – business-as-usual activities	33.2	66.3
Avoided time delays from no longer needing permits – major events	32.4	129.8
Operational efficiency and flexibility	6.3	12.6
Admin savings from reduced permit applications	2.1	3.4
Present value of benefits	74.1	212.2
Present value of costs	4.6	4.6
Net benefits	69.5	207.6
BCR	16.2	46.3

Figure 10: Net present value of benefits of including SPVs in HVAMS, 2017-2039



A1. Modelling assumptions

This section sets out the assumptions we have used in this study.

We have sourced parameter values from the Australian Transport Assessment and Planning (ATAP) guidelines[10] where possible. The ATAP guidelines have been endorsed by all Australian jurisdictions and are published by the Transport and Infrastructure Council for the purposes of economic evaluation and cost-benefit analysis.

The time period we have evaluated is from FY2016-17 to FY2038-39, comprising:

- a 3 year period to extend HVAMS to SPVs (FY2016-17 to FY2018-19); and
- a 20 year period to evaluate the benefits arising from extending HVAMS to SPVs (from FY2019-20 to FY38-39).

We have used a seven per cent discount rate to calculate the present value of benefits and costs. This is consistent with Infrastructure Australia's assessment guidelines.[11] The base year of our analysis is FY2021-22.

[10] Transport and Infrastructure Council, *Australian Transport Assessment and Planning Guidelines – PV2 Road Parameter Values* August 2016.

[11] Infrastructure Australia, Assessment Framework, March 2018, p 104.

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