VAGO
Victorian Auditor-General's Office

Major Infrastructure Program Delivery Capability

August 2021

Independent assurance report to Parliament
2021–22: 2

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The Hon Nazih Elasmar MLC
President
Legislative Council
Parliament House
Melbourne

The Hon Colin Brooks MP
Speaker
Legislative Assembly
Parliament House
Melbourne

Dear Presiding Officers

Under the provisions of the *Audit Act 1994*, I transmit my report *Major Infrastructure Program Delivery Capability*.

Yours faithfully

Andrew Greaves
Auditor-General

18 August 2021

The Victorian Auditor-General's Office acknowledges Australian Aboriginal peoples as the traditional custodians of the land throughout Victoria. We pay our respect to all Aboriginal communities, their continuing culture and to Elders past, present and emerging.

Contents

Audit snapshot

Are relevant public sector agencies strategically planning the material and human resources needed to deliver Victoria's major infrastructure projects?

Why this audit is important

Victoria's major projects pipeline has expanded dramatically since 2016, particularly for transport projects. Coinciding with this, the infrastructure boom on Australia's east coast has led to competition for workers and material resources.

To deliver projects cost-effectively and on time, public sector agencies need to identify resource gaps and strategically address any shortages.

Who we examined

- Department of Treasury and Finance and its Office of Projects Victoria
- Department of Transport and its Major Transport Infrastructure Authority
- Department of Jobs, Precincts and Regions.

What we examined

We examined if agencies:

- have assessed the resources needed across the pipeline
- have addressed resource shortages and risks
- collaborate with each other and the relevant industries to plan for resources.

What we concluded

The audited agencies are not sufficiently strategic in planning for the material and human resources they need to deliver major government infrastructure projects. The consequence of this is that the risk of cost overruns and delays will be higher than it needs to be.

The agencies have identified potentially critical resource shortages and risks. However, there are significant gaps in the information they use to assess and address these shortages and how they coordinate this work.

As a result, no agency fully understands the construction industry and public sector's ability to deliver the government's pipeline, or how effective their work to mitigate resource shortages is. The agencies' advice to government does not consistently disclose the extent of these knowledge gaps. This reduces the reliability of their advice to the government about these risks.

Key facts

High investment in Victoria

$111bn
invested in 155 Victorian major projects between 2021–22 and 2024–25

35%
higher infrastructure investment in 2021–22 than in 2019–20

Delivery challenges for major projects

$3.8bn
in cost increases between 2019–20 and 2020–21

30
projects delayed between 2019–20 and 2020–21

Key shortages in resources

4 000
workers short for civil construction projects by 2022

Decline
in enrolments in construction apprenticeships and traineeships since 2015

Sources: 2021–22 state Budget, 2019–20 state Budget, *Skills Demand Snapshot: Victoria's Civil Sector*, Victorian Skills Commissioner, 2020, and *Results of 2020 Audits: Technical and Further Education Institutes*, VAGO, 2021.

What we found and recommend

We consulted with the audited agencies and considered their views when reaching our conclusions. The agencies' full responses are in Appendix A. We use the audited agencies' current names throughout the report for simplicity. Section 1.4 identifies their former names for reference.

Assessing resource shortages and risks

To support the delivery of major infrastructure projects, the audited agencies need to understand the human and material resources required. We focused on how they assess four key aspects of these resources:

- the construction industry workforce
- the public sector workforce
- the construction market, which includes construction firms and supply chain businesses
- the building materials used, such as the supply of extractive materials and disposal of contaminated spoil.

If an agency finds or predicts a shortage, it needs to design and implement strategies to address it to mitigate the potential impact on project delivery. However, the audited agencies' current ability to advise the government about shortages and mitigation strategies is limited because their resource assessments are outdated and there are gaps in their data.

Extractive materials are quarry products, such as rock, gravel and sand.

Contaminated spoil is the earth that tunnelling and construction activities dig up that does not meet standards for 'clean' waste. The level of contamination influences whether it can be re-used, treated or sent to landfill.

Identifying shortages and risks

Except for the Department of Jobs, Precincts and Regions' (DJPR) forecasts about extractive materials, the audited agencies' assessments of resource shortages and risks lack quantitative data. They also lack accurate and current detail about the size and timing of most identified shortages. In particular:

Audited agencies have assessed the …	and have identified shortages and risks, such as …	But the accuracy of these assessments is reduced because …
industry workforce	in 2020, the Department of Treasury and Finance (DTF), working with other departments and audited agencies, identified that 17 construction skill areas have a high risk of shortages.	national data classifications are limited to certain occupation types, which makes it hard for DTF, the Office of Projects Victoria (OPV) and the Major Transport Infrastructure Authority (MTIA) to quantify the size and timing of shortages in many specific occupation types, such as 'tunnelling engineer' and 'road constructor'.
	in 2020, MTIA assessed that 98 per cent of high-skilled construction occupations will have some level of shortage between 2022 and 2025.	
public sector workforce	in 2016 and 2017, DTF and MTIA determined that departments and delivery agencies were concerned about the high risk of shortages in project leadership, commercial and legal expertise and technical skills.	DTF, OPV and MTIA have not updated their assessments since 2017 or collected the data they need to quantify the size of any shortages.
construction market	in 2020, DTF, OPV and MTIA identified the risk that the small pool of domestic tier 1 construction firms may not be able to take on new major projects.	DTF, OPV, MTIA and the Department of Transport (DoT) do not collate data on how many domestic tier 2 and 3 firms and international tier 1 firms could participate in the government and transport pipelines.
building materials	in 2016, DJPR forecast shortages in the extractive materials needed for future construction in the state (not just the government pipeline) by 2026. It predicted that these shortages would further increase by 2050.	due to commercial confidentiality issues, DJPR has had difficulty getting reliable data from quarry operators and the construction industry on the volume of materials that can potentially be supplied from existing and planned quarries and what the demand from major projects is likely to be. DJPR is working to improve its data collection, for example by introducing new regulations requiring quarries to report on their available resources from July 2021. Since the 2016 forecasts, DJPR has implemented actions to address forecast shortages. However, the government pipeline has continued to expand significantly since then. These factors are changing both supply and demand for extractive materials.
	in 2020 DoT, working with other departments and audited agencies, assessed that Victoria does not have enough re-use, treatment or landfill sites available to manage the rapidly increasing volumes of contaminated spoil that the government pipeline is generating.	DoT has not yet quantified the state's capacity to re-use, treat or dispose of contaminated spoil but is planning to do this. It has not estimated how much spoil upcoming projects, such as the Suburban Rail Loop, are likely to generate.

While most of these assessments are recent, some of the extractive materials and public sector workforce assessments date back to 2016 and 2017.

DTF, OPV and MTIA continue to rely on outdated information about risks to the public sector's ability to deliver the government pipeline. This is despite the government's annual infrastructure investment more than doubling from $9.1 billion in 2016–17, when these agencies last assessed the workforce, to a forecast $24.2 billion in 2021–22. While the public sector workforce is a smaller component of major projects than the industry workforce, it is still critical to ensuring projects are scoped, procured and managed well.

DTF and OPV are the central agencies that oversee the government pipeline's delivery. However, they have not consolidated information about shortages from all of the audited agencies' assessments. As a result, they do not have a holistic understanding of the size and timing of shortages for the entire government pipeline.

This lack of a holistic understanding, and knowledge gaps about the size and timing of shortages, mean the audited agencies do not have the information they need to:

- prioritise which shortages to address first to support the government pipeline's delivery
- determine the type and scale of actions that they or other departments and agencies need to deliver to increase the capability and capacity of the industry and public sector workforces, market and materials
- accurately advise the government about the likely impacts of shortages on the delivery of the government pipeline and the actions required to mitigate these risks.

Modelling resource capability and capacity

DJPR, OPV and MTIA each use technically reliable models to forecast specific aspects of the construction industry workforce:

- DJPR models employment demand for the whole state, across all industries.
- OPV models the demand for construction industry workers for major projects.
- MTIA has modelled the supply and demand for industry workers for the transport pipeline.

DJPR and OPV also work with the Department of Education and Training (DET) when developing their forecasts. DET models industry workforce supply for the state as part of its work managing the technical and further education (TAFE) and training system. DJPR and DET's statewide models predate OPV's new workforce modelling for government major projects.

DJPR also models the supply and demand for extractive materials.

Constraints to the modelling

DJPR, OPV and MTIA designed their industry workforce models to meet specific but separate information needs. They did not design them to also integrate with each other. The differences in their forecasting methods, assumptions, constraints and outputs mean DJPR and OPV cannot join their models together or with DET's in their current forms. As a result, DJPR and OPV's models do not provide consistent and

Tier 1 construction firms are firms that typically manage Victoria's larger infrastructure projects, such as projects worth over $1 billion.

Tier 2 firms typically work on major projects up to $500 million or contribute to tier 1 consortiums on larger projects.

Tier 3 and below firms typically work on projects below $100 million and are part of the supply chain for larger projects.

The **government pipeline** is the program of all major government infrastructure projects. The **transport pipeline** is the transport sector subset of the government pipeline.

Major projects are projects valued at $100 million or more. These include **megaprojects**, which are valued at $2 billion or more.

In this report, **capability** refers to the skills and experience that the industry and public sector workforces need to deliver a major project.

Capacity refers to the availability of construction firms that can bid for a major project contract and the quantity of human and material resources required to deliver it.

reliable information about the size and timing of skill shortages. The lack of integration is a missed opportunity for these agencies to better understand:

- the human and material resources that the industry needs to deliver the government pipeline
- how supply and demand for resources across the government pipeline influences the transport pipeline.

DJPR and OPV's models also do not consider macro-economic factors that influence labour supply, such as government policies that impact workforce capability.

Additionally, DJPR's workforce modelling does not include the distribution of skills across the occupations and industries under the Australian and New Zealand Standard Classification of Occupations (ANZSCO). This means DJPR only forecasts employment by industry, and not by occupations within industries.

The **ANZSCO** system is a framework for classifying occupations. The classifications identify broader groups of construction occupations but do not list all individual occupations in the construction industry. For example, while there is a classification for civil engineers, it does not separately identify some subtypes, such as tunnelling engineers.

OPV's workforce model only forecasts demand for individual projects and subsets of projects. It cannot model demand for the entire government pipeline, even though this would improve its understanding of potential shortages for individual projects.

OPV and MTIA's models do not distinguish between 'relative' shortages, which occur when there are enough people who want employment but need training or incentives to enter the industry, and absolute shortages, which occur when there are simply not enough people wanting work. When the government decides how to overcome a shortage, this distinction is fundamental because it determines the types of actions that it can take.

Improvements to models

DJPR, OPV and MTIA are updating their models to address some of these limitations. DJPR is also developing a new model to improve its 2016 assessment of supply and demand for extractive materials.

In 2020, DTF and DET jointly led the Skills Interdepartmental Committee (IDC), which included all of the audited agencies. The Skills IDC, which ceased operating in December 2020, aimed to coordinate and develop actions to build the industry workforce. It identified the need for OPV and DJPR to integrate their models with DET's to understand supply and demand in the construction market.

OPV and DJPR have started work to better share and align results and analysis between their separate models, and with DET's. However, OPV and DJPR are not planning to revise and integrate their models. Without this they cannot address the differences in their modelling approaches and provide reliable information to government about skill shortages that may impact the government and transport pipelines.

Recommendations about assessing resource shortages and risks

We recommend that:		Response
Department of Treasury and Finance, including the Office of Projects Victoria Department of Transport, including the Major Transport Infrastructure Authority	1. to the extent possible, collect and collate comprehensive, accurate, quantitative information, research and analysis to annually estimate and monitor the size and timing of resource shortages and risks across the government pipeline (see sections 2.1, 2.2, 2.3, 2.4 and 2.5)	**Accepted by:** Department of Treasury and Finance Department of Transport
Department of Jobs, Precincts and Regions	2. in consultation with the Department of Treasury and Finance and its Office of Projects Victoria, the Department of Education and Training and other relevant agencies, leads the development of an integrated, aggregate, macro-economic model of the Victorian economy that can determine key drivers of the labour market (see Section 2.6)	**Accepted in principle by:** Department of Jobs, Precincts and Regions
	3. ensures that the state's employment demand modelling includes the distribution of skills across occupations and industries under the Australian and New Zealand Standard Classification of Occupations and works with other agencies as needed to do this (see Section 2.6)	**Accepted in principle by:** Department of Jobs, Precincts and Regions
Department of Treasury and Finance, including the Office of Projects Victoria	4. revises its major projects industry workforce demand modelling to enable it to: • differentiate between absolute and relative workforce shortages • account for cumulative workforce demand across the government pipeline (see Section 2.6)	**Partially accepted by:** Department of Treasury and Finance
	5. works with the Department of Jobs, Precincts and Regions and the Department of Education and Training to ensure its revised major projects workforce demand model integrates with their state macro-economic and industry workforce models to identify potential skills shortages across the government pipeline (see Section 2.6)	**Accepted by:** Department of Treasury and Finance
Department of Transport, including the Major Transport Infrastructure Authority	6. uses results from government pipeline modelling by the Department of Treasury and Finance and its Office of Projects Victoria and the Department of Jobs, Precincts and Regions to understand its workforce forecasts for the transport sector and revises its forecasts to make the differences between absolute and relative shortages clear (see Section 2.6).	**Accepted by:** Department of Transport

Addressing resource shortages and risks

The audited agencies are acting to address resource shortages and risks. However, except for DJPR's planning for extractive materials shortages, they have been slow to coordinate and deliver this work following the government pipeline's rapid growth since 2016.

This delayed response poses risks to delivering the government pipeline within the intended timeframes, budgets and quality standards, particularly for the biggest and most complex projects.

Sequencing projects across the pipeline

In 2015, DTF advised the government of the need to strategically schedule major projects both within the government pipeline and with other states and territories to help reduce competition for resources.

In 2019, DTF advised the government that separate investment decisions for individual projects across the pipeline has led to 'un-strategic scheduling'. This has exacerbated shortages and risks, rather than helping to reduce them.

DTF has committed to working with agencies to manage peaks in construction activity. Despite this, DTF and OPV do not advise the government or delivery agencies on project timing and sequencing options to help alleviate shortages and risks when projects compete for resources. DoT and MTIA do not do this for the transport pipeline either.

Planning strategies and actions to build capability and capacity

Collectively, the audited agencies have six key strategies underway or in draft to respond to the resource shortages and risks they have identified across the government and transport pipelines. Figure A lists these strategies and the resourcing aspects that they address. Appendix D contains information on the strategy actions and IDC members.

Figure A: **Agencies' key strategies to address delivery capability and capacity needs**

			Resourcing aspects focused on			
Agency	Strategy	Year	Public sector workforce	Industry workforce	Construction market	Building materials
OPV	Major Infrastructure Capability and Capacity Strategy (major infrastructure strategy)	2017	✓	✓	✓	N/a
DTF	Optimising Victoria's Infrastructure Investment reform strategy (investment reform strategy)	2019	✓	✓	✓	N/a
	Skills for Major Projects IDC strategy (Skills IDC strategy)[(a)]	2020	N/a	✓	N/a	N/a
DJPR	*Helping Victoria Grow: Extractive Resources Strategy* (extractives strategy)	2018	N/a	N/a	N/a	✓
MTIA	Industry Workforce Strategy (draft)	2020	N/a	✓	N/a	N/a
DoT	Spoil Management Strategy IDC Spoil Management Strategy (draft)	2020	N/a	N/a	N/a	✓

Note: N/a denotes not applicable.

Note: [(a)]DTF jointly led the Skills IDC strategy with DET.

Source: VAGO.

The audited agencies can also deliver actions outside of their strategies. For example, MTIA delivers additional actions for industry skills, such as supporting the Victorian

Tunnelling Centre and the MetroHub training centre for the Metro Tunnel Project. For this audit, we focused on assessing the actions that agencies are delivering through the six key strategies.

Content in agencies' strategies

Except for DJPR, the audited agencies cannot consistently show that their strategies:

- target the causes of shortages and risks
- prioritise which causes to address
- have a clear rationale that supports the actions they select.

For example, OPV knows there is a risk that Victoria does not have enough skilled public sector leaders to deliver the government pipeline. However, it does not know if this is because there are not enough leadership development, recruitment and retention programs across departments and delivery agencies or because the existing programs do not work, or both.

DTF does not have a transparent rationale for how it prioritised shortages and risks and selected actions to mitigate them in its 2019 investment reform strategy. This means it is not clear if its strategy addresses the highest-priority issues and its actions are the best ways to address risks.

MTIA could not show us how it uses its knowledge of workforce shortages and their causes to determine what size its training programs need to be.

Coordinating strategies and actions

The audited agencies do not effectively coordinate with each other to fully address capability and capacity risks across the government and transport pipelines.

In 2015 and 2016, DTF, OPV, MTIA and DJPR identified that concurrent, expanding infrastructure pipelines across Australia's east coast were triggering intense competition for human and material resources. DTF and MTIA's reviews at that time recommended that departments and agencies coordinate their work to help make the resources needed to deliver the government pipeline available.

The audited agencies took several steps in response, including:

- establishing OPV in 2016
- introducing the Major Projects Skills Guarantee in 2016
- commencing OPV's major infrastructure strategy in 2017
- joining New South Wales (NSW) and the industry to form the NSW–Victoria Construction Industry Leadership Forum in 2017.

In 2015, DJPR established its Extractives Strategy Taskforce (which was then called the Extractive Industries Taskforce) and started assessing supply and demand for extractive resources.

However, DTF and OPV did not begin major efforts to coordinate their approaches until late 2018. By then, Victoria's average annual government infrastructure investment had almost doubled. DoT and MTIA made little progress in coordinating planning across the transport sector until 2020.

Introduced by the Victorian Government in 2016, the **Major Projects Skills Guarantee** requires construction projects valued at $20 million or more to use Victorian apprentices, trainees and cadets for at least 10 per cent of total estimated labour hours. It is now included as part of Victoria's *Local Jobs First Policy*.

The audited agencies have formed eight state-based committees, including both formal committees and taskforce arrangements, to coordinate their actions since 2015. This started with DJPR's Extractives Strategy Taskforce in 2015. DTF, OPV, DoT and MTIA formed the other seven committees from 2017, although they did not establish two of these until 2019 and the final two until 2020.

Only four of the eight committees have delivered at least some of the coordinated actions they committed to under their terms of reference. Three of the four had an action plan to identify tasks and monitor their progress, which was central to their success.

The audited agencies have all responded quickly to collaboratively assess and address the impact of the coronavirus (COVID-19) pandemic on planning and delivering major projects.

Engaging with the construction industry

DTF and OPV do not have an engagement strategy to guide and communicate how departments and agencies will work with the construction industry to deliver the government pipeline. Despite this, DTF, OPV, MTIA and DJPR do engage with the industry and have actions underway or planned to build the industry's capability and capacity. For example, DTF, OPV and MTIA have been members of the NSW-Victoria Construction Industry Leadership Forum since they joined with industry representatives and their NSW counterparts to form it in 2017.

While valuable, much of this work is not specific to the government pipeline, does not include all major projects or is specific to individual projects. DTF, OPV, DoT and MTIA also do not regularly consult on whole-of-pipeline resourcing with Victoria's Local Jobs First Commissioner or with the local, smaller suppliers that support the pipeline's delivery.

The **Local Jobs First Commissioner** advocates for local industries and checks if agencies and contractors comply with the local content and job commitments they make in government infrastructure contracts.

These gaps in whole-of-pipeline engagement limit the audited agencies' ability to:

- understand delivery risks to the government pipeline
- identify emerging issues
- prioritise and plan which issues need a government response
- keep the industry informed about their work.

While OPV has recognised the need for an industry engagement strategy since 2018, it has not developed one. In December 2019, MTIA and DTF advised the government that they would develop a state engagement strategy. They did not set a timeline for completing this work and advised us that their work is on hold while their response to the COVID-19 pandemic takes precedence.

Planning for the public sector workforce

DTF and OPV have cross-agency actions underway to build the public sector workforce's capability. These actions include training programs that OPV introduced in 2018 and 2019 to develop project leadership and commercial skills, such as contract management. While DoT and MTIA do not coordinate their actions to build workforce capability across public sector transport agencies, MTIA's five project offices each have actions underway to build their workforce's capability.

DTF, OPV and MTIA have not reviewed how well their actions are addressing the capability shortages and risks that DTF and MTIA identified in 2016 and 2017, despite

recognising the need to do this. For example, OPV has been responsible to the Treasurer since 2017 for ensuring the public sector has access to the skills it needs to deliver the expanding government pipeline. It does not have the data and monitoring required to provide this assurance.

DTF, OPV, DoT and MTIA's lack of coordination and planning reduces their ability to identify capability shortages and risks. It also limits their ability to efficiently align their actions to build the public sector's capability with the separate work that other departments and delivery agencies do.

Coordinating resources for the transport sector

As the portfolio department for the transport sector, DoT, with support from MTIA, advises the government on the need for new transport infrastructure, including options and timing for delivering projects.

DoT's business cases do not accurately advise the government on the feasibility of its recommended options, timeframes and costs for new projects. This is because DoT does not know the cumulative resourcing impacts of new projects and projects underway across the entire transport pipeline.

DoT does not have consolidated information about all aspects of delivery capability and capacity across the transport pipeline. DoT advised us that it is not funded to produce or consolidate this information, and its focus is on individual projects' scopes and costs. It instead relies on construction firms to secure the necessary resources required to deliver the projects.

Individual transport agencies deliver actions to build capability and capacity, such as assessing the market's capacity and developing project leaders in the public sector. However, they do not use a strategic sector-wide approach to coordinate and align this work. Our 2021 *Integrated Transport Planning* audit found that DoT is yet to establish an integrated approach to transport investment that is informed by relevant plans.

This leaves the government exposed to a range of risks across the pipeline, such as the risks that:

- there will not be enough suitable firms available or willing to deliver the work
- competition for stretched resources will lead to increased construction costs or delays
- transport agencies do not have the experience and skills needed to develop, procure and oversee the projects.

DoT and MTIA have started work to fill some gaps in their knowledge of the resources needed across the sector and started work on coordinated actions to build capability and capacity. However, their work is still draft. In 2020:

- DoT convened the Spoil Management Strategy IDC (the Spoil IDC), and with the other departments and agencies, drafted the Spoil Management Strategy to respond to the identified risk of shortage of disposal sites for contaminated soil from major projects.
- MTIA drafted its Industry Workforce Strategy to support the industry workforce needed to deliver the transport pipeline.

Monitoring building materials and equipment needs

None of the audited agencies or their committees monitor supply and demand for the main materials or equipment needed for the government pipeline, such as steel, extractive resources and options for managing contaminated spoil. As a result, they cannot identify and prioritise any emerging issues in material and equipment supply and advise the government of any significant risks. DJPR engaged with DoT and MTIA in 2020 and 2021 to get data on the transport pipeline's demand for extractive materials. It is jointly planning with MTIA to survey the construction industry contractors involved in transport major projects.

Delivering strategies and actions

Across their six strategies, the audited agencies have over 80 actions underway to help support or build delivery capability and capacity in the four resourcing aspects that we audited. They have made variable progress in delivering these actions. Their need to respond to the COVID-19 pandemic interrupted the audited agencies' progress during 2020.

DTF has completed two-thirds and OPV less than a quarter of the actions they committed to in their respective 2019 and 2017 strategies, even though none of the actions had completion dates later than December 2019. While DTF has started all 11 of the actions in its 2019 investment reform strategy, OPV has still not started three of the 11 actions under its major infrastructure strategy, which aim to help plan and build the public sector workforce and broaden market participation in major projects.

DTF and other departments jointly completed three of the five actions that the Skills IDC's strategy was able to deliver. They could not complete two actions or start the sixth action due to their additional work responding to the pandemic.

DoT's 2020 draft spoil management strategy and MTIA's 2020 draft Industry Workforce Strategy are still not finalised.

DTF, OPV, DoT and MTIA's lack of detailed planning for how to deliver their projects has contributed to delayed progress in delivering their strategies and actions.

DJPR is largely on track to deliver its 2018 extractives strategy by 2023. This includes significant progress to address its actions and recommendations from the Commissioner for Better Regulation's 2017 report *Getting the Groundwork Right: Better regulation of mines and quarries*. Despite this, DJPR did not complete these actions by June 2020 as planned.

Delaying these actions presents a risk to the government pipeline's successful delivery.

Measuring the impact of strategies and actions

None of the audited agencies have the performance measures, indicators and targets needed to show if their efforts are reducing capability and capacity shortages and risks as intended.

DTF, OPV, DoT and MTIA also do not assess if their capability and capacity strategies and actions help departments, other transport agencies and contractors to successfully deliver major projects within their planned scopes, costs and timelines.

The agencies' failure to measure the impact of their capability and capacity strategies and actions also increases the risk that they are wasting resources, effort and time.

Recommendations about addressing resource shortages and risks

We recommend that:		Response
Department of Treasury and Finance, including the Office of Projects Victoria	7. use aggregated information on Victoria's ability to deliver the government pipeline to inform their decisions and advice to the government on the state Budget and infrastructure investments, including: • the size and timing of shortages and risks across resources needed to deliver the government pipeline • the extent that shortages and risks are being addressed by existing mitigation actions that the government and industry deliver • how the proposed timing of new or rescheduled major projects aligns with the forecast availability of resources across the pipeline • priorities for any further government actions needed to secure the resources required for the pipeline's delivery (see sections 2.1, 3.1, 3.3 and 3.4)	**Accepted by:** Department of Treasury and Finance
	8. make the aggregated information on resource shortages and risks available to departments and delivery agencies to inform their decisions and advice to the government about major infrastructure investments and actions needed to build and support resources (see sections 2.1 and 3.4)	**Accepted by:** Department of Treasury and Finance
	9. engage regularly with the construction and associated industries about the resources needed to deliver the government pipeline by: • working with the Department of Transport, including the Major Transport Infrastructure Authority, to complete the planned industry engagement strategy and make it publicly available • introducing a formal and at least annual engagement that is specific to Victoria's government pipeline between the industry and relevant departments and delivery agencies (see Section 3.4)	**Accepted by:** Department of Treasury and Finance
Department of Transport	10. leads coordinated planning to assess and manage delivery capability and capacity risks for the transport sector (see sections 2.1, 3.3 and 3.4)	**Accepted by:** Department of Transport
Department of Treasury and Finance, including the Office of Projects Victoria Department of Transport, including the Major Transport Infrastructure Authority Department of Jobs, Precincts and Regions	11. coordinate, deliver and complete their strategies, actions and the committee work they lead by: • documenting implementation plans that include tasks, responsibilities, budgets and timelines • setting objectives, measures, indicators and targets for what their strategies and actions aim to achieve • monitoring, reviewing and overseeing their progress and impact (see sections 3.3, 3.5 and 3.6).	**Accepted by:** Department of Treasury and Finance Department of Transport Department of Jobs, Precincts and Regions

1. Audit context

Victoria's annual infrastructure investment is four times higher than it was in 2015–16, and other states are also boosting their investment in major projects.

Victoria's 2021–22 state Budget noted that the state has $144 billion of new and existing projects funded and underway, up 35 per cent from 2019–20. Of these, $111 billion are major projects. This has led to pressure on the market's capacity and shortages in skills and resources, which makes it harder for the government to deliver projects on time and on budget.

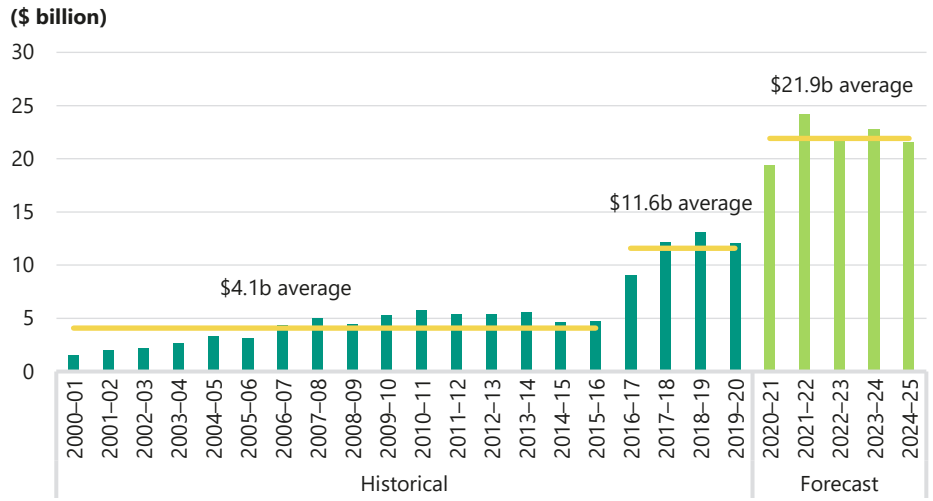
This chapter provides essential background information about:

- Major projects in Victoria
- National infrastructure demand
- Capability and capacity shortages
- Agencies' responsibilities
- Actions to improve capability and capacity

1.1 Major projects in Victoria

As Figure 1A shows, the Victorian Government's annual spending on infrastructure has grown significantly since 2016. The 2021–22 state Budget forecast that this spending will average $21.9 billion a year between 2020–21 and 2024–25.

FIGURE 1A: **Victoria's infrastructure investment**



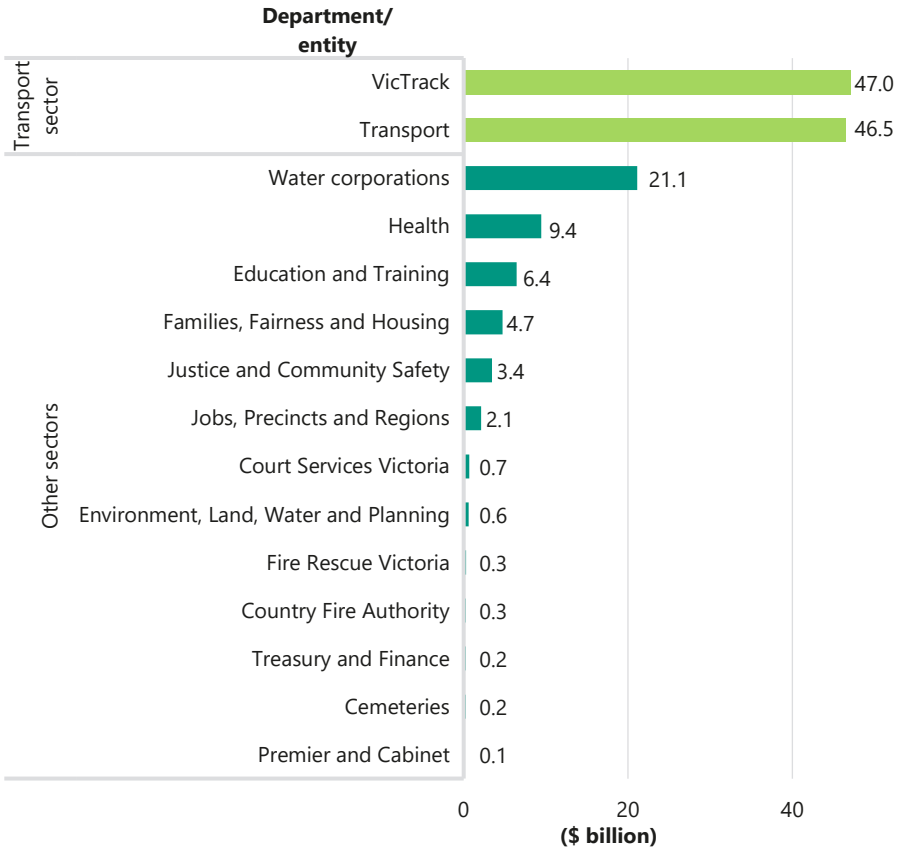
Source: VAGO, using DTF data.

Most of this spending is on major projects, and an increasing proportion is on megaprojects, which we define as projects that cost over $2 billion. Victoria's leading megaprojects are:

- North East Link Project ($15.4 billion total estimated investment)
- Level Crossing Removal Project (LXRP) ($13.3 billion)
- Metro Tunnel Project ($12.3 billion)
- West Gate Tunnel Project ($6.3 billion).

In addition to these, the government is planning new major projects and megaprojects, including Melbourne Airport Rail, Geelong Fast Rail and Suburban Rail Loop. As Figure 1B shows, most government infrastructure spending is on transport projects, which is why our audit focuses on this sector.

FIGURE 1B: **Victorian Government infrastructure program by department/entity, 2021–22**

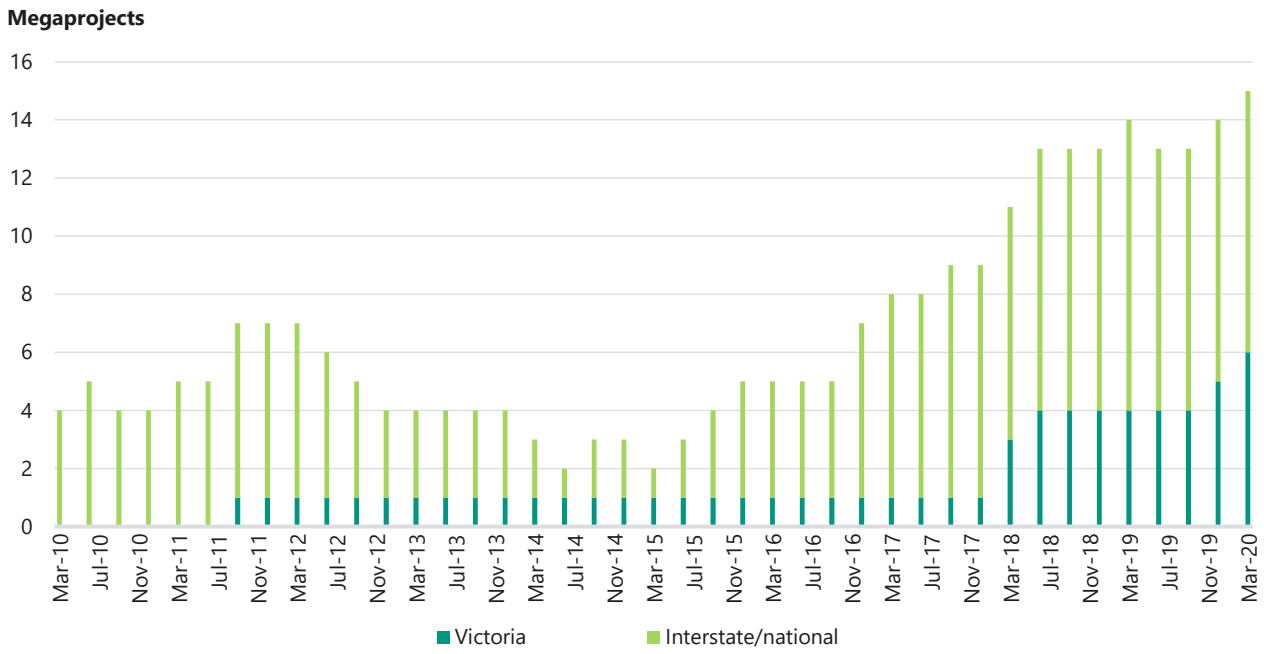


Note: Only includes departments/entities with infrastructure programs valued at around $100 million or more.
Source: VAGO, using DTF data.

1.2 National infrastructure demand

Government investment in major projects has grown significantly across Australia since 2016. Figure 1C shows the nationwide growth in megaprojects since 2010. All of these projects are transport projects.

FIGURE 1C: **National growth of megaprojects under construction**



Source: VAGO, based on *The rise of megaprojects: counting the costs*, Grattan Institute, 2020, using Grattan Institute data.

This boom in infrastructure spending across Australia is increasing the demand for contractors to deliver the projects and the materials needed to build them. This has led to shortages in labour and materials. In the 2021–22 state Budget papers, DTF noted that the costs for 117 major projects had a net increase of 4 per cent or $3.8 billion between 2019–20 and 2021–22, while 30 projects were delayed.

Cost overruns

As projects become larger, cost overruns also become larger. In its November 2020 report, *The rise of megaprojects: counting the costs*, the Grattan Institute found that since 2001, more than a third of cost overruns on major projects across Australia came from just seven projects. It also found that projects estimated to cost over $1 billion have an average cost overrun of at least another $1 billion. Since 2015, the average nationwide road or rail project has doubled in value to $1.1 billion.

1.3 Capability and capacity shortages

Construction market

Tier 1 construction firms predominantly lead megaprojects because they have the required people, experience and finances. Multiple tier 1 firms usually form a consortium to deliver the more complex and higher-value megaprojects. They also typically join with, or subcontract parts of the work to, smaller tier 2 or tier 3 firms.

Australia has three tier 1 firms—CPB Contractors, John Holland Group and Acciona—but has more tier 2, tier 3 and smaller firms. Infrastructure Australia advised us that its research shows that the number of tier 1 and tier 2 firms has stayed stable over the last 10 years and is not keeping pace with the growth in demand.

The infrastructure boom is stretching the domestic market's capacity to deliver projects. Infrastructure Australia's *Australian Infrastructure Audit 2019* reported that some larger firms are also less willing to take on megaprojects because of the greater risks and in some cases, financial losses, that accompany the increasing size and complexity of these projects.

As a result, some major projects face a lack of market interest. Infrastructure Australia and other industry analysts have reported that nationwide, some megaprojects have received just one response to an expression of interest or had to be repackaged and re-tendered to attract a greater range of bidders.

Industry workforce

About 40 000 Victorians work in civil construction. As the number of major projects has increased, the demand for skilled workers and managers has exceeded supply. In early 2020, the Victorian Skills Commissioner estimated that the sector will need an additional 4 000 workers by 2022. They also forecast that the rail construction sector, which currently employs up to 7 000 Victorians, will need up to 800 more workers by 2022.

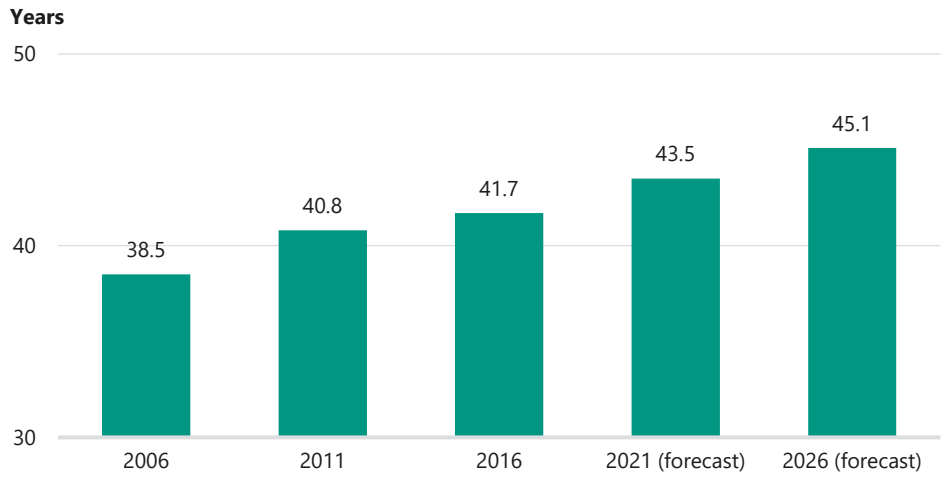
The Victorian Skills Commissioner and MTIA have reported the following jobs as critically needed:

The civil construction sector needs more ...	**The rail construction sector needs more ...**
• plant operators	• signal technicians
• project managers	• rail plant operators
• diesel mechanics	• track examiners/certifiers
• pipe layers	• high-voltage substation electricians
• civil engineers	• overhead line workers
• surveyors.	• electrical engineers.

As Figure 1D shows, general shortages may worsen because the average age of the Victorian infrastructure workforce is rising and there are fewer new workers entering the industry.

For example, the Victorian Skills Commissioner found that in the rail construction sector, the need for signal technicians is critical because the current gap of around 60 workers is likely to worsen due to an ageing workforce leaving the sector.

FIGURE 1D: **Average age of the Victorian infrastructure workforce**



Source: MTIA, based on data from the Australian Bureau of Statistics.

Skills training

The Victorian Skills Commissioner reported that despite an increase in the civil construction workforce of 71 per cent between 2015 and 2018, training enrolments declined by 73 per cent. Employers noted that this is due to increased use of labour hire and financial incentives for completing work, which provides work-based experience rather than qualifications. The Victorian Skills Commissioner noted that as businesses continue to prefer labour hire rather than developing the skills of their own workforce, this increases their dependence on subcontractors and competition for skilled labour, which may intensify skill shortages.

Labour hire involves contracting workers to a specific project for a set period of time.

Our 2021 report *Results of 2020 Audits: Technical and Further Education Institutes* found that commencements across all government-funded TAFE courses were volatile in 2019 and 2020. Commencements increased in 2019 in response to the government's Free TAFE program but then decreased in 2020 due to the impacts of the COVID-19 pandemic.

Free TAFE covers tuition costs for eligible students studying priority courses determined by the government.

Public sector workforce

While the industry workforce builds the government's major projects, the public sector plans and oversees them. A public sector team for a major infrastructure project typically has:

- project leaders, who lead, plan, direct and control the project through its life cycle
- technical staff, such as specialist engineers and statutory planners
- commercial and legal staff, who manage procurement processes and contracts
- project managers, who deliver the project according to its plan and schedule.

In its *Australian Infrastructure Audit 2019*, Infrastructure Australia identified that the competitive construction market is straining the public sector's capability and capacity to deliver major projects in larger cities. It found that this poses risks to government

agencies' ability to identify the best way to deliver a project, select the right contractors for the job and oversee the contractors' progress.

There is no publicly available information on Victorian Government departments and delivery agencies' capability and capacity to deliver the pipeline.

Materials

In addition to skilled labour and public sector capability, major projects need physical resources. This includes heavy equipment, such as tunnel boring machines; extractive materials, such as hard rock, gravel and sand; and landfill space. For example, a lack of existing landfill capacity to dispose of soil from tunnel boring has contributed to delays on the West Gate Tunnel megaproject.

Extractive materials

According to a study commissioned by DJPR in 2016 titled *Extractive Resources in Victoria: Demand and Supply Study 2015–2050*, demand for extractive materials in Victoria was expected to reach almost 90 million tonnes by 2050, which was more than double the demand in 2015. Transport, energy and utilities projects were expected to make up 30 per cent of the demand for extractive materials in 2050, up from 22 per cent in 2015.

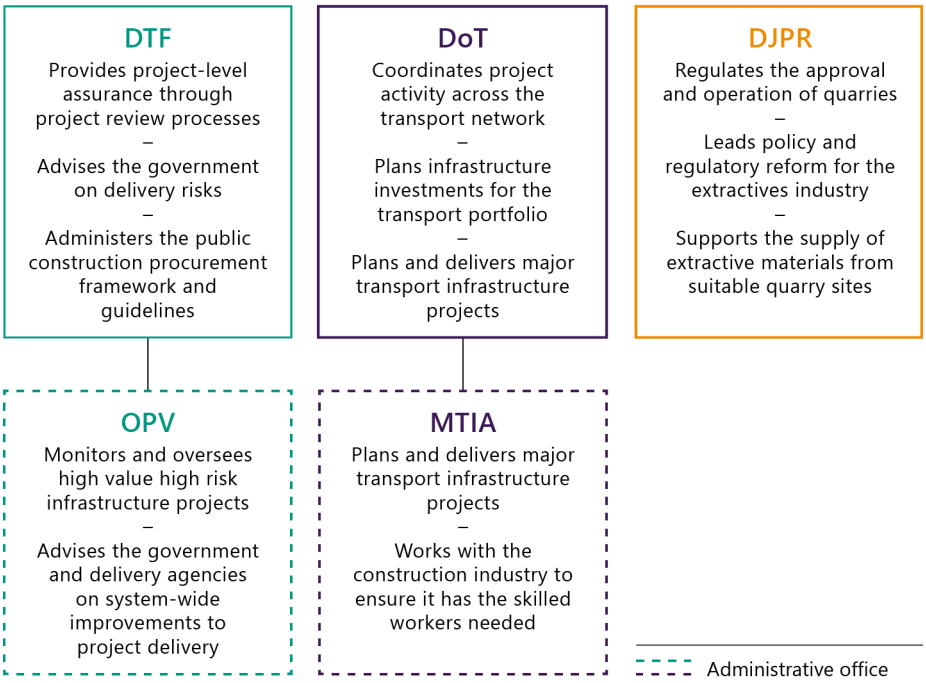
The 2016 study also found that in 2026, the supply of extractives would fall short of what the estimated demand would be and by 2050, the state would have exhausted many quarries and rock types. DJPR estimated that by 2050, 34 per cent of extractive resources would have to be sourced from new quarries.

Major projects typically source extractive resources from quarries close to their site to save on transport costs. As most major projects are in metropolitan Melbourne and the inner regions, quarries near these areas will be exhausted first.

1.4 Agencies' responsibilities

We audited three departments that have responsibilities for major infrastructure project capability and capacity, which Figure 1E summarises. We also focused on the administrative offices within DTF and DoT that have primary responsibilities in this area.

FIGURE 1E: **Departments with key responsibilities for major infrastructure project capability and capacity and their relevant administrative offices**



Source: VAGO.

MTIA, which is DoT's delivery agency, formed in January 2019. It comprises the Office of the Director-General and five project offices that manage some of Victoria's largest megaprojects. The project offices are:

- North East Link Project
- LXRP
- West Gate Tunnel Project
- Rail Projects Victoria
- Major Road Projects Victoria.

DoT and DJPR also formed in January 2019. Our audit discusses the audited agencies' actions since 2015, which was when DoT and DJPR were both part of the Department of Economic Development, Jobs, Transport and Resources. Prior to 2019, MTIA's six offices were also part of that department. We refer to these agencies by their current names throughout this report.

While other government departments and agencies have roles in supporting skills development and training, including DET, we did not include them in this audit because their focus is not specific to the government's major infrastructure projects.

1.5 Actions to improve capability and capacity

In October 2015, Parliament created Infrastructure Victoria and tasked it with drafting a 30-year infrastructure strategy for the state, which it did in December 2016. However, the strategy does not identify actions to address skills or other capability and capacity shortages that impact the government pipeline.

The government created OPV in September 2016 to support major project delivery. The government has also started new initiatives to attract people to the construction industry, including the Free TAFE program that DET oversees. This program, which began in 2019, includes five apprenticeship pathways and 10 courses in construction-related qualifications. In addition, the government began the Major Project Skills Guarantee in 2016, which requires construction projects valued at $20 million or more to use Victorian apprentices, trainees and cadets for at least 10 per cent of total estimated labour hours. Now included under the *Local Jobs First Policy,* this initiative has created employment for nearly 4 000 apprentices.

The 2020–21 state Budget funded the Big Build Apprenticeships training pathway. This aims to expand employment and training opportunities for apprentices and trainees on major infrastructure projects. DET established its Apprenticeships Victoria division in 2020–21 to coordinate the new pathway in partnership with major project employers and the TAFE and training system.

On 1 July 2021 the government established the Victorian Skills Authority. This new entity aims to ensure Victoria has enough workers with the right skills to meet demand. It will engage with relevant industries to develop an annual skills plan, to better guide training delivery in the state.

The audited agencies have taken numerous actions to address capability and capacity risks, including many actions in partnership with the construction and extractives industries.

As the sector responsible for managing most major projects, the transport sector has some substantial programs underway. For example, MTIA introduced the Victorian Tunnelling Centre in partnership with Holmesglen, a TAFE provider, to meet tunnelling skill needs for the Metro Tunnel Project. This centre has the capacity to train 5 000 students each year. Over time, MTIA also intends the centre will support the skills needed for the West Gate Tunnel, North East Link and the planned Suburban Rail Loop.

In addition to the Victorian Tunnelling Centre, MTIA and its agencies have many other programs to support industry jobs, including:

- seven programs to support skills development
- seven programs to help attract talented employees
- nine programs to support social procurement targets.

This audit considered agencies' strategic and coordinated planning to assess and address capability and capacity risks, as detailed in chapters 2 and 3. We did not assess the effectiveness of individual programs that directly train and deploy workers or build capability and capacity in other ways.

2. Assessing resource shortages and risks

Conclusion

DTF, OPV, DoT, MTIA and DJPR have assessed the human and material resources needed to deliver the government's pipeline of major infrastructure projects. However, their assessments are not complete or accurate due to limitations and data gaps in the models they use. While all agencies can address many of their limitations—and OPV and DJPR have work underway to do this—significant gaps remain.

These gaps mean that the agencies' advice to the government about resource-related risks to delivering major projects on time and on budget is not comprehensive or complete. This introduces risks about the reliability of the agencies' advice because they have not fully disclosed the gaps to the government.

This chapter discusses:

- An overview of shortages and risks
- Industry and public sector workforce shortages
- Construction market capacity risks
- Building material shortages
- Modelling resource capability and capacity

2.1 Overview of shortages and risks

Each audited agency has identified shortages and risks across different resourcing aspects of the government and transport pipelines. Figure 2A highlights the key shortages they have identified.

FIGURE 2A: **Audited agencies' knowledge of resource shortages and risks**

Key aspect	Agency and year of most recent assessment	Identified shortage and risks	Size and timing of shortages
Industry workforce	DTF (2020) with DET, OPV and the Skills IDC	17 skills at the highest risk of shortage, including construction managers, plumbers and engineering production workers	Not determined
	MTIA (2020)[a]	Shortages between 2022 and 2025 in: • 98% of high-skilled occupations, such as civil engineers, surveyors, spatial scientists • 95% of medium-skilled occupations, such as carpenters, joiners and steel workers	Not determined, except for a shortage of 2 000 engineers between 2022 and 2025
Public sector workforce	DTF (2016)	Shortages in: • project leadership and delivery skills • commercial and legal skills, such as contract management • technical and engineering skills	Not determined
Construction market	DTF, OPV and MTIA[a] (2020)	Risk that there will not be enough local tier 1 construction firms to lead major project consortiums	Not determined
Materials: extractive resources	DJPR[b] (2016)	DJPR forecast in 2016 that without new quarries, there would be a shortage of quarry products used in construction, such as rock, gravel and sand. Its separate supply and demand assessments in 2019 and 2020 showed changes since 2016, but DJPR does not yet know if any shortages are now likely	Average potential shortage across all extractive materials: • 13% shortage by 2026 • 30% shortage by 2050 DJPR is working to update these forecasts, with results due in the second half of 2022
Materials: contaminated spoil	DoT (2020)	Shortage of sites capable of re-using, treating or disposing of contaminated spoil from major projects	Not determined

Note: [a]Shortages identified by MTIA are for the transport pipeline only.

[b]Shortages identified by DJPR for extractive materials were for all private and public construction. DJPR estimated that in 2015 the government pipeline's demand for extractive materials was around 20 per cent of the total demand across all construction.

Source: VAGO.

Figure 2A shows that gaps in DTF, OPV and MTIA's workforce assessments mean they cannot readily identify the size and timing of predicted shortages. Without this information, these agencies cannot give the government accurate and comprehensive advice about the urgency of any workforce shortages and prioritise actions to address them.

In addition to these assessments, DTF, OPV, DoT and MTIA identify workforce and materials shortages and risks for individual projects, particularly when they are developing the business case for a new project. However, the focus of this work is only at the individual project level and does not consider the impact of other projects that may compete for the same resources. This means they do not know the true extent of workforce shortages for the government pipeline.

2.2 Industry workforce shortages

DTF, OPV and MTIA have identified widespread industry workforce shortages for the government and transport pipelines. However, their analyses about these shortages lack specific quantitative information about the timing of shortages, how big they will be and which occupations are likely to be affected. As a result, the agencies do not know the size and the timing of the shortages they have identified.

Through the Skills IDC in 2020, DTF, OPV and DJPR identified 17 vocational education and training (VET) related occupations that have the highest risk of immediate shortage across the government pipeline following the COVID-19 pandemic's impact on the construction industry. These shortages include four occupations that employ high volumes of workers: plumbers, construction managers, structural steel and welder trades, and painters.

While the Skills IDC did not identify how many workers are lacking, it estimated that over 1 200 construction managers would be needed for 17 major projects due to start in 2020 and 2021. It also identified that 6 100 to 8 000 carpenters and joiners needed to be trained in 2020 to meet the current demand for these roles across the pipeline.

To identify the risk of immediate shortages, DTF, OPV and DJPR used available supply and demand data to identify and rank the construction occupations that have the highest risk of shortages. The Skills IDC was planning to do a detailed analysis to determine the size of the skills gaps. However, it could not complete this due to the way that the pandemic disrupted employment in some occupations.

Instead, the Skills IDC modified its approach to focus on how COVID-19 is expected to impact the supply and demand for particular occupations and its resulting risk of workforce shortages. This was a 'point-in-time' assessment and did not also evaluate the medium or longer-term risks of shortages related to the expanding government pipeline. This makes it difficult to determine the full extent of future shortages.

OPV's workforce demand forecasts informed the Skills IDC's work. However, its forecasts do not contain enough data about:

- the annual variation in project costs and staffing to enable OPV to model peaks and troughs in workforce demand over a project's life
- past staffing for some sectors and occupation profiles for all sectors to accurately predict future workforce needs for different infrastructure types.

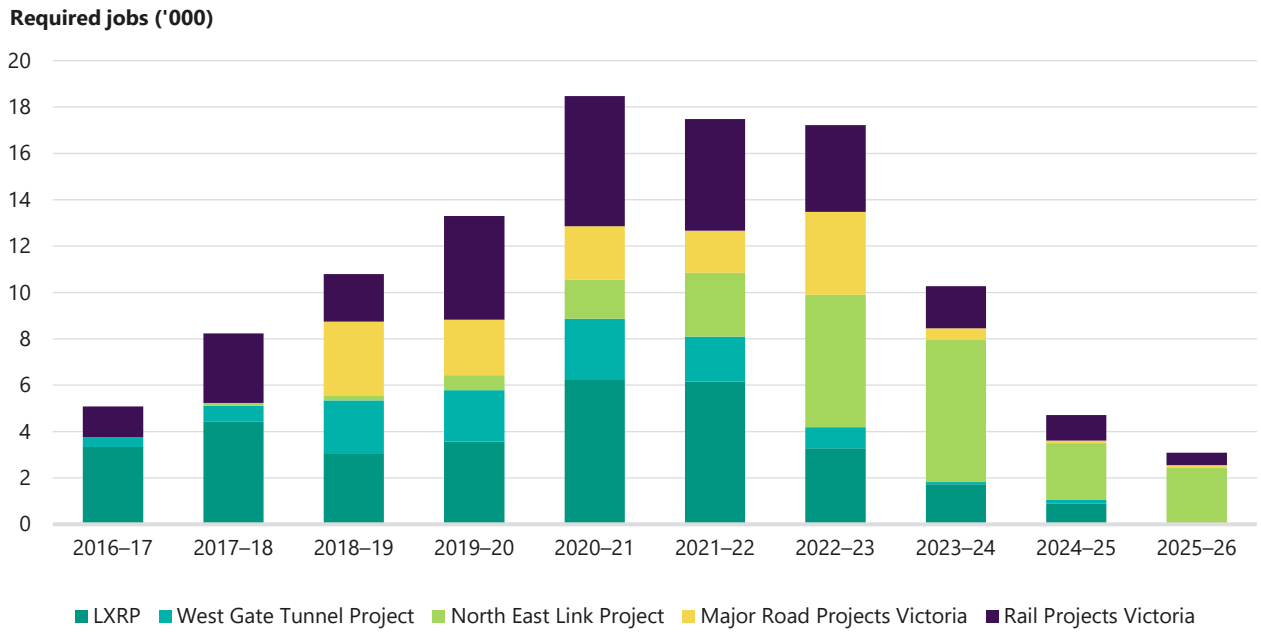
This reduces OPV's ability to forecast demand across all phases of a project and limits its ability to assess workforce demand across different infrastructure types.

Transport sector

MTIA's 2019 and 2020 capability assessments of the industry workforce included both supply and demand for major transport infrastructure projects. Stakeholders from the construction industry advised MTIA that they are confident the industry can deliver the pipeline in the short term. However, MTIA's assessments indicate that shortages driven by strong demand for both high and medium-skilled occupations are likely to emerge by 2025.

As Figure 2B shows, MTIA estimated in its 2020 assessment that the average number of construction jobs needed for major transport projects would more than double from around 8 000 in 2017–18 to over 18 000 in 2020–21 and remain high until 2022–23. We note that these forecasts are based on knowledge at the time of the assessment and do not include new projects, such as the Suburban Rail Loop.

FIGURE 2B: **Forecast industry workforce demand across MTIA delivered projects for 2016–2017 to 2025–2026**



Source: MTIA.

MTIA's assessments also found that the following five occupations will make up 36 per cent of all roles needed during the construction peak:

- civil engineers
- plant operators
- construction managers
- labourers
- architects.

MTIA's assessments demonstrate declining numbers of apprentices in training and university enrolments in civil engineering. This means that the supply of these occupations is unlikely to keep up with demand.

As Figure 2A shows, while MTIA's assessments quantified shortages for engineering professions, they did not provide information about:

- the skills that will be in shortest supply
- the size or timing of shortages in specific occupations.

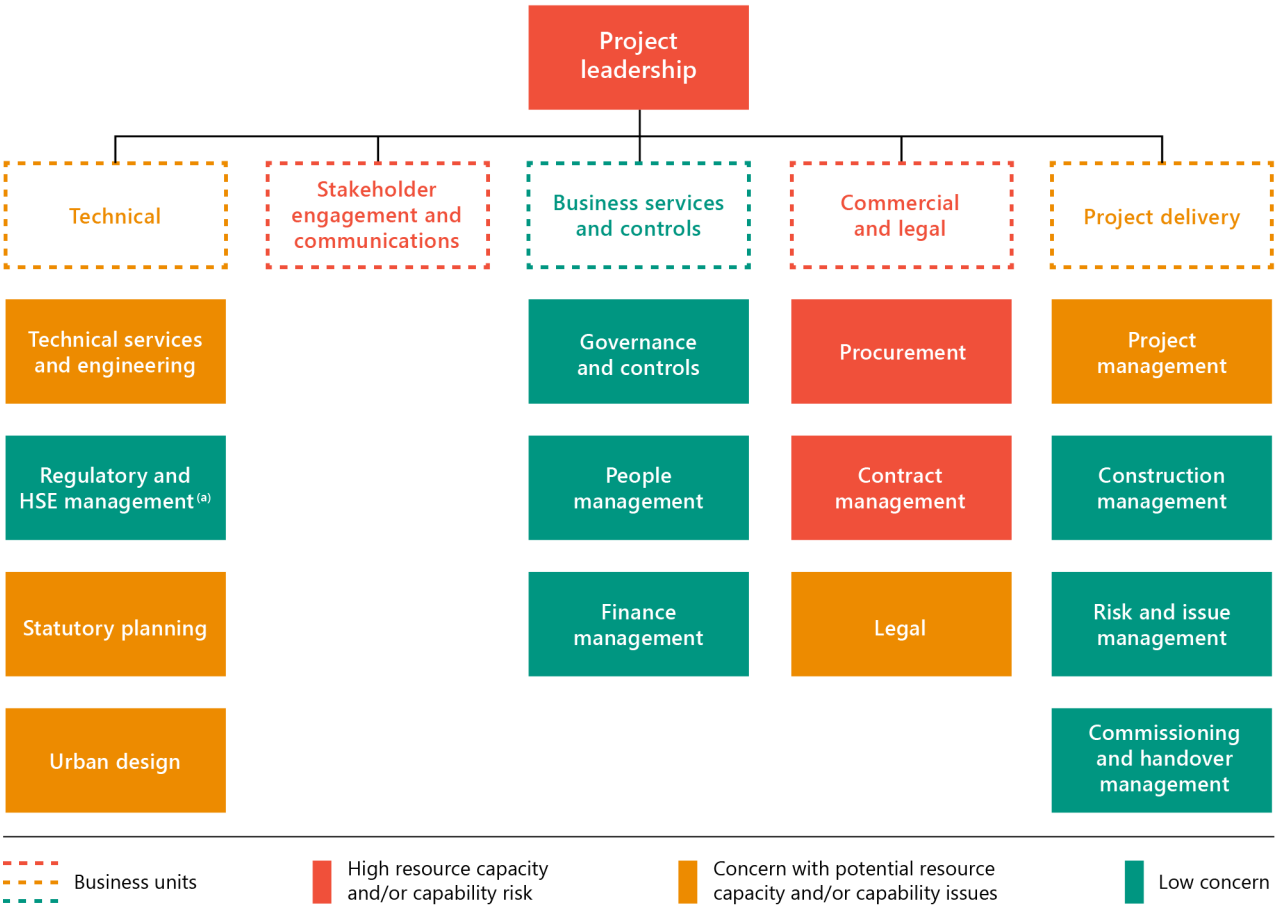
Instead, MTIA's recent assessments only report the proportion of shortages across groups of occupations and not the number of workers needed. For example, it found there will be shortages in 68 per cent of civil construction occupations.

MTIA's 2020 industry workforce assessment noted that a lack of data on the total size of the Victorian construction workforce and the lack of detail in the ANZSCO workforce data meant it could not pinpoint specific occupation shortages. For example, occupations such as tunnelling engineer or road constructor either have no ANZSCO classification or the classification only reflects part of what the specific occupation does. This means that MTIA does not have a clear picture of the supply and demand for specific critical roles in the transport sector.

2.3 Public sector workforce shortages

DTF's most recent assessment of whole-of-pipeline public sector shortages was in 2016. As Figure 2C shows, this review identified project leadership, commercial and legal expertise and stakeholder communication skills as key high-risk capability gaps across Victorian Government departments and delivery agencies.

FIGURE 2C: **Risks for public sector workforce capacity and capability skill areas identified by DTF in 2016**



Note: (a)HSE stands for health, safety and environment.

Source: VAGO, based on DTF.

DTF based the findings from this review on department and delivery agencies' self-assessments of their capacity to respond to the government pipeline. The lack of objective, quantifiable data means that DTF does not know the actual size and timing of public sector capability gaps across the pipeline.

DTF and OPV have not followed up on the 2016 analysis to quantify the size of public sector shortages at a statewide level. Public sector data captured by the Victorian Public Sector Commission does not reveal specific project occupations, and DTF and OPV do not collect this information from agencies to analyse public sector capability and capacity. This is despite the government's annual infrastructure investment more than doubling from $9.1 billion in 2016–17 to a forecast $24.2 billion in 2021–22. While the public sector workforce is a smaller component of major projects than the industry workforce, it is still critical to ensuring projects are scoped, procured and managed well.

MTIA analysed workforce planning and capability gaps in transport agencies in 2017. However, it advised us that it did not consider this assessment to be reliable because the forecasted shortages did not align with its in-house observations about workforce

changes. MTIA and DoT have not made any further attempts to assess or aggregate their knowledge of public sector capability in the transport sector since 2017.

2.4 Construction market risks

Since 2015, DTF, OPV and MTIA have regularly identified market capacity constraints as a risk to delivering major projects, particularly megaprojects. The main risk they identify is that there will not be enough contractors available with the size, experience, financial backing and risk appetite to deliver the government pipeline. This can lead to contractors charging more for their services due to reduced competition, or there being no firms available to bid for new projects.

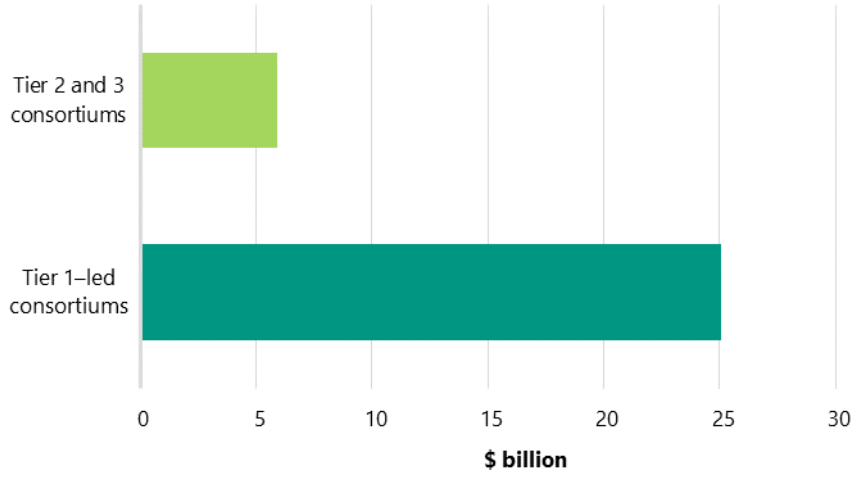
Tier 1 firms

DTF, OPV and MTIA have identified that tier 1 firms' existing commitments may limit their ability to take on more major projects. For example, in 2020 OPV identified that four tier 1–led consortiums were delivering over 80 per cent of high value high risk (HVHR) projects by value, which Figure 2D shows. This is up from 69 per cent in 2019.

DTF classifies major infrastructure projects and major information and communications technology projects as **HVHR** investments if:

- DTF's risk assessment process rates them as high risk
- the Victorian Government decides they warrant the rigour applied to HVHR investments.

FIGURE 2D: **Value of Victorian HVHR projects by contractor type, 2020**



Source: VAGO, using OPV data.

OPV has also identified that the tier 1 firms delivering the major projects face the greatest delivery challenges. For example, for one tier 1 firm, almost two thirds of the work it is delivering, as measured by value, faces significant delivery risk. This is primarily through the firm's involvement in two high-value megaprojects.

Tier 2 and tier 3 firms

DTF, OPV and MTIA have highlighted concerns that there not enough tier 2 and tier 3 firms participating in major projects. This is because of the:

- lack of certainty about what projects will become part of the government pipeline

- large size of many major project tenders.

These issues are limiting tier 2 and 3 firms' involvement in major projects at a time when greater participation could reduce the reliance on tier 1 firms.

Infrastructure Australia advised us that its research shows that the number of tier 1 and 2 firms, which has stayed stable over the last 10 years, has been far outpaced by the growth in demand.

International firms

DTF, OPV and MTIA have also determined that allowing international firms to participate in major projects can help overcome the shortage of local tier 1 firms. International firms are part of the consortiums delivering some of Victoria's biggest projects, such as the Metro Tunnel Project. However, recent analysis from the Grattan Institute's 2021 *Megabang for megabucks: Driving a harder bargain on megaprojects* report shows that NSW has been more successful at this than Victoria. Since 2006, 28 per cent of NSW's transport contracts worth $1 billion or more have involved international participants, compared to 11 per cent in Victoria.

Data

DTF, OPV, DoT and MTIA do not collate data on the number of tier 2, tier 3 and international firms that could participate in delivering the government and transport pipelines. They also do not know if participation by these types of firms is changing over time and how significant or urgent the risk of decreasing participation is.

These agencies' market assessments focus on identifying firms available to participate in individual projects or types of projects, such as MTIA's assessments for road projects.

While DTF collects data about the market's capacity, it does not use it to assess capacity to deliver the pipeline or monitor participation. In some cases, this is because the data is incomplete. For example:

DTF ...	**but ...**
has a register of construction suppliers (contractors) that are pre-qualified for government project work	DTF does not use this supplier information to monitor the numbers of different-sized firms over time.
collects tender information from the Buying for Victoria website	• it is not mandatory for government agencies to use the website to manage their tenders—DTF's 2019 assessment showed only 61 per cent of agencies registered to use the website • DTF separately records tenders advertised, tender submissions and tenders awarded. Gaps in the data and the lack of a common identifier for each tender mean it cannot match the data to analyse it.

DTF ...	but ...
collects construction supplier performance reports, which include an assessment of a supplier's performance in managing resources and other factors related to project delivery	• most delivery agencies do not comply with the requirement under the 2018 *Ministerial Directions for Public Construction Procurement in Victoria* and associated 2020 *Instructions for Public Construction Procurement in Victoria* to submit supplier performance reports.

2.5 Building material shortages

Extractive materials

DJPR's 2016 forecasts indicated that there was enough extractive material in the ground to meet future demand. However, DJPR also estimated that the costs of extracting and supplying the material would rise over time as available materials in existing quarries become depleted and new quarries are established further away from construction locations. DJPR forecast that without new or expanded quarries, supply shortages would arise by 2026 and become more acute over time. For example:

- in 2026, based on existing and planned quarry locations, the average supply shortfall of extractive materials as a proportion of demand would be 13 per cent, growing to 30 per cent by 2050
- by 2050, 34 per cent of demand would need to be sourced from quarries not built or planned in 2018.

Key changes since 2016 mean that these forecasts are likely to be outdated. For example:

- DJPR has been working to support supply and mitigate the risk of shortages in the short and long term through its 2018 extractives strategy, as we discuss in Section 3.5
- the government pipeline has expanded significantly, which is likely boosting demand for the extractive materials needed to build roads, tunnels and other infrastructure.

DJPR updated its demand forecasts in 2019, which showed that demand was 20 per cent higher than its 2016 baseline forecasts. Its 2020 supply data shows that the annual volume of extractive materials produced by quarries increased approximately 25 per cent between 2014–15 and 2019–20.

Limitations in DJPR's data and modelling mean it cannot identify:

- the root cause of any supply and demand imbalances and when they are likely to occur
- potential actions the government could take to minimise the risk of shortages disrupting the government pipeline's delivery.

DJPR is working on its planned five-yearly update of the supply and demand forecasts. It is due to report on its updated forecasts in the second half of 2022. However, it currently lacks accurate data for its new forecasts, related to the:

- capacity that existing and planned quarries have to supply materials
- demand from the government pipeline.

DJPR is aware that incomplete and unreliable data limits the accuracy of its forecast shortages. It is working to improve the quality of its data on quarry capacity, demand from the government pipeline and the costs of transporting extractive materials.

Quarry capacity

Individual quarries have data on how much extractive material they supply, where they supply it to and how much remains in their reserves. The construction firms delivering major projects have data on how much extractive materials their projects use and where the materials come from. DJPR has difficulty accessing this data because quarries and firms keep it confidential. This impedes DJPR's ability to accurately forecast the volume of materials firms need to deliver major projects.

DJPR has introduced new regulations that require quarries to annually report on their available resources by stone type from July 2021. This is important because as DJPR has acknowledged, the lack of regulation in the industry on this type of reporting has limited its ability to respond to demands and prevent shortages.

Demand from the government pipeline

DJPR, OPV, DoT and MTIA do not all regularly share information on the pipeline and individual projects' supply and demand for extractive materials. DJPR engaged with DoT and MTIA in 2020 and 2021 to source this information and is jointly planning with MTIA to survey the construction industry contractors involved in transport major projects.

DJPR does not assess the supply and demand for extractive materials for the government or transport pipelines, which make up around a third of the state's demand for extractive resources, separately from other non-government demand. This means that while DJPR can advise the government about overall demand risks, it cannot specifically advise where the demand comes from or how to best respond to it.

Cost of transporting extractive materials

As existing quarries become depleted and it becomes necessary to source materials from more distant quarries, the cost of some materials will go up. For example, in 2016 DJPR estimated that for every additional 25 kilometres materials have to travel, an extra $2 billion in extractive transport costs would be incurred across the government pipeline between 2015 and 2050.

However, DJPR has not yet been able to quantify how much the costs per tonne will progressively rise as more material is supplied to the market. This is a critical gap because without this information, DJPR cannot assess if extractive material costs will exceed the budgets of major projects across the government pipeline. It has work underway to do this, which we discuss in Section 2.6.

Contaminated spoil

In leading the Spoil IDC's work, DoT has identified that the unprecedented volume of spoil being generated across the pipeline is unsustainable. It expects that current transport infrastructure projects alone will generate almost four million tonnes of

contaminated spoil. This estimate does not include upcoming projects, such as the Suburban Rail Loop.

The average volume of spoil with low levels of contamination generated annually in Victoria more than doubled from 336 000 tonnes a year in 2007–08 to 2016–17 to 707 000 tonnes in 2017–18 to 2018–19. Currently, 95 per cent of this contaminated spoil is sent to landfill.

While DoT has forecast the increasing volumes of spoil that major infrastructure projects will generate, it has not yet quantified the state's capacity to re-use, treat or dispose of it, although it plans to do this. This means it does not know the size and timing of the related shortages it anticipates.

The new *Environment Protection Regulations 2021*, which started on 1 July 2021, may affect the state's future spoil management capacity by potentially expanding opportunities to re-use low-level contaminated spoil. However, the companies that manage contaminated spoil have limited capacity to respond quickly to changing regulations because it takes time to establish new spoil sites.

2.6 Modelling resource capability and capacity

The audited agencies' information on industry workforce and extractive material shortages comes from models that OPV, DJPR and MTIA use to forecast supply and demand. OPV, DJPR and MTIA all model demand for the industry workforce. DJPR models supply and demand for extractive materials. Figure 2E summarises the purpose of each agency's modelling activity.

FIGURE 2E: **Audited agencies' modelling activities for industry workforce and materials**

Agency	Model focus	Modelling activities
DJPR	Statewide employment demand	• forecasting the number of employees across Victoria up until to 2034, disaggregated by industry and region • providing employment forecasts by region, industry and occupation, and measuring the net inflow of workers by region over time • providing information that the government can use for jobs policies and planning
DJPR	Statewide extractive materials supply and demand	• forecasting supply and demand for extractive materials in Victoria based on demand from both public and private sector construction (DJPR does not separately model supply and demand for the government pipeline)
OPV	Industry workforce demand for government major projects	• estimating the employment impacts from major infrastructure projects • quantifying the number of full-time equivalent employees for different occupations that the state will need for certain types of major infrastructure projects
MTIA	Industry workforce supply and demand for the transport pipeline	• analysing the transport sector's industry workforce using supply and demand modelling • focusing on demand for critical skills and occupations in the private sector up until 2025

Source: VAGO.

We also looked at how OPV and DJPR integrate with DET's modelling when developing their forecasts. DET models VET workforce supply and demand across the state's economy to help it manage the TAFE and training system. It uses DJPR's statewide employment modelling to do this. DET does not model supply specific to the government pipeline, although its supply and demand analyses include the construction industry.

DJPR and DET's models are designed to assess statewide employment. These models predate OPV's workforce forecasting for major projects.

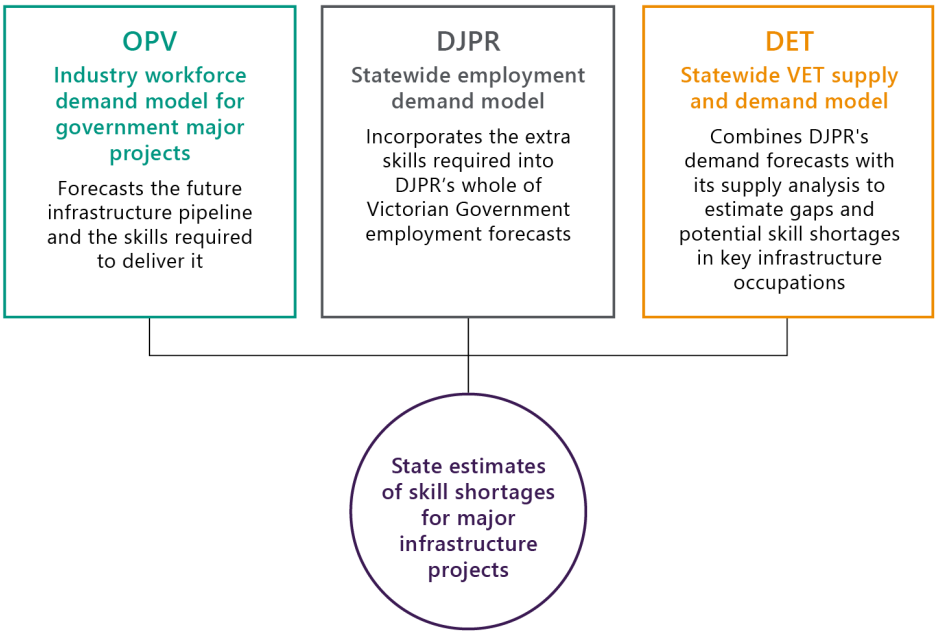
Constraints to modelling approaches

While DJPR, OPV and MTIA's workforce models are technically reliable for their different purposes, they have not ensured the separate models also work together in an integrated way. As a result, they do not have a comprehensive understanding of the supply and demand of the industry workforce for the government pipeline. Forecasting limitations in their modelling approaches also reduce their ability to assess how the government can best address supply shortages and risks.

Integrating workforce models

In 2020, the Skills IDC identified the need for OPV and DJPR to work with DET to integrate their models to understand supply and demand for the industry workforce needed for the government pipeline. They developed a concept for this integration, which Figure 2F shows. At that time, OPV was still developing its model.

FIGURE 2F: **Concept for integrating OPV, DJPR and DET's industry workforce capability modelling**



Source: VAGO, based on information from DTF.

OPV and DJPR are working to enact the concept through better sharing and aligning the results and analysis from their, and DET's, existing separate models. However, OPV and DJPR do not aim to revise and integrate their models, which they need to do to provide consistent and reliable information to government about the extent of skill shortages in the labour market.

OPV and DJPR cannot integrate their models to forecast supply and demand and identify potential workforce shortages for the government pipeline because:

- they did not design their modelling approaches from the outset to work in an integrated way
- their models use different forecasting methods, assumptions and constraints and produce different outputs, which means they cannot be joined together (or with DET's modelling) in their current forms
- their models do not adequately consider how the Victorian labour market functions because they do not include factors that affect labour supply, such as changes to migration rules.

Additionally, MTIA has not considered how its modelling of supply and demand in the transport sector for industry workforce skills aligns with the statewide modelling that DJPR and DET do.

Without integration and alignment, OPV, DJPR and MTIA's models cannot provide accurate information about the size and timing of skills shortages that may impact major project delivery. These gaps and uncertainties mean DTF, OPV and MTIA cannot give the government reliable advice about priority shortages for the government and transport pipelines and approaches to alleviate them, such as through training, increased skilled migration and/or coordinating the timing and sequencing of projects.

Limitations of OPV and DJPR's workforce modelling

OPV and DJPR's workforce models have mostly achieved their original purposes, which Figure 2E shows. However, OPV and DJPR's models do not consider the relationships between Victoria's labour market and other macroeconomic variables, such as competition from other states for workers. This means that the forecasts that these models generate are not based on all of the available information and therefore do not give a complete estimate of the government pipeline's workforce needs.

OPV and DJPR's models also do not identify how new government policies may impact the supply of workers. This means, for example, that while the models can estimate how many workers will be needed by occupation type at a certain year, they cannot predict how a new policy to subsidise a training course may impact the supply of workers.

OPV's workforce model aims to model demand and estimate employment impacts for major infrastructure projects. However, the model has two significant limitations.

Firstly, it does not have the capacity to model demand for the entire government pipeline. The model can only do this for individual projects and groups of projects. This is a significant limitation because demand for the total pipeline is likely to rise due to supply constraints that cannot be identified and quantified by modelling individual projects or subsets. This is because as more investment is injected into the economy, multiple industry sectors start competing for workers and materials. This

can change when and where shortages are likely to occur across different industry sectors.

Secondly, OPV's model cannot differentiate between 'absolute' and 'relative' shortages. This distinction is fundamental to how the government decides to address shortages:

- relative shortages can be fixed through policies and incentives that use the existing labour pool
- absolute shortages, for example, the inability of the labour market to supply enough skilled workers in the short to medium term, need different solutions, such as importing more labour from other states or overseas.

DJPR's workforce modelling does not include the distribution of skills across occupations and industries under ANZSCO. This means it only forecasts employment by industry and not by occupations within industries. Both OPV and DJPR are aware of other models that address these limitations. They are working to improve their own modelling tools to consider these factors.

Limitations of MTIA's workforce modelling for the transport sector

The modelling that MTIA uses to identify critical industry workforce shortages cannot differentiate between absolute and relative shortages either. Its modelling also does not consider the additional impact that forecast shortages across the whole pipeline will have for transport projects. This means that MTIA does not have all of the information it needs to plan transport infrastructure projects within the context of the wider government pipeline.

Limitations of DJPR's extractives modelling

DJPR's extractive materials modelling is the most developed of the audited agencies' supply and demand models.

DJPR is now developing a new modelling approach to overcome the limitations it identified in its 2016 modelling. For example, its previous modelling approach could not distinguish between:

- absolute shortages in supply due to approved quarries becoming depleted
- relative shortages caused by constraints, such as restricted quarry operating hours or inadequate road networks for transporting quarry products.

DJPR's new approach aims to show how different government actions and regulations could improve supply and mitigate rising cost pressures, including:

- fast-tracking approvals for quarry expansions in strategic locations
- extending operating hours for some quarries.

DJPR aims to improve its estimates of how supply costs will change over time for different major projects. However, its planning does not include enough detail for us to confirm that it will quantify how the cumulative demand for extractive materials across the government pipeline will affect the unit cost per tonne of extractive materials for individual projects.

3. Addressing resource shortages and risks

Conclusion

All audited agencies have strategies and actions that target human and material resource shortages and risks. However, many of these actions are behind schedule and agencies do not know if they are effectively reducing delivery risks to the government infrastructure pipeline.

Gaps in how the audited agencies coordinate with each other and relevant industries on strategies and actions mean they cannot advise the government on how well they are addressing different shortages and risks or which actions to prioritise. This reduces their ability to achieve cost-effective interventions across the pipeline and avoid time and cost overruns.

This chapter discusses:

- Scheduling projects
- Strategies and actions to build capability and capacity
- Planning strategies and actions
- Coordinating strategies and actions
- Delivering strategies and actions
- Measuring the impact of strategies and actions

3.1 Scheduling projects

DTF's 2015 advice to the government about establishing OPV recognised the need to strategically sequence major projects both within the government pipeline and with other states and territories to optimise delivery benefits. An MTIA review in 2017 also identified this as a gap.

DTF advised the government in May 2019 that making separate investment decisions about individual projects has led to 'un-strategic scheduling', which has exacerbated shortages and risks. DTF committed to working with agencies to manage peaks in construction activity, which includes identifying projects that would benefit from restaging.

Despite this, DTF, OPV, DoT and MTIA do not use project scheduling—the timing and sequencing of major projects across the government or transport pipelines—to help:

- even out the peaks and troughs in infrastructure investment
- alleviate shortages and risks when projects compete for resources.

This is a missed opportunity to effectively manage resource shortages in both the public sector and industry.

3.2 Strategies and actions to build capability and capacity

As Figure A shows, since OPV formed in 2016, all of the audited agencies have begun to develop or deliver strategies to address the four aspects of capability and capacity that our audit focuses on. Appendix D lists the actions included in each strategy.

The agencies can also deliver actions outside their strategies. For example, MTIA delivers additional actions for industry skills, such as supporting the Victorian Tunnelling Centre and the MetroHub training centre for the Metro Tunnel Project. We focused on assessing the actions that agencies are delivering through the six key strategies.

OPV

OPV's 2017 major infrastructure strategy lists 11 actions to:

- develop the public sector's project delivery workforce
- prevent industry-based skills gaps
- coordinate related actions across the government and the construction industry.

These actions included launching the Victorian Major Projects Pipeline website in July 2020. This website aims to provide the industry with a single source of information on Victoria's major projects.

DTF

In May 2019, DTF developed its investment reform strategy to optimise Victoria's infrastructure investment. This strategy has 11 actions, including work to:

- address barriers to international construction firms entering the market

- improve government agencies' models for forecasting skill and resource shortages
- improve cost planning for major projects.

DTF and DET jointly led the 2020 Skills IDC, which included all of the audited agencies, the Department of Premier and Cabinet and the former Department of Health and Human Services. The Skills IDC strategy aimed to coordinate and develop industry workforce actions and examine the supply and demand for skills. It also aimed to identify ways to address market failures and structural issues that prevent major projects from accessing an adequate supply of skilled people. The IDC wound up in December 2020.

DJPR

In June 2018, DJPR published its extractives strategy, which it based on the modelling it conducted in 2016 and its engagement with stakeholders, such as quarry owners and operators. The strategy aims to ensure that high-quality extractive resources continue to be available at a competitive price.

As part of this strategy, DJPR is implementing the recommendations from the Commissioner for Better Regulation's 2017 *Getting the Groundwork Right: Better regulation of mines and quarries*. These recommendations include simplifying how DJPR assesses proposed quarries and making sure it focuses on the most complex risks. Another recommendation is to investigate new ways to identify and secure quarry locations that are strategically located for potential future development.

MTIA

In 2020, MTIA drafted its Industry Workforce Strategy, which consolidated its work to identify industry workforce problems and the resulting risks to project delivery. MTIA used this work to inform core strategies to address these risks.

MTIA's project offices all have separate strategies and actions to address workforce capability risks for the major infrastructure projects that they lead. One major strategy is its 'training for the future' program, which LXRP leads. This program aims to build rail workers' skills and diversify the skill supply chain through training programs, internships and reskilling workers from declining industries. Other programs aim to build LXRP's internal workforce capability, such as its 'leaders of great change' program.

MTIA is also delivering the Victorian Tunnelling Centre in collaboration with Holmesglen, as part of the Metro Tunnel Project. This centre is targeted at building a future industry pipeline of workers skilled in underground construction and tunnelling.

DoT

Through the Spoil IDC in 2020, DoT developed a draft Spoil Management Strategy to manage contaminated spoil across the government pipeline. DoT advised us that it is also developing a rail skills strategy.

3.3 Planning strategies and actions

Figure 3A summarises our findings about how the audited agencies' prioritised which resource issues to focus their strategies on, and selected the most appropriate actions to address them.

FIGURE 3A: **Audited agencies' basis for prioritising and responding to resource issues**

Agency	Strategy	Year	Focuses on identified shortages and risks?	Targets causes of shortages?	Prioritises causes to address?	Selects actions based on clear rationale?
OPV	Major infrastructure strategy	2017	✓	Partly	✓	Partly
DTF	Investment reform strategy	2019	✓	Partly	×	Partly
	Skills IDC strategy (jointly led with DET)	2020	✓	✓	Partly	✓
DJPR	Extractives strategy	2018	✓	✓	✓	✓
MTIA	Industry Workforce Strategy (draft)	2020	✓	✓	✓	Partly
DoT	Spoil Management Strategy (draft)	2020	✓	✓	×	Partly

Source: VAGO.

Targeting known issues and their causes

As Figure 3A shows, all of the audited agencies' strategies target known capability issues. However, OPV and DTF's strategies do not consistently identify the causes for all known shortages. For example, OPV knows that there are not enough skilled public sector leaders to meet the government pipeline's growth. However, it does not know if this is due to one or both of the following reasons:

- leadership development, recruitment and retention programs do not exist across departments and delivery agencies or there are not enough of them
- these programs exist but do not work, for example because they are not appropriately tailored to needs.

DTF and DoT's strategies do not clearly explain how they prioritise which causes to focus on. For example, while DJPR's extractives strategy prioritises causes that are more urgent or are important precursors to other actions, DTF's investment reform strategy does not do this.

Selecting the best way to address issues

Aside from DJPR's extractives strategy and the Skills IDC strategy, the audited agencies do not consistently use a transparent rationale to select the best options to address specific shortages and their causes.

For example, DTF did not assess what actions had been successful across Victorian departments and agencies, or other jurisdictions, when it developed its 2019 investment reform strategy. This means it is not clear if it chose actions that are practical to deliver or selected actions that are likely to have the greatest benefit.

In selecting some proposed actions in the draft Spoil Management Strategy, DoT and the other Spoil IDC members (listed in Appendix D) have considered actions that other jurisdictions have taken. For example, the action to help re-use spoil notes that the South Australian Government is running a soil bank to treat contaminated soil and provide clean fill soil to projects when needed. The strategy notes that Victoria may need a similar soil bank. While the draft Spoil Management Strategy acknowledges the importance of prioritising its proposed actions, it does not do this.

MTIA's draft Industry Workforce Strategy uses stakeholder consultation and research to identify priority skills to develop. It has also assessed the strengths and weaknesses of MTIA's existing actions. However, MTIA cannot show how it uses its knowledge of workforce shortages and their causes to determine what size its training programs need to be.

3.4 Coordinating strategies and actions

The audited agencies do not effectively coordinate with each other to fully address capability and capacity risks across the government and transport pipelines.

Timeliness of coordination

Through formal reviews in 2015 and 2016, DTF, MTIA and OPV recognised the need for a coordinated response to emerging delivery capability issues due to the infrastructure boom on Australia's east coast.

However, DTF, OPV, DoT and MTIA did not begin major efforts to coordinate their approaches until late 2018. By then, Victoria's forecast annual average of government infrastructure investment had almost doubled from the 2015 forecast.

Initial response

The Victorian Government's initial coordinated response to the escalating resourcing risks included establishing OPV and introducing the Major Projects Skills Guarantee in 2016. In 2017, OPV released its major infrastructure strategy and Victoria joined NSW in the NSW–Victoria Construction Industry Leadership Forum.

DJPR's introduction of the Extractives Strategy Taskforce in 2015 and resource assessments in 2016 were timely because they came soon after it identified the risk of extractive resources shortages in 2015.

Further coordination

Despite their knowledge of ongoing human and material resource shortages and risks, DTF and OPV did not further coordinate supply and demand assessments and capability planning across the government until late 2018. At that time, they introduced cross-agency committees, industry workforce demand modelling and capability-building actions. DoT and MTIA made little progress in coordinating planning across the transport sector until 2020, when they drafted their respective industry workforce and spoil management strategies.

Response to COVID-19

In contrast to their delayed response to delivery capability and capacity issues, DTF, OPV, DoT and MTIA have responded quickly to collaboratively assess and address the impact of the COVID-19 pandemic on planning and delivering major projects. DJPR

has also responded quickly. For example, the audited agencies have met frequently since March 2020 to share information on potential and actual impacts on contractors delivering government projects and opportunities to support affected contractors.

Coordinating through cross-agency committees

The audited agencies have all established or participate in cross-agency committees with each other and other government agencies and jurisdictions that have objectives related to planning resource capability and capacity. Figure 3B summarises these committees.

FIGURE 3B: **Committees to coordinate capability and capacity planning and their focus**

Note: The years are when each committee started.
Source: VAGO.

All of the audited agencies use these committees to build relationships and share information and advice on delivery capability and capacity for major projects. For example, they have used them to understand resourcing shortages and related cost pressures caused by the COVID-19 pandemic.

At the national level, the NSW-Victoria Construction Industry Leadership Forum has had the most influence on the audited agencies' work through the guidance notes it has produced on ways to address resourcing issues. These notes include guidance on

opportunities for creating smaller packages for early works on projects, adopting electronic tendering and managing project risks.

As Figure 3C shows, only four of the eight state committees have delivered, or are on track to deliver, at least some of the assessments, plans or actions under their terms of reference or work plans.

For three of the four state committees that have delivered coordinated actions, having an action plan is key to their success. Their action plans have enabled them to plan tasks and timelines and regularly monitor their progress against them.

None of the remaining committees have set a timeline for their work and only the Cost Escalation Working Group, which was only active in 2019, had a work plan for delivering its intended actions.

FIGURE 3C: **Progress of state committees in coordinating delivery capability and capacity actions**

Committee (lead agency)	Intended action	Timing	Delivered or on track?
Extractives Strategy Taskforce (DJPR)	Guide the extractive strategy's development and implementation	By 2023	On track
MTIA Executive Committee (MTIA)	Oversee the development of MTIA's industry strategy and joint procurement review with DTF	Timeline not set	Partly delivered
Skills for Major Projects IDC (DTF, jointly led by DET)	Explore causes of industry skill shortages and options for addressing them	By December 2020	Partly delivered
Spoil Management Strategy IDC (DoT)	Develop a preliminary spoil management strategy for current projects	By May 2020	Partly delivered
Construction Leadership Group (OPV)	Advise the government on priority recommendations for addressing systemic project delivery issues	Ongoing from December 2018	Not delivered
Public Construction Procurement Committee (DTF)	Monitor and advise DTF on trends in contractor performance across projects	Ongoing from June 2018	Not delivered
Transport Industry Training Committee (MTIA)	Coordinate the planning, design, review and industry engagement for industry capability programs	Ongoing from 2017	Not delivered
Cost Escalation Working Group (MTIA)	Identify international participation issues and possible responses	Timeline not set	Not delivered

Source: VAGO.

Coordinating actions through agency strategies

None of the agencies' six key strategies in Figure 3A outline how they will work with other relevant agencies to deliver their actions and drive successful, ongoing coordination. Additionally, only DJPR's extractives strategy is a public document. DTF and OPV have not publicly published information about their strategies. This means that other departments, agencies and the construction industry are not aware of DTF and OPV's work when planning new projects' resourcing requirements, bidding for future projects or developing actions to build capability and capacity.

This lack of coordination has led to overlaps in some actions. For example, since 2016 DTF, OPV and MTIA have separately explored solutions for market capacity constraints at a whole-of-pipeline level. Each agency has separately reviewed different procurement approaches to encourage a broader range of suitable contractors and more international firms to bid for projects.

This led to these agencies producing similar recommendations through different approaches, which is inefficient. For example, each of the three agencies recommended creating smaller project 'packages' within big projects where feasible to encourage tier 2 and tier 3 firms to participate.

This work has not yet led to new statewide or transport sector guidance on procurement. Despite this, some of MTIA's project offices have pursued their own solutions for individual projects. While this is positive, the lack of statewide guidance creates the risk that agencies will use inconsistent procurement approaches across projects. It is also a missed opportunity for delivery agencies to capitalise on lessons learnt and improvements across the pipeline.

Engaging with relevant industries

Victoria does not have a statewide engagement strategy to communicate its plans for collaborating with the construction industry and building capacity and capability. While OPV recognised the need for a strategy in 2018, it has not developed it. Additionally, while the government approved MTIA and DTF's proposal to develop such a strategy in December 2019, it is on hold while COVID-19 priorities take precedence.

In comparison, NSW introduced its industry strategy, the *NSW Government Action Plan: A ten point commitment to the construction sector,* in 2018. The 10 actions it publicly commits to are:

- 'Procure and manage projects in a more collaborative way'.
- 'Adopt partnership-based approaches to risk allocation'.
- 'Standardise contracts and procurement methods'.
- 'Develop and promote a transparent pipeline of projects'.
- 'Reduce the cost of bidding'.
- 'Establish a consistent NSW Government policy on bid cost contributions'.
- 'Monitor and reward high performance'.
- 'Improve the security and timeliness of contract payments'.
- 'Improve skills and training'.
- 'Increase industry diversity'.

Victoria has some of these elements in place, such as a website promoting the government pipeline and a bid cost contributions policy. However, the lack of an engagement strategy for Victoria is a missed opportunity to enhance communication with the construction industry and therefore limits the audited agencies' ability to:

- get early advice from the construction industry to understand emerging capability and capacity issues and trends across construction firms and supply chain businesses and plan accordingly
- understand how realistic their time and cost projections to deliver the pipeline are and how effective their support to build industry capability is

- consider timing and sequencing opportunities across projects to help match the demand for the industry workforce and construction market with the supply
- keep the industry informed about their progress in:
  - assessing supply and demand
  - supporting industry capability and capacity.

In the absence of an overarching strategy, DTF, OPV, DoT and MTIA are primarily responsible for coordinating with the construction industry about the government pipeline. Apart from DoT, these agencies regularly do this to discuss major projects and the industries' delivery capability and capacity. For example:

- DTF, OPV and MTIA regularly engage with the construction industry through the NSW–Victoria Construction Industry Leadership Forum, which focuses on delivery issues for the east coast's bigger projects
- DTF, OPV and MTIA engage with the construction industry to plan individual major projects, including delivery timing and their procurement approaches.

The July 2020 launch of OPV's Victorian Major Projects Pipeline website was an important milestone in communicating the pipeline to the construction industry. The portal summarises information on new and current major projects in one location.

DJPR regularly engages with the extractives industry through its Extractives Strategy Taskforce, but not with the construction industry. This means it lacks direct information about resource demand across the state, including demand for major projects.

These engagement activities provide valuable information to agencies and the industry for planning major projects, such as information on skill gaps and ways to address them.

However, none of these discussions focus on the resourcing needs across the entire government pipeline or the statewide actions underway or needed to address shortages. DTF, OPV, DoT and MTIA do not regularly consult with Victoria's Local Jobs First Commissioner and local, smaller construction suppliers about the entire pipeline's industry resourcing needs.

Planning for the public sector workforce

Some coordinated actions to build the public sector's capability have occurred through OPV's major infrastructure strategy, DTF's investment reform strategy and some shared actions across MTIA's project offices. These actions include:

- OPV collaborating with departments and delivery agencies to develop and deliver its project leadership and commercial training program
- MTIA's project offices working together to recruit and train university graduates.

We discuss these actions further in Section 3.5.

Since 2017, DTF, OPV, DoT and MTIA and their committees have not monitored or reassessed the public sector workforce's capability and capacity to plan and deliver the expanding government pipeline or reviewed how well their actions are addressing the identified capability issues. This is despite the agencies and committees recognising the need to do this. For example:

- Since 2017, the Treasurer has expected OPV to be responsible for ensuring the public sector has access to the skills it needs to deliver the government pipeline, but OPV does not monitor this.
- The Construction Leadership Group's responsibilities include prioritising recommendations to the government about addressing systemic project delivery issues and constraints. However, it does not discuss, assess or monitor if public sector workforce shortages contribute to systemic issues.
- The Public Construction Procurement Committee's responsibilities include supporting government agencies to meet their procurement responsibilities, such as building their procurement skills. However, it does not discuss or monitor procurement skills or how agencies build them.

This reduces these agencies' ability to identify workforce shortages and risks. It also limits their ability to efficiently align their actions to build the public sector's capability with the separate work that other departments and delivery agencies do.

Coordinating resources for the transport sector

DoT is the lead agency for planning the transport pipeline. There are currently 94 major projects in the transport sector at varying stages of development and delivery. DoT and MTIA both have roles in planning and delivering projects and support each other to do this. DoT primarily leads project planning and MTIA leads procurement and delivery. However, except for its 2020 work to coordinate the draft Spoil Management Strategy, DoT does not coordinate or oversee capability and capacity assessments and planning.

DoT advised us that rather than focusing on delivery feasibility, its planning for individual projects focuses on developing projects' scopes and budgets and ensuring the new infrastructure will integrate with the existing network. It relies on the construction industry and actions from other agencies to fill any capability or capacity gaps.

However, industry reviews have found that the construction industry is unlikely to invest in developing skills to the level the pipeline needs because it does not have certainty about projects beyond the four-year period covered by the current state Budget.

DoT's project planning approach means it is advising the government on infrastructure projects without being able to anticipate delivery risks or explain how feasible its recommended project budgets and timelines are.

This leaves the government exposed to a range of risks across the pipeline, including the risks that:

- there will not be enough firms available or willing to deliver the work
- competition for resources will lead to increased costs or delays
- transport agencies may not have the experience and skills needed to develop, procure and oversee projects.

These findings about DoT's project planning approach align with the findings in our 2021 *Integrated Transport Planning* audit. This report found that DoT is yet to establish an integrated approach to transport investment that is informed by relevant plans.

Additionally, MTIA's project offices are working to build capability and capacity without a strategic sector-wide approach to coordinate the work. For example:

- there are 14 industry skills and capacity development actions underway across MTIA's five project offices, but only five are jointly delivered or have joint participation
- neither DoT nor MTIA have an overarching public sector workforce strategy to ensure the transport sector can efficiently access the capability it needs
- there is no capability-focused transport committee that includes both DoT and MTIA, although both agencies plan to join a working group with NSW transport agencies to share information on infrastructure planning and procurement.

MTIA's 2020 draft Industry Workforce Strategy has identified an opportunity to coordinate and consolidate industry-focused programs across its project offices, but MTIA has not started doing this yet.

If DoT and MTIA do not coordinate with each other, they are unlikely to:

- maximise participation in their different workforce programs
- transfer knowledge between projects
- provide career progression opportunities across the sector.

Monitoring building material and equipment needs

None of the audited agencies or their committees monitor supply and demand for the main building materials and equipment used in major projects, such as steel and cranes. While MTIA recognised the need to know more about these resources in April 2020, it did not progress its planned assessments. MTIA could not advise us why it did not progress this work.

As a result, the audited agencies do not have the information they need to identify and prioritise emerging issues in material and equipment supplies and advise the government of any significant risks.

As we discuss in Section 2.5, the audited agencies have not effectively collaborated with each other to share information about how much extractive materials transport projects use and where they source it from.

3.5 Delivering strategies and actions

The audited agencies have over 80 actions across their six key strategies. As Figure 3D shows, the agencies have made variable progress in delivering these actions. Their need to respond to the COVID-19 pandemic also interrupted their progress during 2020.

By delaying progress on actions that are important for addressing capability and capacity issues, agencies increase the risk that Victoria will not be able to deliver major projects to the agreed quality, budgets and timelines. The long lead time it takes to build some skills through university and VET courses, such as three years for skills like structural steel and welding, accentuates this risk.

FIGURE 3D: **Audited agencies' progress in delivering their key strategies**

Agency	Strategy	Strategy enacted	Planned date for completing strategy	Strategy delivery status
DTF	Investment reform strategy	May 2019	December 2019	• Not on track • All actions started • Seven of 11 actions completed
	Skills IDC strategy	February 2020	December 2020	• Not on track • All actions started • Three of 5 actions completed[(a)]
OPV	Major infrastructure strategy	November 2017	December 2019	• Not on track • Three of 11 actions not started • Two of 11 actions completed
DJPR	Extractives strategy	June 2018	December 2023	• On track • Delivering as planned
MTIA	Industry Workforce Strategy (draft)	Not finalised (drafted in August 2020)	Not set	Not assessable
DoT	Spoil Management Strategy (draft)	Not finalised (drafted in June 2020)	Not set	Not assessable

Note: [(a)]The Skills IDC was unable to start its sixth action due to delayed progress of external work.
Note: Appendix D lists the actions in these strategies and notes completed actions.
Source: VAGO.

DTF and OPV

DTF has started all 11 of the planned actions in its investment reform strategy and OPV has started eight out of 11 from its major infrastructure strategy. DTF has completed two-thirds of its planned actions and OPV less than a quarter of its planned actions, despite it being well past their December 2019 completion dates.

OPV has completed two of the 11 actions in its strategy. It has established:

- the Major Projects Leadership Academy
- a program that recruits and develops technical graduates.

Over 750 public sector staff have completed these programs and OPV's commercial capability training. This exceeds OPV's initial target of 100 participants per year across all three programs. OPV's June 2020 evaluation of the Major Projects Leadership Academy found that the program is providing a high quality and valuable experience. However, it is too early to predict its overall impact on project delivery.

In July 2020, OPV also introduced the Victorian Major Projects Pipeline website. OPV plans to update it quarterly to include new projects and show projects moving through different stages. However, it has not updated any project listed on the website since it began.

DTF has completed seven of the 11 actions in its investment reform strategy. These actions include developing the pipeline website and establishing quantity surveying

expertise within OPV. They also include supporting stronger whole-of-government engagement with the international market, such as:

- ensuring the major infrastructure program is a focus in Invest Victoria's 2020 *International Investment Strategy*
- revising Victoria's bid cost reimbursement policy to reduce bidding costs for construction firms.

Examples of actions that OPV and DTF have not completed or started include:

- OPV committed to developing a whole-of-government workforce planning tool by the end of 2018, but it still has not started this work.
- DTF committed to developing a forecast model that incorporates existing infrastructure program data, population data, skill demand, and supply and demand forecasts for extractive resources. While much of this work is underway, DTF has not yet planned how it will align its skill forecasts with its extractive forecasts.

While DTF's advice to the government in 2015 and 2019 highlighted the urgency of these actions, OPV and DTF have not delivered their strategies by the scheduled dates. DTF and OPV's need to respond to COVID-19 has further delayed their progress.

The Skills IDC

With the other departments and agencies on the Skills IDC (see appendix D for IDC membership), DTF jointly completed three of the five Skills IDC strategy actions that the committee could start. These actions were:

- reforming apprenticeships and traineeships, which developed the new Big Build Apprenticeships training pathway funded through the 2020–21 state Budget
- introducing onsite collaboration between TAFEs, the government, the construction industry and contractors bidding for work on the North East Link Project and the New Footscray Hospital to support workforce and skills development—this collaborative approach now underpins the Big Build Apprenticeships training pathway
- implementing reforms to attract trainers and improve TAFE courses.

The Skills IDC did not complete its actions to develop a shared framework of supply and demand for the industry workforce to inform policy development. It also did not develop reform options to bridge the undersupply of skill needs. Due to its need to respond to COVID-19, DJPR did not complete its review of the Major Projects Skills Guarantee before the IDC finished its work. This meant the IDC could not start its sixth action, which was to use the review to identify relevant reform options for the skills guarantee.

DJPR

DJPR intends to complete its extractives strategy actions by the end of 2023. However, its lack of detail on planned timelines for some actions makes it difficult to assess its progress.

While DJPR has significantly progressed its actions to improve how it regulates the extractives industry, it did not complete them all by June 2020 as it had originally

planned. The Commissioner for Better Regulation's December 2020 report *Implementing Getting the Groundwork Right: Better regulation of mines and quarries* concluded that DJPR:

- completed 13 of its 15 actions
- completed nine of 13 recommendations
- is implementing the rest, which includes a recommendation to help secure strategic extractive resources in defined locations.

DoT

DoT and the other departments on the Spoil IDC drafted the Spoil Management Strategy in June 2020. DoT advised us that the IDC is still considering spoil management options. Delaying actions that can help increase the state's spoil management capacity may put projects that are likely to generate significant volumes of contaminated spoil at risk, such as the North East Link Project and the Suburban Rail Loop.

MTIA

MTIA has not finalised its 2020 Industry Workforce Strategy, even though it completed the draft a year ago.

MTIA started developing a public sector equivalent to its 2020 draft Industry Workforce Strategy in 2017, which its 2017 gap analysis recommended. It did not continue this work. MTIA advised us that it considers the gap analysis was flawed. It also told us that its project offices adequately manage their workforce to meet the increasing demand.

As Section 1.5 outlines, MTIA's project offices have a large number of programs underway to support skill development, attract talented employees and support social procurement targets. However, these offices do not consistently report on the progress of these programs against their deliverables and timelines. MTIA does not consolidate information on their progress and achievements either.

Implementation planning and oversight

A lack of detailed implementation planning by DTF, OPV, DoT and MTIA has contributed to their delayed progress in delivering or finalising their strategies. In particular, they have not consistently detailed the tasks, responsibilities, resourcing, budgets and risks involved with delivering their strategies and actions. Without this information, it is difficult for them to set realistic timeframes for completing the work and monitor and guide their progress to ensure they achieve the intended results.

The Skills IDC

The Skills IDC lacked a finalised implementation plan, and its reporting does not show the analysis, investigations and research that underpinned the actions it delivered. This made it hard for us to assess if it completed its work to the intended scope and quality.

The Skills IDC scaled back several of its actions during 2020 because its members had to redirect some of their effort to respond to the COVID-19 pandemic.

3.6 Measuring the impact of strategies and actions

Reducing capability and capacity shortages and risks

None of the audited agencies have performance measures, indicators or targets to enable them to monitor the overall effectiveness and impact of their strategies and actions. As a result, they cannot show that their work is reducing major project capability and capacity risks. This also means that the agencies are not fully aware of which actions are the most successful and which ones they should prioritise.

OPV, DJPR and MTIA have recognised the need to measure the impact of their actions but have not followed through on their commitments to do this. DTF has not planned to assess the impacts that its investment reform strategy and Skills IDC strategy are having. While DoT's draft Spoil Management Strategy identifies intended outcomes, it does not specify how DoT and the other departments will measure their progress in achieving them.

Some of MTIA's individual actions have measures or indicators. For example, MTIA has measures related to enrolment numbers and learner satisfaction for its 'professionals' program. However, few of MTIA's actions have targets, benchmarks or descriptions to indicate what success looks like or use evaluations to assess this. Figure 3E details the impact that this lack of measurement has had on MTIA's understanding of how successful its signalling capability actions have been.

FIGURE 3E: **Case study: Assessing MTIA's signalling training**

MTIA has introduced five actions since 2016 to help address the continuing shortages in rail signalling skills.

In 2015, MTIA's consultation with the construction industry and government indicated that a shortage in rail engineering skills, particularly signalling, would likely emerge during peak periods of national rail construction activity. Exacerbating this, it predicted that the demand for rail signallers in Victoria would compete with the larger forecast NSW infrastructure program between 2017 and 2019.

Between 2016 and 2019, MTIA introduced five actions to address the shortages:

- rail signalling engineering cadetships
- a signal maintenance technician/supervisor program
- more rail signalling qualifications

- a rail industry capability project, which develops new rail signalling qualifications
- a 'professionals' program for professionals new to the rail sector.

However, MTIA's planning of these actions did not specify the anticipated benefits or desired results in addressing signalling skill shortages. For example, it did not specify how many program participants or workers with new qualifications it expected would enter the workforce and when.

While all of these actions have produced graduates, MTIA has also not analysed or evaluated the impact they have had on addressing the ongoing signalling skill shortages.

Skill shortages in signalling are still an issue. DTF and OPV's 2020 project monitoring and reviews found that shortages of people with signalling skills have delayed the delivery of the Murray Basin Rail Project and the Warrnambool Line Upgrade. In its draft 2020 Industry Workforce Strategy, MTIA also found that the lack of signalling skills poses a critical risk to delivering its transport pipeline.

Source: VAGO.

Contribution to improving project delivery

DTF and OPV's project monitoring indicates that delivery issues and risks for some projects link to capability and capacity or resourcing causes. For example, in addition to signalling delays and risks, potential resource shortages were identified as a risk to the substation work on the tram fleet procurement project in 2020. However, the information that DTF and OPV collect from departments and delivery agencies does not enable them to accurately assess or monitor the causes of delivery issues, including when these are linked to the capability or capacity of workforces or materials.

DTF and OPV report quarterly to the government on the progress of major projects. This includes tracking projects' performance and risks against expected timelines, costs and scopes. During 2020, this reporting identified delivery issues and risks for over half of the major projects that were in procurement or construction phases. However, it did not consistently identify the causes of these issues and risks.

While these reports do not identify common causes of delivery risks, OPV's March 2020 review of 6 500 recommendations from project reviews found that project resourcing was the sixth most common reason for delivery issues. The lessons learnt from these projects included that project teams need to be resourced with the appropriate people and skills, which strongly indicates the presence of workforce gaps.

As we identify in Section 2.4, gaps in DTF's information about firms working on major projects limit its ability to assess if their capability and capacity is affecting project delivery.

APPENDIX A

Submissions and comments

We have consulted with DTF, including OPV, DoT, including MTIA, and DJPR and we considered their views when reaching our audit conclusions. As required by the *Audit Act 1994*, we gave a draft copy of this report, or relevant extracts, to those agencies and asked for their submissions and comments.

Responsibility for the accuracy, fairness and balance of those comments rests solely with the agency head.

We received the following responses:

Response provided by the Acting Secretary, Department of Treasury and Finance

Department of Treasury and Finance

1 Treasury Place
Melbourne Victoria 3002 Australia
Telephone: +61 3 9651 5111
dtf.vic.gov.au
DX210759

D21/155120

Mr Andrew Greaves
Auditor-General
35 Collins Street
MELBOURNE VIC 3000

Dear Auditor-General

PROPOSED PERFORMANCE AUDIT REPORT – MAJOR INFRASTRUCTURE PROGRAM DELIVERY CAPABILITY

Thank you for your letter dated 21 July 2021, inviting the Department of Treasury and Finance (DTF) to respond to the proposed performance audit report: *Major Infrastructure Program Delivery Capability.*

DTF notes the findings of the report and recommendations directed at DTF including the Office of Projects Victoria. DTF accepts in full six recommendations and accepts in part one recommendation.

A proposed action plan for implementing the recommendations directed at DTF and OPV is attached to this letter.

Thank you for the opportunity to comment on the proposed report.

Yours sincerely

Jason Loos
Acting Secretary

5 / 8 / 2021

VICTORIA State Government

Response provided by the Acting Secretary, Department of Treasury and Finance—continued

Department of Treasury and Finance, including the Office of Projects Victoria, action plan to address recommendations from the Major Infrastructure Program Delivery Capability performance audit

No	VAGO recommendation	Action	Completion date
1	DTF, including OPV and DOT, including MTIA: To the extent possible, collect and collate comprehensive, accurate, quantitative information, research and analysis to annually estimate and monitor the size and timing of resource shortages and risks across the government pipeline (see sections 2.1, 2.2, 2.3, 2.4 and 2.5)	Accepted Joint advice on skills and market capacity based on the available modelling to be provided to Government. Advice to include assessment of both public sector workforce and industry capacity to respond to the infrastructure pipeline. Timing of advice to be available in advance of annual budget deliberations. Action linked to Recommendation 7.	Early 2022 prior to 2022-23 Budget
4	DTF, including OPV: Revises its major projects industry workforce demand modelling to enable it to: • differentiate between absolute and relative workforce shortages • account for cumulative workforce demand across the government pipeline (see section 2.6)	Partially Accepted The industry workforce demand model estimates labour demand. The output of the industry workforce demand model, along with model estimates for Victoria's supply of labour (DJPR and DET) will be used to estimate relative workforce shortages, informing government policies and incentives for the existing labour pool, and education and migration strategies. Cumulative workforce demand for major projects is being addressed in the next model upgrade.	By December 2021
5	DTF, including OPV: Works with the Department of Jobs Precincts and Regions and the Department of Education and Training to ensure its revised major projects workforce demand model integrates with their state macro-economic and industry workforce models to identify potential skills shortages across the government pipeline (see Section 2.6).	Accepted The next major projects workforce demand model upgrade will include options for user variations to reflect variations in market information (e.g. escalation) over the life of an infrastructure project. The output of the demand model can be integrated with other supply and economic data in a business intelligence tool to identify shortages across the government pipeline.	By December 2021
7	DTF, including OPV: use aggregated information on Victoria's ability to deliver the government pipeline to inform their decisions and advice to the government on the state Budget and infrastructure investments, including: • the size and timing of shortages and risks across resources needed to deliver the government pipeline • the extent that shortages and risks are being addressed by existing mitigation actions that the government and industry deliver • how the proposed timing of new or rescheduled major projects aligns with the	Accepted Work with relevant agencies so that all demand, supply and economic information is analysed and joint advice on skills and market capacity based on the available modelling is provided to Government. Action linked to Recommendation 1.	Early 2022 prior to 2022-23 Budget

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Response provided by the Acting Secretary, Department of Treasury and Finance—continued

	forecast availability of resources across the pipeline • priorities for any further government actions needed to secure the resources required for the pipeline's delivery (see sections 2.1, 3.1, 3.3 and 3.4)		
8	DTF, including OPV: make the aggregated information on resource shortages and risks available to departments and delivery agencies to inform their decisions and advice to the government about major infrastructure investments and actions needed to build and support resources (see sections 2.1 and 3.4)	Accepted Joint advice consolidating assessment and analysis from modelling to be made available by OPV to departments and delivery agencies as part of addressing Recommendations 1, 5 and 7.	Early 2022
9	DTF, including OPV: engage regularly with the construction and associated industries about the resources needed to deliver the government pipeline by: • working with the Department of Transport, including the Major Transport Infrastructure Authority, to complete the planned industry engagement strategy and make it publicly available • introducing a formal and at least annual engagement that is specific to Victoria's pipeline between the industry and relevant departments and delivery agencies (see Section 3.4)	Accepted Update construction industry on reforms through a co-ordinated approach between DTF, OPV, DOT and MTIA. OPV to facilitate annual industry engagement to promote the future pipeline and consult industry on future demand pressures.	By December 2021
11	DTF, including OPV, DOT including MTIA and DJPR: coordinate, deliver and complete their strategies, actions and the committee work they lead by: • documenting implementation plans that include tasks, responsibilities, arrangements, budgets and timelines • setting objectives, measures, indicators and targets for what their strategies and actions aim to achieve • monitoring, reviewing and overseeing their progress and impact (see sections 3.3, 3.5 and 3.6)	Accepted DTF will report back to government on the Skills for Major Projects IDC. DTF to update the Infrastructure Reform strategy, incorporating recent reviews. OPVs Major Infrastructure Capability and Capacity Strategy to be replaced by the Major Infrastructure People and Systems Strategy, incorporating successful initiatives (e.g. recent modelling initiatives upgrades), and to include emerging systemic reform opportunities.	By December 2021

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Response provided by the Acting Secretary, Department of Transport

Department of Transport

GPO Box 2392
Melbourne, VIC 3001 Australia
Telephone: +61 3 9651 9999
www.transport.vic.gov.au
DX 210074

Ref: BSEC-1-21-7994R

Mr Andrew Greaves
Auditor-General of Victoria
Victorian Auditor-General's Office
Level 31, 35 Collins Street
MELBOURNE VIC 3000

Dear Mr Greaves

Victorian Auditor-General's Office – Proposed Report – Major Infrastructure Program Delivery Capability

Thank you for your letter of 21 July 2021 relating to the 'Major Infrastructure Program Delivery Capability' performance audit and for the opportunity to provide comments on the proposed report (the Report).

The Department accepts VAGO's findings and provides feedback in the attached action plan. The Department will continue to work collaboratively with MTIA and Agencies to ensure a better understanding of industry capability for Major Infrastructure Projects.

The Department's action plan on the Report is attached for your consideration.

Yours sincerely

William Tieppo
Acting Secretary
Department of Transport

6 / 8 /2021

VICTORIA State Government

Major Infrastructure Program Delivery Capability

Proposed Action Plan

No.	VAGO recommendations	Action	Completion date
1.	We recommend that agencies to the extent possible, collect and collate comprehensive, accurate, quantitative information, research and analysis to annually estimate and monitor the size and timing of resource shortages and risks across the government pipeline.	Accepted. DoT will continue to work with DTF, DET, DJPR and other agencies to update and monitor the annual resources issues for current and future transport infrastructure pipeline based on the overall State based modelling. The information collated will be utilised as part of future business case development.	Ongoing – Annual update
6.	We recommend that the Department of Transport (DoT) including the Major Transport Infrastructure Authority (MTIA) uses results from government pipeline modelling by the Department of Treasury and Finance and its Office of Projects Victoria and the Department of Jobs, Precincts and Regions to understand its workforce forecasts for the transport sector and revises its forecasts to make the differences between absolute and relative shortages clear.	Accepted. DoT (with MTIA) will work with the relevant agencies to gain access to data to provide a better understanding of the predicted demands across the key workforce risk areas and revise its forecasts to make differences between absolute and relative shortages clear.	30 June 2022
10.	We recommend that DoT leads coordinated planning to assess and manage delivery capability and capacity risks for the transport sector.	Accepted. DoT will coordinate with MTIA and other agencies to annually assess the delivery capability and capacity risks for the transport sector.	Ongoing – Annual update

No.	VAGO recommendations	Action	Completion date
11.	We recommend that agencies coordinate, deliver and complete their strategies, actions and the committee work they lead by: • documenting implementation plans that include tasks, responsibilities, arrangements, budgets and timelines; • setting objectives, measures, indicators and targets for what their strategies and actions aim to achieve; and • monitoring, reviewing and overseeing their progress and impact.	Accepted. DoT will develop the Rail Skills Strategy and will also continue to deliver key strategies and initiatives. Where appropriate DoT will continue to work with the relevant agencies in contributing to, and leading such strategies as required.	30 June 2022

VAGO Proposed Report – Major Infrastructure Program Delivery Capability - Action Plan

Response provided by the Director-General, Major Transport Infrastructure Authority

MAJOR TRANSPORT INFRASTRUCTURE AUTHORITY

Level 14, 121 Exhibition St, Melbourne 3000
GPO Box 2392, Melbourne, Victoria, 3001
T: 9027 5700

Mr Andrew Greaves
Victorian Auditor-General
Victorian Auditor-General's Office
Level 31/35 Collins Street
Melbourne VIC 3000

Dear Andrew

MAJOR INFRASTRUCTURE PROGRAM DELIVERY CAPABILITY AUDIT – PROPOSED DRAFT REPORT

Thank you for your letter of 21 July 2021 providing the Major Transport Infrastructure Authority with the opportunity to provide feedback and comments on the proposed draft report for the Major Infrastructure Program Delivery Capability performance audit.

MTIA values the opportunity to review the proposed draft report and understands the importance of the audit in examining how key government agencies are forecasting and managing any capability gaps and risks.

Please find the attached action plan on the proposed draft report which outlines how MTIA intends to address the audit recommendations.

Should you wish to discuss MTIA's response, please contact Sara McIvor, Director, Program Assurance, MTIA on 9655 6289 or by email: sara.mcivor@mtia.vic.gov.au.

Please do not hesitate to contact me if you wish to discuss this matter.

Yours sincerely

Corey Hannett

Corey Hannett
Director-General

6 / 08 / 2021

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VICTORIA State Government

Response provided by the Director-General, Major Transport Infrastructure Authority—continued

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MTIA action plan to address recommendations from the Major Infrastructure Program Delivery Capability performance audit

Rec no.	VAGO recommendation	Action	Completion date
1.	Department of Treasury and Finance (including the Office of Projects Victoria) and Department of Transport (including the Major Transport Infrastructure Authority): • To the extent possible, collect and collate comprehensive, accurate, quantitative information, research and analysis to annually estimate and monitor the size and timing of resource shortages and risks across the pipeline.	MTIA accepts the recommendation. MTIA will continue to work with the Department of Treasury and Finance and the Office of Projects Victoria as requested, to provide input on resource issues to support the monitoring of risks across the pipeline. .	Ongoing
6.	Department of Transport (including the Major Transport Infrastructure Authority): • Use results from government pipeline modelling by DTF and OPV and DJPR to understand its workforce forecasts for the transport sector and revises its forecasts to make differences between absolute and relative shortages clear.	MTIA accepts the recommendation. MTIA will work with the relevant agencies to gain access to pipeline modelling to better understand the predicted demands across the key workforce risk areas.	30 June 2022
11.	Department of Treasury and Finance (including the Office of Projects Victoria), Department of Transport (including the Major Transport Infrastructure Authority) and Department of Jobs, Precincts and Regions: • Coordinate, deliver and complete their strategies, actions and the committee work they lead by: ○ documenting implementation plans that include tasks, responsibilities, arrangements, budgets and timelines; ○ setting objectives, measures, indicators and targets for what their strategies and actions aim to achieve; and ○ monitoring, reviewing and overseeing their progress and impact.	MTIA accepts the recommendation. Where appropriate, and as requested MTIA will continue to work with the relevant agencies in contributing to, and leading such strategies as required. MTIA will also continue to deliver their key strategies and initiatives. This will include the development of an Industry Workforce Strategy as requested by, and to align with the DoT Rail Skills Strategy currently being developed.	Ongoing

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Response provided by the Associate Secretary, Department of Jobs, Precincts and Regions

Department of Jobs, Precincts and Regions

Ref: BSEC-2-21-14679

GPO Box 4509
Melbourne,
Victoria 3001 Australia
Telephone: +61 3 9651 9999
DX 210074

Mr Andrew Greaves
Auditor-General of Victoria
Victorian Auditor-General's Office
Level 31, 35 Collins Street
MELBOURNE VIC 3000

Dear Mr Greaves

VAGO's Proposed Report – Major Infrastructure Program Delivery Capability

Thank you for your letter of 21 July 2021, providing the department with a proposed report for VAGO's performance audit on Major Infrastructure Program Delivery Capability. We welcome the opportunity to provide comments to be included in the report.

We have reviewed VAGO's audit recommendations, and have accepted in principle two recommendations, and accepted one in full. Our detailed comments are enclosed.

We thank you and your team for the constructive engagement with the department throughout the audit.

If you require further information, please contact Justin Perkov, Acting Director Audit & Assurance on 0491 614 371 or justin.x.perkov@ecodev.vic.gov.au.

Yours sincerely

Penelope McKay
Associate Secretary

06/08/2021

VICTORIA State Government

Response provided by the Associate Secretary, Department of Jobs, Precincts and Regions—continued

DJPR action plan to address recommendations from the Major Infrastructure Program Delivery Capability performance audit

No	VAGO recommendation	Action	Completion date
2	In consultation with the Department of Treasury and Finance and its Office of Projects Victoria, the Department of Education and Training and other relevant agencies, leads the development of an integrated, aggregate, macro-economic model of the Victorian economy that can determine key drivers of the labour market (see Section 2.6)	Accepted in principle DJPR is committed to working with relevant agencies to better understand the drivers of the labour market to support the delivery of major infrastructure projects as needed.	June 2023
3	Ensures that the state's employment demand modelling includes the distribution of skills across occupations and industries under the Australian and New Zealand Standard Classification of Occupations and works with other agencies as needed to do this (see Section 2.6)	Accepted in principle DJPR is committed to expanding the state's employment projections model to consider the distribution of skills across occupations and industries, working with relevant agencies as needed.	June 2023
11	Coordinate, deliver and complete their strategies, actions and the committee work they lead by: • documenting implementation plans that include tasks, responsibilities, arrangements, budgets and timelines • setting objectives, measures, indicators and targets for what their strategies and actions aim to achieve • monitoring, reviewing and overseeing their progress and impact (see sections 3.3, 3.5 and 3.6).	Accepted 11. a) The *Helping Victoria Grow: Extractive Resources Strategy* sets out actions supported by a funded program (ERS program). DJPR, Resources will work through the ERS Program Control Board (PCB) to update the existing Extractive Resources Strategy Program Plan (program plan) and subsidiary priority project plans. • The program plan summarises how the ERS program will be delivered, managed, and monitored over the life of the ERS program. • The program plan sets the program level framework and governance arrangements and program controls. The program plan is adaptive and evolves over time as different stages of the ERS program are delivered and projects and priorities change. • Considering VAGO's recommendation, the program plan will be updated to include additional and revised information on responsibilities, arrangements, budgets, and timelines.	October 2021

Response provided by the Associate Secretary, Department of Jobs, Precincts and Regions—continued

	11. b) DJPR, Resources will develop a suite of performance indicators to measure and demonstrate the impact of the actions outlined in the strategy. • Performance indicators will be included in the program plan • The amended program plan will be tabled at the October 2021 ERS PCB meeting for endorsement. 11. c) DJPR, Resources will monitor the performance indicators developed under Action 11. b) • Regular updates on progress against the endorsed performance indicators will be presented to the ERS PCB.

APPENDIX B

Acronyms and abbreviations

Acronyms

ANZSCO	Australian and New Zealand Standard Classification of Occupations
DET	Department of Education and Training
DJPR	Department of Jobs, Precincts and Regions
DoT	Department of Transport
DTF	Department of Treasury and Finance
HVHR	high value high risk
IDC	interdepartmental committee
LXRP	Level Crossing Removal Project
MTIA	Major Transport Infrastructure Authority
NSW	New South Wales
OPV	Office of Projects Victoria
TAFE	technical and further education
VAGO	Victorian Auditor-General's Office
VET	vocational education and training

Abbreviations

COVID-19	coronavirus
extractives strategy	*Helping Victoria Grow: Extractive Resources Strategy*
investment reform strategy	Optimising Victoria's Infrastructure Investment reform strategy
major infrastructure strategy	Major Infrastructure Capability and Capacity Strategy
Skills IDC	Skills for Major Projects Interdepartmental Committee
Skills IDC strategy	Skills for Major Projects IDC strategy
Spoil IDC	Spoil Management Strategy Interdepartmental Committee

APPENDIX C

Scope of this audit

Who we audited	What we assessed	What the audit cost
• DTF (including OPV) • DoT (including MTIA) • DJPR	We assessed how the agencies: • assess capability and capacity across the pipeline • address capability and capacity shortages and risks • collaborate with each other and the relevant industries to support resource planning.	The cost of this audit was $955 000.

The government has policies to improve workforce diversity and inclusion, which are aspects of building capability and capacity. However, they were not a focus for this audit, which focused on skills.

Our methods

As part of the audit we:

- interviewed staff from DTF, OPV, DoT, MTIA and DJPR involved in planning and managing delivery capability and capacity for major infrastructure projects
- interviewed stakeholders that have an impact on, or are impacted by, major infrastructure project planning and delivery, for example, Infrastructure Victoria, the Local Jobs First Commissioner and Civil Contractors Federation Victoria
- reviewed agencies' strategies, plans, meeting records, data, models and advice to the government, major project business cases and other relevant documents
- contracted a subject matter expert to review the models that the audited agencies use to forecast delivery capability and capacity.

We conducted our audit in accordance with the *Audit Act 1994* and ASAE 3500 Performance Engagements. We complied with the independence and other relevant ethical requirements related to assurance engagements. We also provided a copy of the report to the Department of Premier and Cabinet.

APPENDIX D

Agency strategies and actions

Figure D1 lists the actions that each agency is delivering or planning under the key strategies that we examined in the audit. It also shows which of the four aspects of major project resourcing they address. Figure D2 lists the members of the two IDCs.

FIGURE D1: **Key strategies the audited agencies have underway or in draft to address delivery capability and capacity shortages, and the actions that each strategy includes**

Lead agency	Strategy	Resourcing aspects covered	Actions
OPV	Major Infrastructure Capability and Capacity Strategy (2017) (major infrastructure strategy)	• Industry workforce • Public sector workforce • Construction market	• Review the market competitiveness of government project delivery roles **(underway)** • Establish the Major Projects Leadership Academy training program for executive and senior Victorian public sector staff **(complete)** • Develop project delivery and commercial training for Victorian public sector staff **(underway)** • Develop infrastructure workforce planning tools for agencies **(not started)** • Strengthen the Victorian Government's approach to recruiting and developing technical graduates **(complete)** • Develop a repository of major projects 'lessons learnt' **(underway)** • Assess government skill gaps to identify current or future supply constraints and implement strategies to address them **(not started)** • Assess industry skill gaps to identify current or future supply constraints and implement strategies to address them **(underway)** • Identify barriers to international entry to the major infrastructure delivery market and identify strategies to address them **(underway)** • Review the impact of contract exclusivity provisions on specialist skills supply **(not started)** • Increase the visibility of capability and capacity risks through all phases of the project life cycle **(underway)**
DTF	Optimising Victoria's Infrastructure Investment reform	• Industry workforce • Public sector workforce	• Develop a forecast model that incorporates existing project data, population data, extractive resource supply and demand forecasts and skill demand **(underway)**

Lead agency	Strategy	Resourcing aspects covered	Actions
	strategy (2019) (investment reform strategy)	• Construction market	• Establish quantity surveying expertise in OPV to improve cost planning for projects **(complete)** • Identify and advise on projects that would benefit from restaging **(complete)** • Refine budget processes by changing funding and contingency arrangements and increasing oversight for HVHR projects **(complete)** • Develop a whole-of-government international outreach strategy **(complete)** • Identify any unnecessary barriers for international entrants to pre-qualification **(underway)** • Explore pilots in procurement policy options to encourage international participation **(underway)** • Develop an online infrastructure pipeline platform for the relevant industries, supported by annual whole-of-government infrastructure forums **(complete)** • Develop policy options to assist relevant industries to better partner with the government to achieve its social procurement policy objectives **(underway)** • Reform the Construction Supplier Register **(complete)** • Communicate the updated *Bid Cost Reimbursement for Major Construction Projects* policy to relevant industries **(complete)**
DTF	Skills for Major Projects IDC strategy (2020) (jointly led with DET) (Skills IDC strategy)	Industry workforce	• Identify specific key skills and qualifications that have a high risk of shortage across major infrastructure projects **(not completed)** • Develop apprenticeship/traineeship reform option/s and recommendations **(complete)** • Identify potential reforms to the Major Projects Skills Guarantee's operation if appropriate **(could not start)** • Develop reform options and recommendations to bridge the undersupply of skill needs **(not completed)** • Develop reform options and recommendations to improve the quality, relevancy and training capacity of the VET sector **(complete)** • Present learnings from demonstration projects and identify actions to further address skill shortages **(complete)**
DJPR	*Helping Victoria Grow: Extractive Resources Strategy*[(a)] (2018) (extractives strategy)	Building materials (extractive resources)	• Update mapping and planning provisions to identify and secure existing and future locations for extractive resources via the Strategic Extractive Resources Areas pilots and Extractives Industry Interest Areas refresh • Improve its understanding of the extractive resources needed to support long-term growth within Victoria, including developing a dynamic economic model and five-yearly comprehensive supply and demand updates • Improve the efficiency of transporting critical material supplies from quarries to the market • Improve its understanding of what happens from the quarry gate through the supply chain to the construction site • Reduce demand on virgin extractive resources by substituting them with recycled products where appropriate

Lead agency	Strategy	Resourcing aspects covered	Actions
			• Improve data collection • Simplify its assessment of proposed quarries and strengthen the regulatory focus on the most complex risks • Deliver modern approval and internal processes to enable timely and consistent decision-making and support industry compliance • Ensure that laws and regulations governing the earth resources sector, including extractive resources, are fit for purpose and based on modern technology and best-practice regulatory and governance frameworks • Implement any regulatory changes needed to support it to identify and protect strategic extractive resources
MTIA	Industry Workforce Strategy (2020) (draft)	Industry workforce	16 new actions in five key areas: • Accelerate construction industry skill development (4 actions, including to publicise industry workforce supply and demand risks) • Increase accessibility to the construction industry workforce (3 actions, including to establish and operate an industry workforce entry hub) • Boost diversity within the construction industry workforce (3 actions, including to increase industry awareness and commitments to achieving diverse workforces) • Drive major project commercial arrangements for project workforce outcomes (3 actions, including to strengthen and align incentive regimes across project offices) • Enhance partnering arrangements with the construction industry (3 actions, including to formalise a collaborative approach between the government and construction industry) These new actions are designed to build on and complement existing actions, such as: • Rail Academy Newport • Critical skill shortage programs • 'Professionals' program • MetroHub • graduate program
DoT	Spoil Management Strategy IDC's Spoil Management Strategy (2020) (draft)	Building materials (contaminated spoil)	The draft strategy considers a range of options for managing the volume of contaminated spoil produced and how it is disposed of.

Note: [a]We have not listed actions from the extractive strategy that do not directly relate to supply and demand. For example, we have not included actions such as community engagement, environmental sustainability and quarry uses after closing.

Source: VAGO, based on the audited agencies' strategy documents.

FIGURE D2: **IDC members.**

IDC	Lead department	Member departments and agencies
Skills for Major Projects IDC	DTF and DET	• DJPR • DoT • MTIA • OPV • Department of Premier and Cabinet • former Department of Health and Human Services
Spoil Management Strategy IDC	DoT	• DTF • DJPR • MTIA • Department of Premier and Cabinet • Department of Environment, Land, Water and Planning • Environment Protection Authority

Source: VAGO, based on the audited agencies' committee terms of reference.