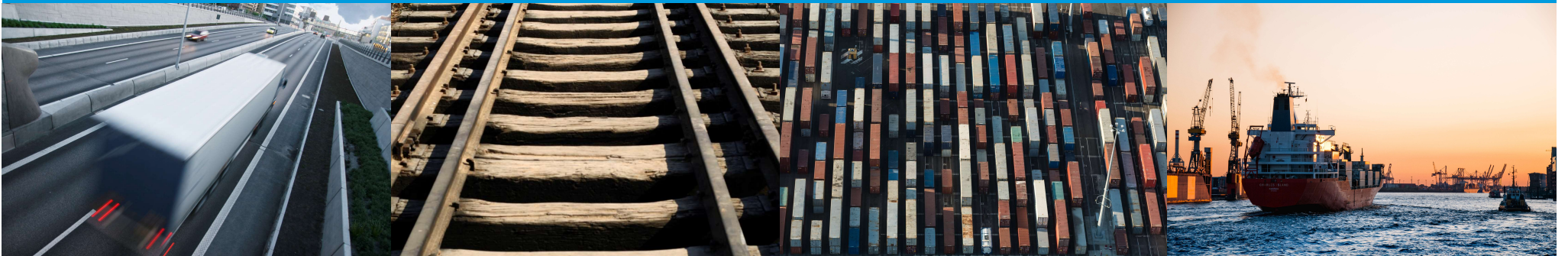




Cost-Benefit Analysis of Port Botany Landside Improvement Strategy (PBLIS) Performance

Main Findings



Contents

1 Context

2 Main findings

3 PBLIS Background

4 Approach and methodology for the CBA

5 Results

6 Recommendations

Context



CONTEXT

- PBLIS was introduced in 2010 to promote the economically efficient operation of the landside supply chain at Port Botany.
- Transport for NSW (TfNSW) engaged Castalia to undertake a cost-benefit analysis (CBA) of PBLIS to inform an Independent Review of PBLIS and the Ports and Maritime Administration Act 1995 (the Act).



PROBLEMS

- Since its inception, PBLIS has delivered some significant benefits, however the improvement in the port landside performance appears to have waned over the past few years.



KEY QUESTIONS

- What has PBLIS has achieved since its inception?
- Are current PBLIS arrangements appropriate?
- Does PBLIS remain the best regulatory approach to manage the landside interface at Port Botany?
- What are the alternative regulatory options?



SOLUTIONS

- Extend the allowed wait time at the truck marshalling area (TMA)
- Reform stevedore regulations around minimum slots per hour
- Further encourage the shift to 24/7 supply chain operations.

1

Main findings



Main findings

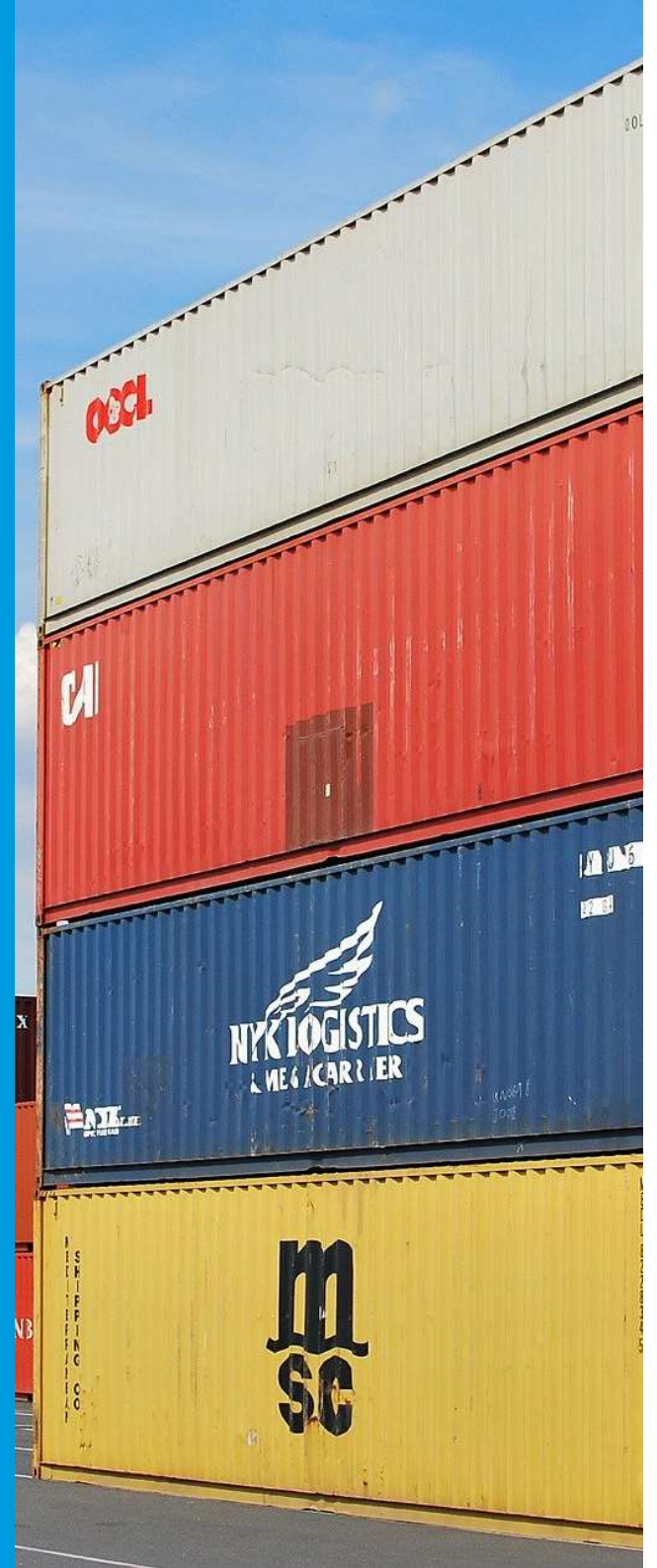
- Under all scenarios considered, the benefits of PBLIS over the forward-looking 10-year assessment period (2022-2031) exceed costs. (The results are sensitive to assumptions about future traffic growth and the discount rate, however, in all sensitivities, PBLIS shows positive net benefits).

Discount Rate	BCR	Net Benefit
3%	2.96	\$159,752,191
7%	2.52	\$104,457,418
10%	1.91	\$55,836,020

- The key benefit of PBLIS arises from traffic decongestion and reduced emissions thanks to the removal of heavy vehicles from the roads around the port.
- The truck turnaround time (TTT) reductions over time are more likely to be driven by the commercial incentives of the stevedores than by policy interventions.
- Given where the industry is today, the removal of key PBLIS components is likely to generate net costs.

2

PBLIS background



Components of PBLIS

PBLIS was established in response to the findings of the 2008 IPART review, which found inefficiencies with container movements at Port Botany and the bottlenecks at the port causing congestion on the wider Sydney road network.

PBLIS defined four components that were key to setting out how stevedores and road carriers contract and do business at Port Botany:



Establishment of the TMA



Introduction of penalties and Mandatory Standards



Introduction of vehicle booking system (VBS) and rules linked to Mandatory Standards and penalties

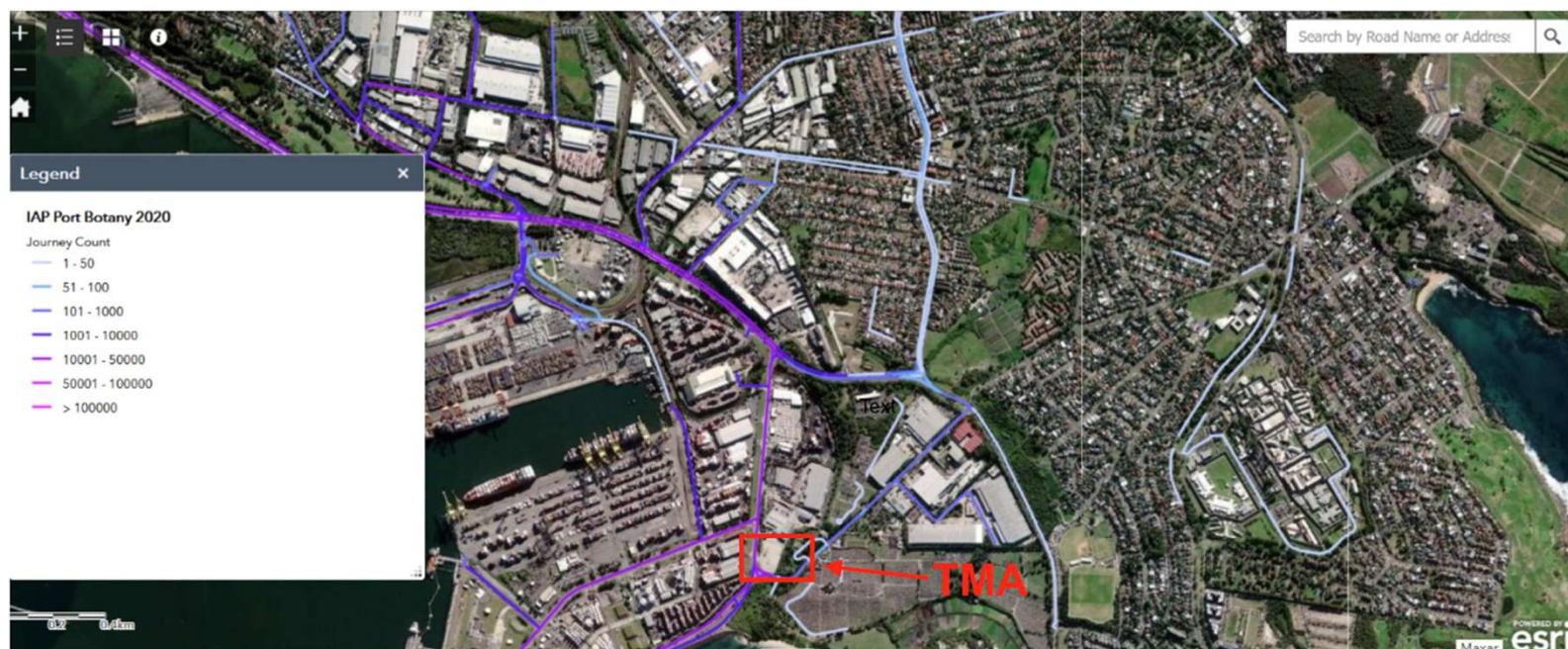


Introduction of service lines at the terminals and enforcement of parking rules for heavy vehicles on the public streets and roads around the port.

1. Establishment of the Truck Marshalling Area (TMA)

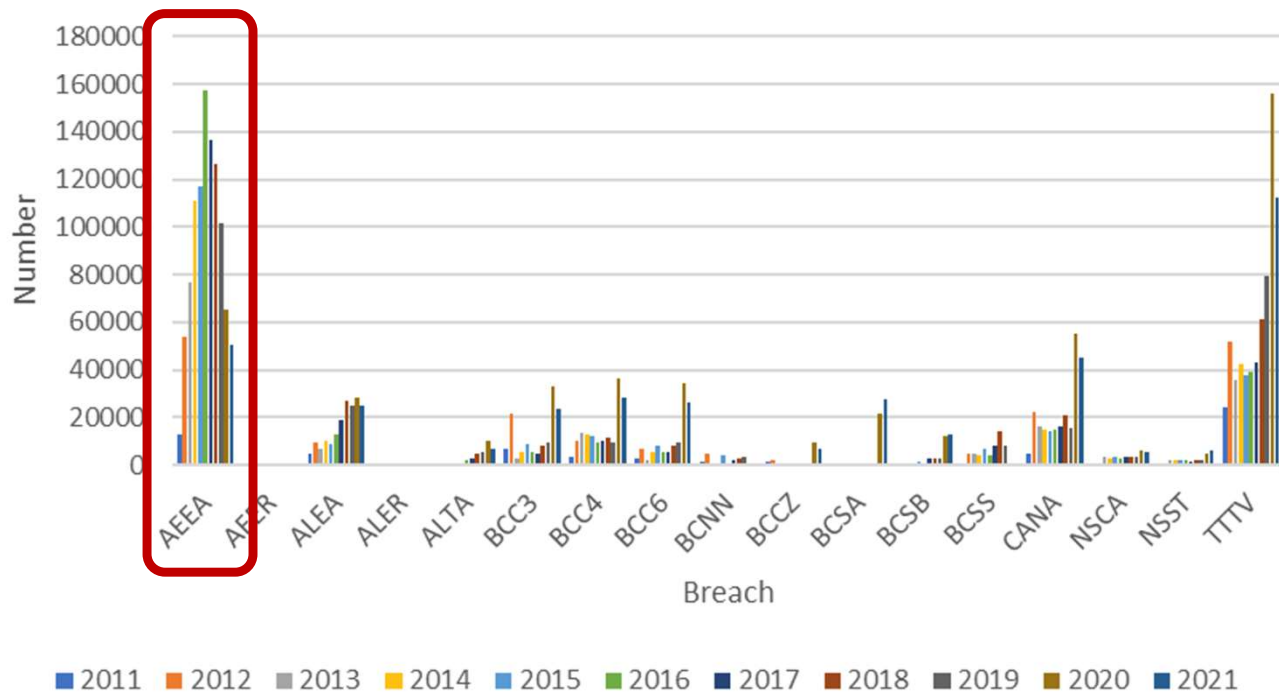
- TMA was established in 2012 to provide a parking space and rest area for trucks that arrive earlier than their booking slot.
- TMA allows trucks to park for up to one hour prior to the booking slot.
- TMA seems to be minimising the spill-over of truck journeys to the residential streets surrounding the port (image below).

Number of truck journeys on the streets around Port Botany



2. Introduction of Penalties and Mandatory Standards

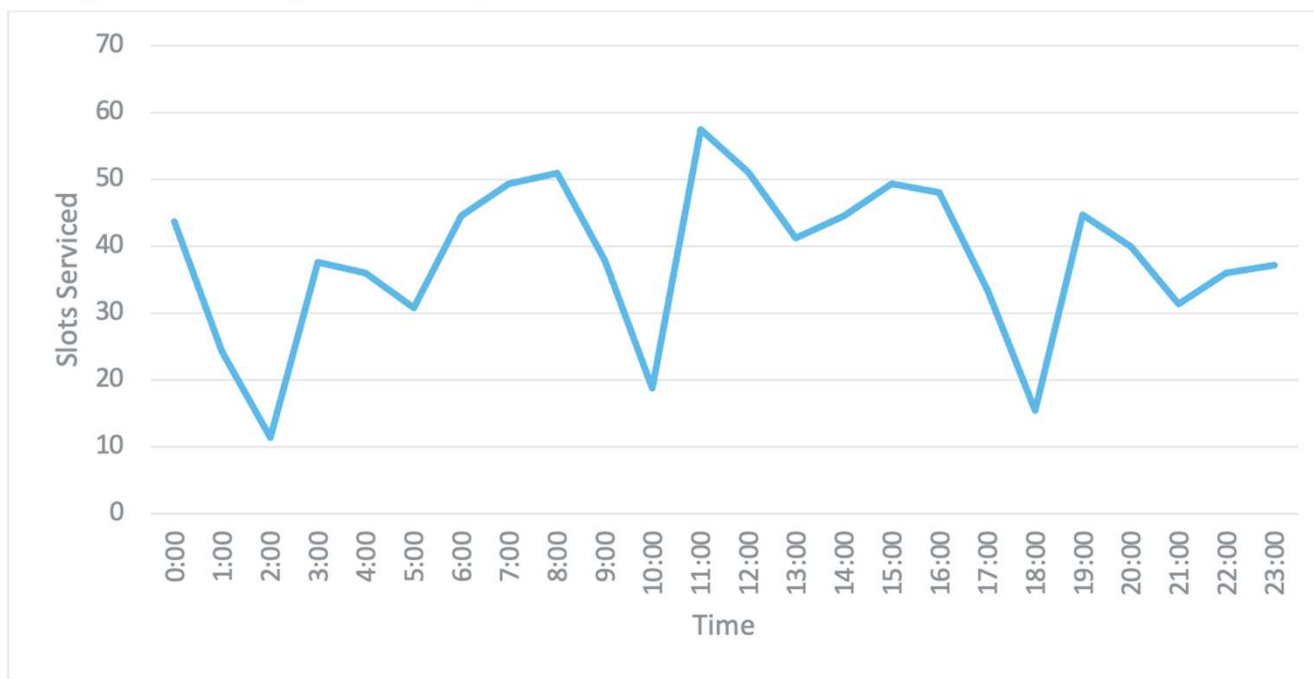
- Penalties were introduced to reduce inefficiencies associated with landside container movements. They are linked to the defined allowable thresholds (mandatory standards)
- Mandatory Standards prescribe the allowable ceiling for TTTs and early or late arrivals, as well as defining other aspects of the PBLIS regime that would incur penalties if violated.
- The largest breach category is early arrivals (AEEA in the figure below). Many of these early arrivals do not incur any financial penalty because either the TMA is not available for early arriving trucks, or the relevant stevedore accepts the truck notwithstanding its early arrival.



3. Introduction of the vehicle booking system (VBS)

- Truck operators must make a booking for a time slot to pick up or drop off containers. The booking is made through the stevedore's VBS, and the data is shared with TfNSW.
- The figure below shows the distribution of slots booked using the VBS between 2011 and 2021 by hour of the day. As the figure suggests, the demand profile is unevenly spread over the 24-hour workday, with least activity during shift changes or meal breaks.

Average slots booked per time zone, 2011-2021



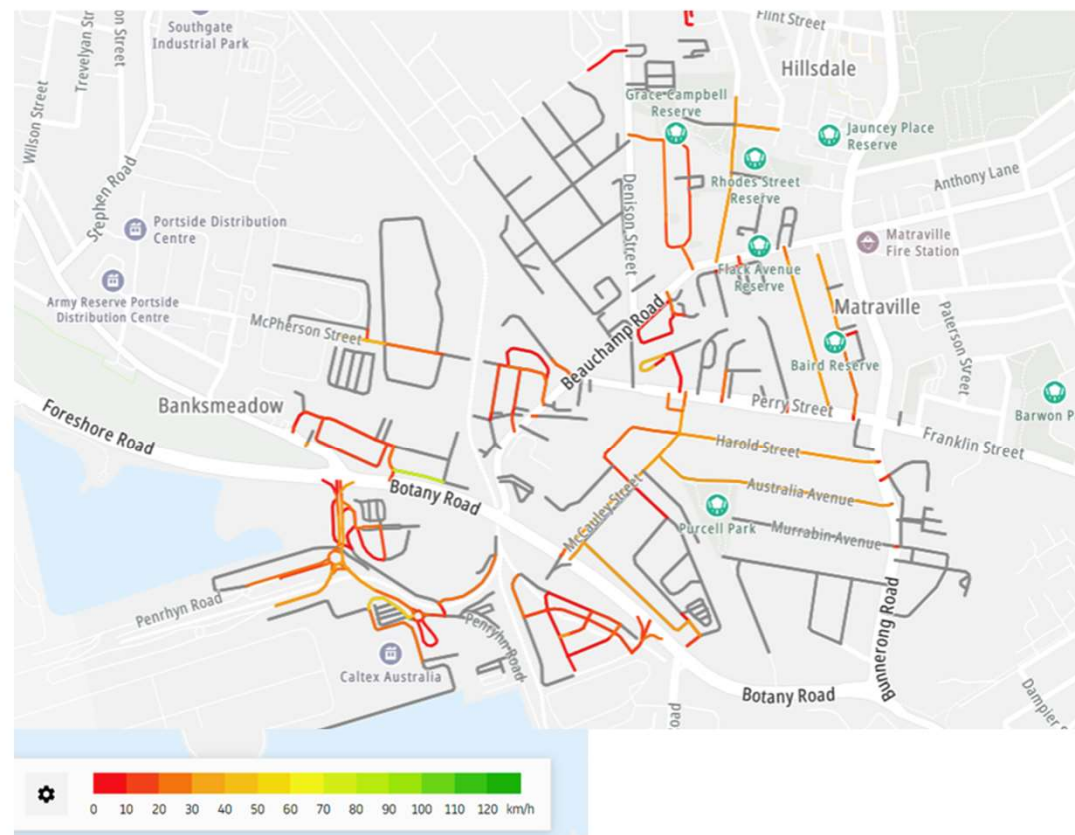
Note: Includes slots booked and subsequently cancelled

Source: TfNSW

4. Introduction of service lines at terminals and parking rules enforcement around the port

- A service line is a corridor leading to the terminal gate, where trucks are expected to smoothly proceed in a queue for their turn to be serviced.
- Traffic management on surrounding streets reduces illegal stopping and truck congestion. As shown in the image below, however, congestion still somewhat remains an issue.

Median speed on local roads and streets in the precinct of Port Botany, January 2022



3

CBA Approach and Methodology



Approach and methodology

- This CBA was conducted by considering a series of counterfactual scenarios based on potentially removing each key element of PBLIS, one at a time, starting in 2022 and estimating quantitative and qualitative effects of removing each comment on key landside performance indicators – 1) TTTs, 2) congestion, 3) shift to 24/7 port, 4) truck utilization, 5) stevedore efficiency.
- Procedures outlined in the TfNSW CBA Guide were applied to measure the full economic, social, and environmental impacts of PBLIS on the NSW community

Benefits	Item
User benefits (landside efficiencies)	<ul style="list-style-type: none"> • TTT • Container density
Social benefits	<ul style="list-style-type: none"> • Environmental externalities • Safety benefits • Decongestion benefits
Government benefits	<ul style="list-style-type: none"> • Avoided road maintenance

Costs	Item
Capital costs	<ul style="list-style-type: none"> • Annual reinvestment cost • Opportunity cost of TMA land
Recurrent costs	<ul style="list-style-type: none"> • Administrative costs (non-labour) • Labour costs
Indirect costs	<ul style="list-style-type: none"> • Potential reduction in private sector innovation and other unintended effects

4 CBA Results



Key findings

- Removal of TMA would create the largest negative effect on the performance indicators, while the removal of the VBS software would have the least effect because stevedores would continue using own booking software.

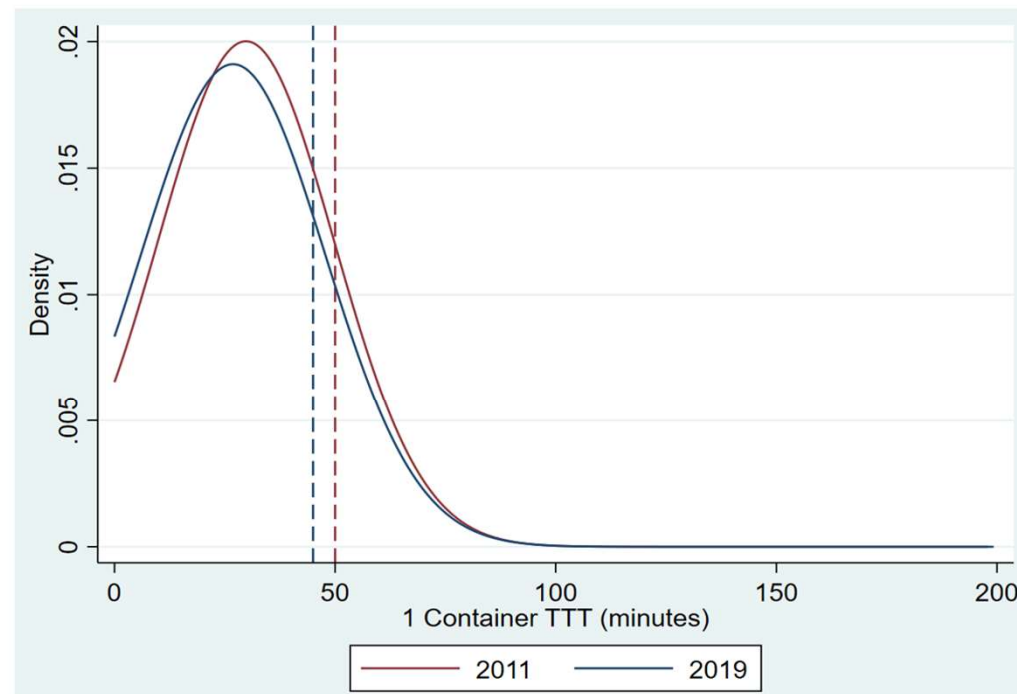
	TTTs	Congestion	24/7 port	Truck utilisation	Stevedore efficiency
TMA	–	–	–	–	–
Penalties and Mandatory Standards	±	–	±	–	–
VBS	±	±	±	±	±
Service lines and parking enforcement	–	–	±	–	–

Note: “–” indicates that the removal of the PBLIS component has a negative effect on the performance indicator; “±*” denotes a neutral effect.

1. PBLIS impact on TTTs

- In the absence of PBLIS, we expect that TTTs will not change significantly because TTT improvements over time were more likely to be driven by the commercial incentives of the stevedores than by policy interventions.
- As shown in the figure below, improvements in TTTs between 2011 and 2019 mainly occurred below the PBLIS thresholds, indicating that while stevedores had room to be “inefficient” up to the allowable 45 minutes TTT value and shift inefficiencies to the road carriers, they didn’t do so.

Normalised TTT distribution of trucks carrying one container in 2011 and 2019



Note: Dashed red line indicates the allowable TTT for trucks carrying one container in 2011 (50 minutes). Dashed blue line indicates the allowable TTT for trucks carrying one container in 2019 (45 minutes).

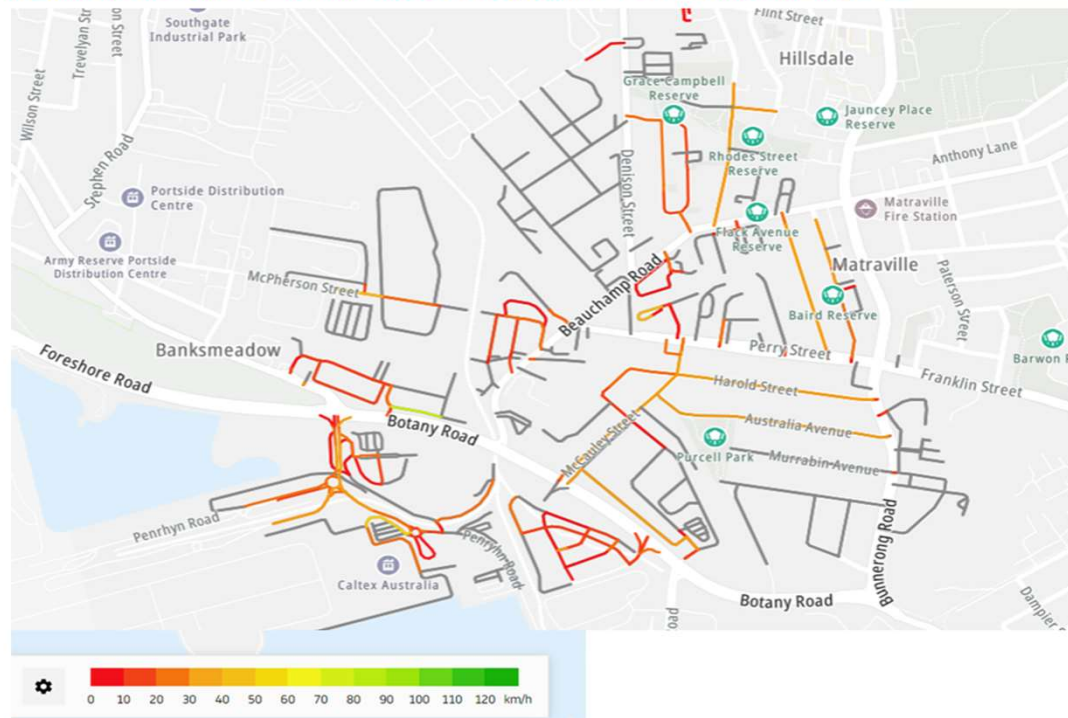
37,800 observations (6.3 per cent of the total number of observations) greater than or equal to 200 minutes were dropped from the dataset.

Source: [TfNSW](#)

2. PBLIS impact on Congestion

- PBLIS has reduced truck movements around the port, resulting in less traffic congestion. This has been achieved thanks in large part to the establishment of the TMA and service lines at the terminals, and the enforcement of parking rules, as well as other components of PBLIS.
- Notwithstanding the improvements, public roads around Port Botany remain somewhat congested.

Median speed on local roads and streets in the precinct of Port Botany, January 2022

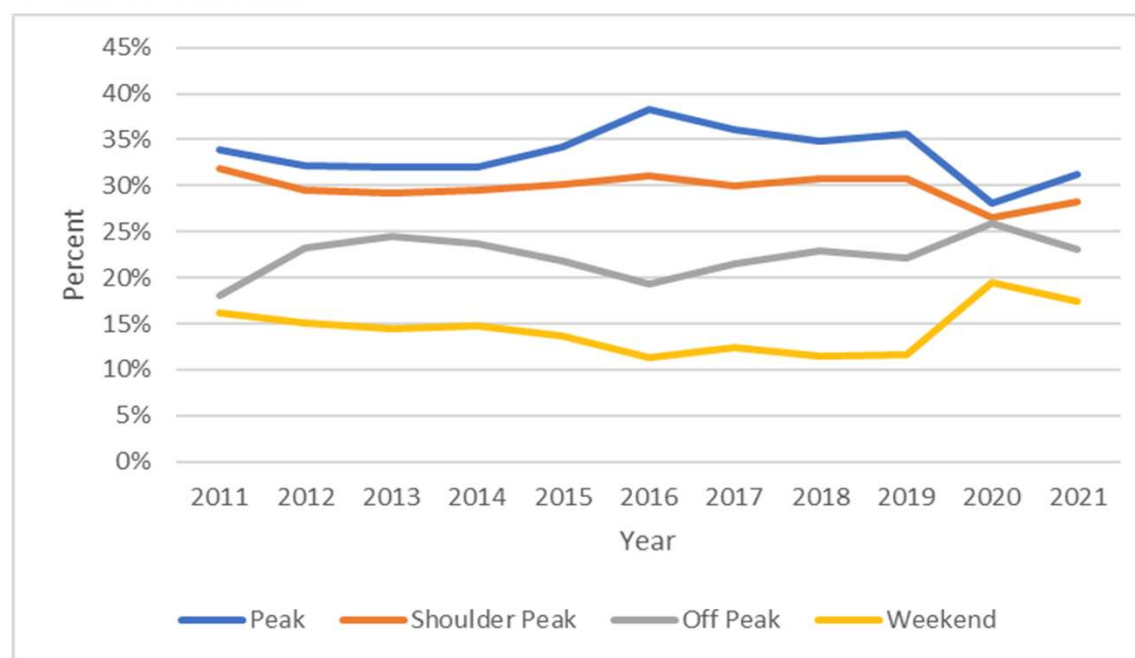


Source: TomTom Move

3. PBLIS impact on shifting the port towards 24/7 operations

- The figure below demonstrates a limited shift towards 24/7 logistic chain operations.
- Many factors could prevent such a shift—including COVID-19 bottlenecks, local council regulations, the rest of the supply chain (e.g., warehouses, stores) only operating during regular business hours.

Port utilisation by time and day



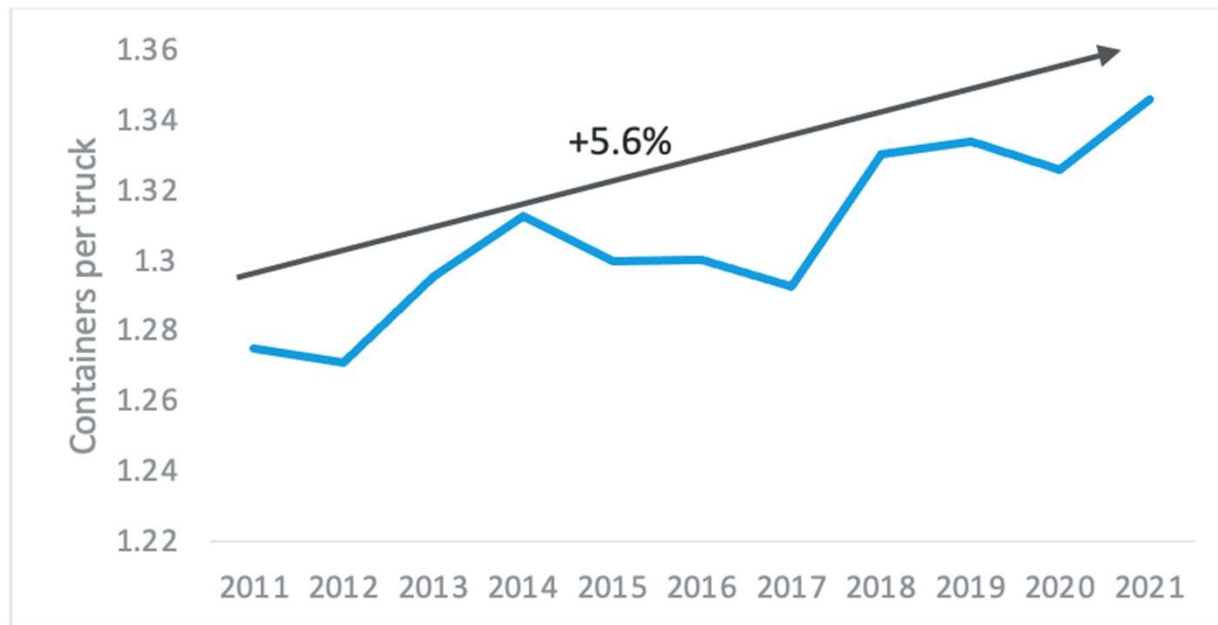
Note: Data is updated as of November 2021

Source: TfNSW

4. PBLIS impact on truck utilisation

- Trucks are expensive to hire and are most optimally utilised when they are neither idling nor waiting in queues.
- Container density is one measure of the effectiveness of truck fleet utilisation—the higher the container density, the more productive the use of the truck.
- Historical data suggests that container densities have not changed significantly under the PBLIS regulations, increasing by only 5.6 per cent between 2011 and 2021.

PBLIS containers per truck

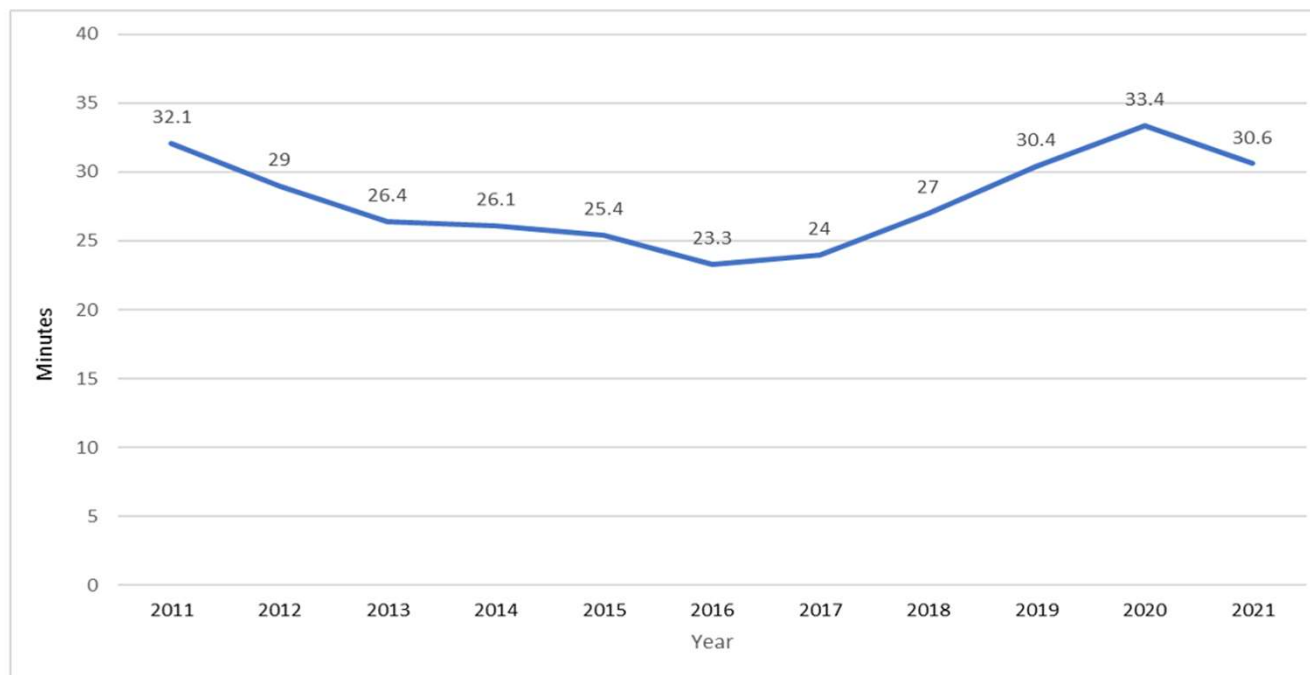


Source: TfNSW

5. PBLIS impact on stevedore efficiency

- TTT value—the main measure of stevedore efficiency—showed a positive trend. TTTs decreased from an average of 32.1 minutes in 2011 to 30.6 minutes in 2021, a 4.7 per cent improvement. This may suggest the equilibrium.
- Stevedores still demonstrate inefficiencies to different degrees (for example, the inefficient stacking of containers and lost containers), which if resolved, could theoretically further improve landside efficiency.

Port Botany average TTT, 2011-2021



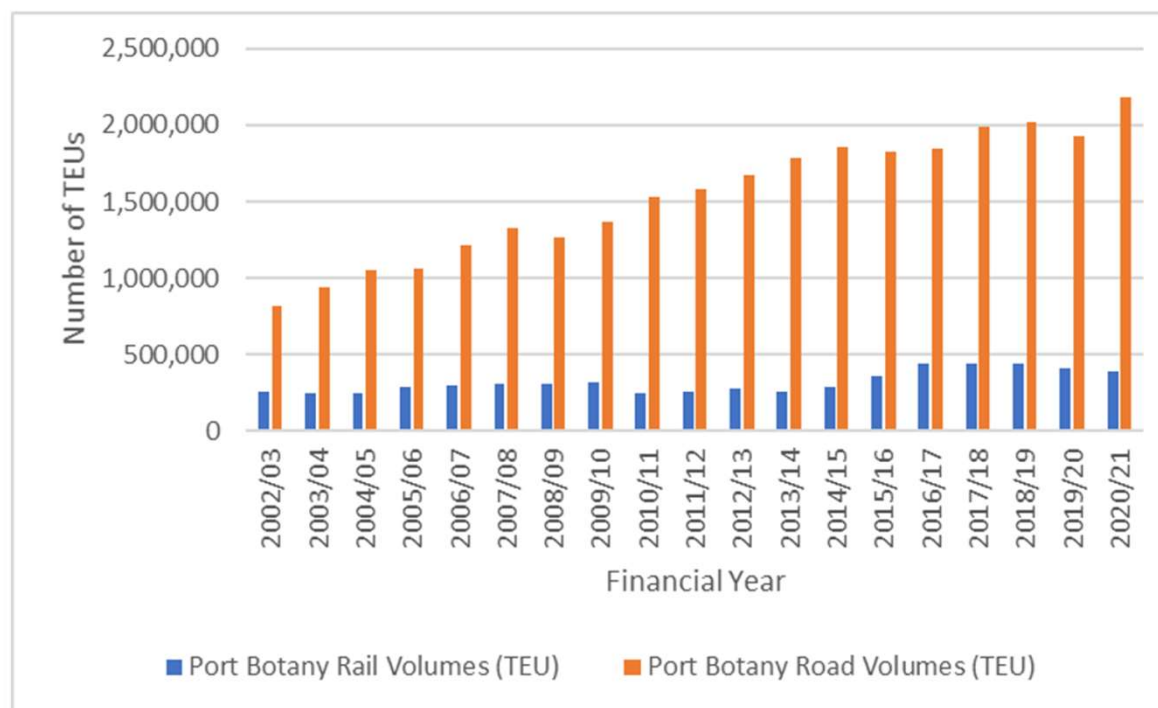
Note: Data is updated as of October 2021

Source: [TfNSW](#)

6. PBLIS impact on rail

- This CBA does not provide any evidence of any influence of PBLIS interventions on the proportion of freight entering the port by rail.
- Significant recent investments by stevedores in rail connectivity at the port suggests that rail throughput may rise in the future.

Total Port Botany road and rail throughput volumes (TEU), 2011-2021



Source: TfNSW

Results and sensitivity testing

Overall, PBLIS delivers a net material benefit. Depending on our assumptions, We conclude that the benefit-cost ratio (BCR) of PBLIS is somewhere between 2 and 3.

CBA results of the PBLIS program, 2021-2031

Discount Rate	BCR	Net Benefit
3%	2.96	\$159,752,191
7%	2.52	\$104,457,418
10%	1.91	\$55,836,020

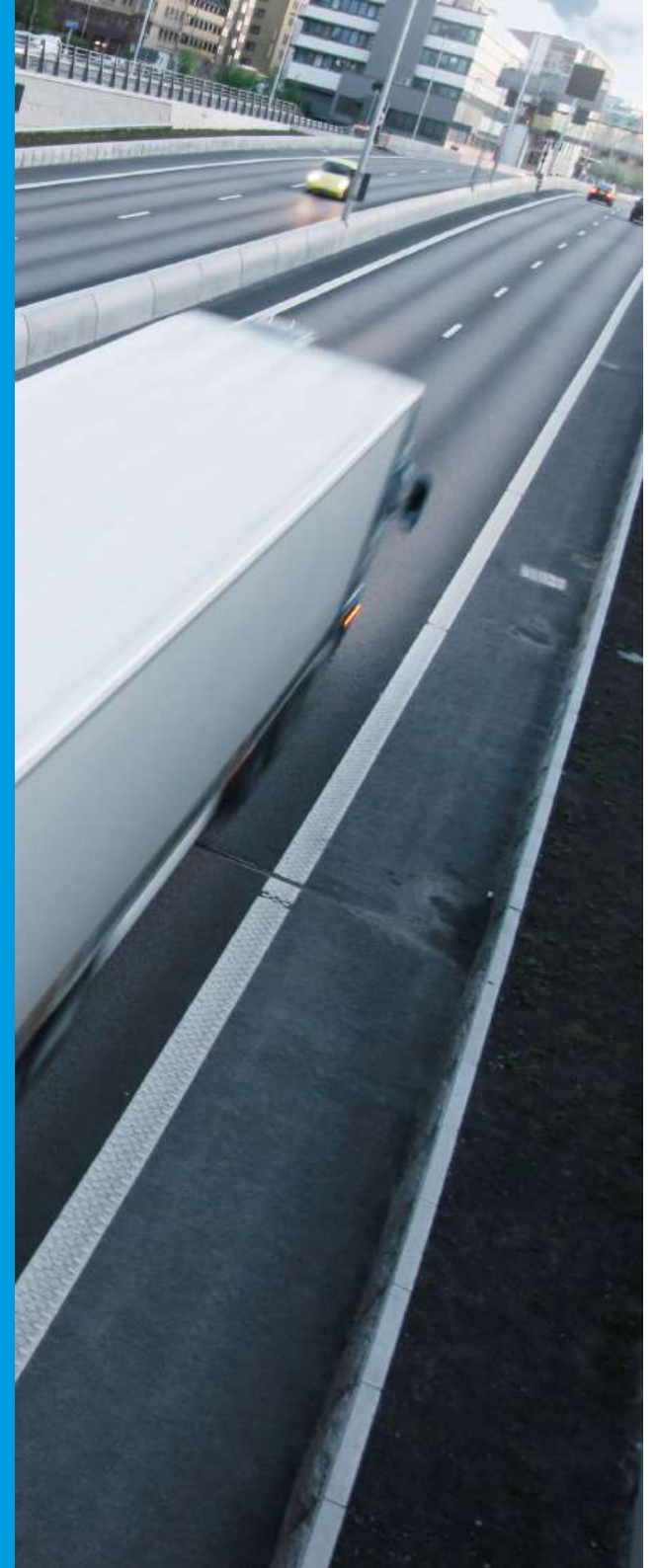
Consultant's calculations

Sensitivity analysis – Truck growth rate

Truck growth rate	BCR	Net benefit, AU\$
1.5%	2.37	\$ 93,987,732
2.92% (base)	2.52	\$ 104,457,418
5%	2.77	\$ 121,390,089
7%	3.04	\$ 139,623,082

Consultant calculations

5 Recommendations



Recommendations



EXTEND TMA TIME

- Extend the allowed time at TMA to two hours to further reduce the incidence of truck parking on the streets and to provide greater flexibility to road carriers.
- Any road operators who wish to remain at the TMA for more than one hour would likely have good reasons to remain in the port precinct.



MINIMUM SLOTS PER HOUR

- The requirement to release the minimum number of slots per hour does not appear to constrain conduct, nor is it contributing sufficiently to off-peak operations.



24/7 SUPPLY CHAIN OPERATIONS

- Most trucks can only work during peak hours on weekdays due to the working hours of warehouses and businesses.
- Stevedores could impose a Peak Period Pricing (PPP) system to reduce demand during peak periods.
- Council curfews prohibit heavy vehicles from driving during off-peak periods.

Contact Us

Alex Sundakov

Alex.Sundakov@Castalia-Advisors.com



Paris • Sydney • Wellington • Washington, DC. • Auckland • Bogotá