NSW GOVERNMENT | Transport for NSW

NSW GOVERNMENT | Transport Sydney Trains

Joint Review on Network Recovery from Major Incidents

Scope of the Review

This report responds to the Minister for Transport's requirement for the Secretary for Transport and the Chief Executive of Sydney Trains & NSW TrainLink to conduct a joint review on how the network can recover from major incidents with cumulative impact that were seen on 8th and 9th January 2018.

Introducing the 2017 Timetable

On 26 November the 2017 Timetable was introduced resulting in an increase of more than 1,500 weekly services in response to a significant increase in demand. Since its launch, in normal circumstances the Timetable operates successfully, meeting targets for on-time running and reliability, and responds as well as the prior timetable to typical scenarios for a routine network incident with potential to disrupt services. However, the ability to recover from the cumulative impact of major incidents was particularly unsatisfactory on the 8th and 9th January 2018.

To confirm the 2017 Timetable was ready to be implemented, it was subjected to an independent assurance process prior the decision to proceed. For several weeks including the whole of December the new timetable performed satisfactorily with 13,574 peak services at 92.7% punctuality and 96,620 total monthly services at 92.3% punctuality. This is very similar to the December 2016 timetable performance, with 8% more services being delivered compared to the previous timetable.

Analysing the Incidents

During the PM peak on Monday 8th and the AM and PM peaks on Tuesday 9th January 2018, train services experienced widespread delays and cancellations that caused major disruption, platform crowding and longer journey times than normal, which was highly unsatisfactory and frustrating for customers. These disruptions arose from a rare combination of causes, the cumulative impact of which has exposed some previously unidentified weaknesses in the underlying approach to provisions made for recovery from unplanned incidents and events.

On Monday 8th January a series of incidents occurred including a train delayed leaving Parramatta due to crew availability on the day, a minor infrastructure failure, a train mechanical issue, a sick passenger delaying services and a freight train incident. Individually these events may have led to a disruption with only minor service impacts that could have been recovered without serious delays. However the cumulative effect of their almost simultaneous occurrence, compounded by underlying issues we have now identified, resulted in major widespread disruption in the PM peak with lengthy delays to some services, and only 60.8% of services meeting the punctuality target. While the AM peak achieved 91.3% punctuality, due to the PM peak outcome, of a total of 3,016 services across the entire day, only 2129 or 70.6% were punctual.

On Tuesday 9th January there were further major disruptions caused by three separate lightning strikes that occurred early in the morning affecting power supply for signals infrastructure in four locations, together with a power supply failure at Penrith. The resulting disruption meant that the AM peak operated at only 60.6% punctuality and the PM peak was delivered at only 25.9%. Of the 3,021 daily services on Tuesday 9th, only 978 or 32.4% were punctual.

While the disruptions on the 8th and 9th January resulted in massive inconvenience to customers, this level of disruption from unplanned events is not unprecedented. Weather and infrastructure failures similarly impacted both suburban and intercity networks under previous timetables. For example, in November 2013 a lightning strike disabled both the primary and back-up train signal systems at Strathfield signal box, resulting in 1018 services being delayed or cancelled. In April 2015 storms affected the network from the Hunter to the Illawarra, including the Sydney suburban region, delaying or cancelling 2807 services over two days.

Managing the complexity of the Sydney rail network

A key underlying contributor to the networks historic and continuing vulnerability to major disruption is the fact that over the past century Sydney's suburban and intercity rail system has evolved into complex network with features that are not typical of modern rail networks in similar size cities. The lines in Sydney's network are often referred to as being 'tangled', meaning there are numerous conflicts and interactions between each line, with multiple branches, crossovers and junctions. This means that when incidents and delays do occur they have the potential and a tendency to cascade across multiple lines, compounding disruption for customers and creating complexity which makes timely recovery far more challenging than it would be if the network was untangled.

Over the past decade several network investment programs have been implemented that partially untangled the network. This simplification is referred to as network sectorisation. A fully sectorised network from both an infrastructure and crewing perspective, has each line operating completely independently, which increases efficiency, and delivers capacity and reliability benefits. Should incidents occur, sectorisation means they have less impact on other lines because disruptions are contained to a single sector of the network.

The 2017 Timetable was designed to achieve a further level of network sectorisation, particularly on the network's critical western corridor, where the number of conflicting points along the corridor was reduced by 46%. The timetable also fully separated Liverpool to Leppington and East Hills to Campbelltown services at Glenfield. However, despite the investment program over recent decades, the capability to operate a timetable that is completely sectorised remains constrained by the legacy of existing infrastructure. The disruptions on 8th and 9th January 2018 were compounded by these limitations, particularly for the T1 and T2 services, as recovery on these lines is particularly hampered by their entangled nature.

In the medium to long term, further investment in network infrastructure, including stabling locations, track configuration and junction removal will be essential to providing more capacity, greater reliability and more resilience to major incidents. In the nearer term, these incidents highlight the need to review strategies to minimise the spread of disruption for a range of potential high impact events and formalise a set of incident recovery protocols within the constraints of the current network. In the short term, further work should be completed to develop incident scenarios for higher impact disruption, with associated recovery plans aimed at containing the impact of incidents.

Crew resourcing

As is standard when developing train timetables, there were several iterations of the draft timetable created throughout the process. Each new draft introduced new services that meant a greater number of shifts were needed to be filled by train crew. Established methods of planning and producing crew deployment plans and schedules were based on legacy systems built up over a number of years. Whilst enabling successful launch of previous timetables (most recently the 2013 timetable) it is now apparent they need to be modernised using latest technology to accommodate the scope of future timetables.

The disruptions on 8th and 9th January have also shown that the business tools and protocols that underpin planning and managing crewing and scheduling to meet operational requirements of timetables now need to be revised and further developed. Specifically, they need to be capable of modelling and analysing a range of degraded network operation scenarios and proactively identify the measures needed to sustain service delivery.

At a more granular level, in the process of optimising crew resources to support the timetabled services, the number of locations and frequency of crews changing between trains was increased 14% (previously 1515 and now 1781). In addition, the time allocated for crew to walk between trains was shortened from 10 minutes to between 5 and 7 minutes. Train crew changeover locations increase from 15 to 19, meaning crew are more dispersed.

Experience since its launch has demonstrated that while these crewing parameters are viable for the 2017 Timetable under normal operating conditions and with routine unplanned events, they do not provide enough flexibility to support recovery when multiple incidents combine to substantially degrade the network (as happened on 8th and 9th January). On both these days, when a series of disruption events occurred together, these crew scheduling parameter settings triggered a multitude of missed train crew connections, the effect of which cascaded across the network. These same conditions made recovery a more difficult and lengthy process than the previous timetable.

On the 8th and 9th January overall crew availability was also impacted by two other temporary conditions:

- the need for additional crew to relieve crew that had been scheduled to work their normal day off on New Year's Eve, which fell on a Sunday, increasing levels of leave;
- the requirements of the Hornsby Junction shutdown, which meant additional drivers were required to support the special timetable for the project works and for training to familiarise crew with the new junction layout.

While these conditions were known and planned for, the provisions made left insufficient reserve capacity to deal with the magnitude of disruption that occurred. The lesson learned is that some additional reserve crew capacity is needed to support the network in recovering from events that potentially have significant impacts. Accordingly, in Post Implementation Reviews of the 2017 Timetable, minor adjustments to scheduled services should be considered, aimed at reallocating crew resources from services with very low patronage levels during off peak periods to provide extra capacity for incident recovery during peak periods.

In addition, while existing measures are in place to increase the number of train crew for the next timetable change, the disruptions on 8th and 9th of January indicate it would be prudent to accelerate recruitment to accommodate the more intensive labour requirements necessary for recovery from major and or cumulative incidents, as well as to counter the effects of ongoing targeted recruitment campaigns by rail operators in Queensland and in Victoria, where higher rates of pay are offered to operate driver-only services.

The incidents of the 8th and 9th January also highlighted limitations in legacy communication systems between the Train Crew Assignment Centre (TCAC), train crew and the Rail Management Centre (RMC), impacting the ability to

optimally reposition available crew to support recovery efforts. Upgrade of this system also needs to be prioritised as part of the new Rail Operations Centre (ROC) that is currently in delivery.

Customer communications

The disruption on 8th and 9th January 2018 triggered the deployment of extra ancillary staff under existing protocols to: increase resources to high risk locations (Lidcombe, Central, Town Hall, Wynyard, Parramatta and North Sydney), implement crowd management at stations to ensure platform capacity was not exceeded; identify lengthy service gaps and communicate the disruption and alternative travel options, such as buses, to customers.

There were service gaps at CBD stations which meant that on several occasions due to large crowds and to keep customers safe, access to platforms were closed off at Central, Town Hall and Wynyard. While there was an existing mechanism for the Rail Management Centre (RMC) to communicate with station management staff via the Train Location System notice boards and SMS alerts, during the Incident insufficient information was available.

It was very difficult for frontline staff to advise customers of specific train running information such as arrival time, destination and stopping pattern. When services did arrive, especially at Central, the stopping pattern often changed due to crew availability and crew relief issues. As a result, the only information that could be provided to customers was generic disruption information. This was exacerbated by the need for incident management staff to organise replacement bus services, in addition to managing and communicating with customers.

During these incidents (and more generally since the new timetable has been implemented) frontline staff and their leaders have worked under demanding circumstances to do their best to deliver services to customers. Their efforts have mitigated the potential impacts of the underlying issues identified in this report.

Recommended actions

This review has identified that the following actions would enable the network to better recover from major incidents.

Action 1	Review strategies for potential high impact events and formalise incident recovery protocols within the constraints of the current network infrastructure
Action 2	In Post Implementation Reviews of the 2017 Timetable identify opportunities to make minor adjustments to scheduled services to reallocate resources from running services with very low patronage levels in off peak to providing extra capacity for incident recovery during peak service periods.
Action 3	In consultation with the unions, revise the business rules and practices for crew changeover; and implement a staged plan to realign crew deployment and arrangements for changeovers.
Action 4	Plan and produce an independently assured revised forward forecast of crew requirements for all known variations from normal operating conditions with increased reserve provisions for network recovery.
Action 5	Accelerate the program for recruitment of new train drivers, and match to the revised forward forecast.
Action 6	Commission an in-depth review by an independent party to define a program to upgrade systems, tools and protocols for crew resourcing and scheduling that enable scenario testing to optimise network resilience provisions.
Action 7	Upgrade TCAC to enable more effective communication between TCAC, train crew and the RMC/ROC. Build further resilience into the IT network to support automated real-time crew scheduling, tracing and communications.
Action 8	Transfer responsibility of sourcing replacement buses to Transport for NSW, allowing Sydney Trains to focus on customer management during network disruptions, to improve on customer communication and crowd management