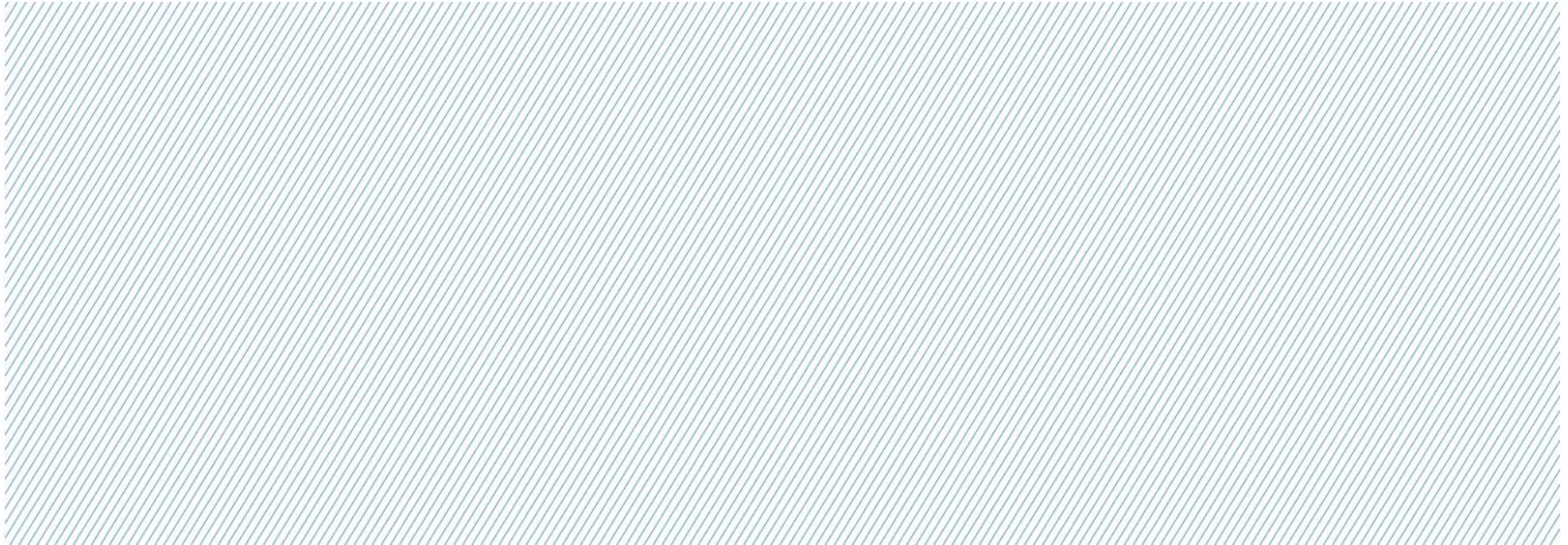


# Risk Adjusted Programme Management

By Chris Young



# Introduction

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- The NZ Transport Agency are the asset owner of the national State highway network.
- The network is around 12,000 km long, and enables 50% of all vehicle kilometers travelled (VKT) , and 70% of freight VKT.
- Each length of highway is classified based on its form and functions, and the level of service provided is relative to the classification.
- At date of writing, there are around 700 current projects either in progress or planned across the NLTP. These vary in size from <\$1M to >\$1bn.
- The number of projects is fluid as new projects continuously emerge following either completion of a Programme Business Case, Corridor Management Plan, or following the approval of a new emergency works, or resilience based event.
- We invest around \$1.5bn per year improving the network

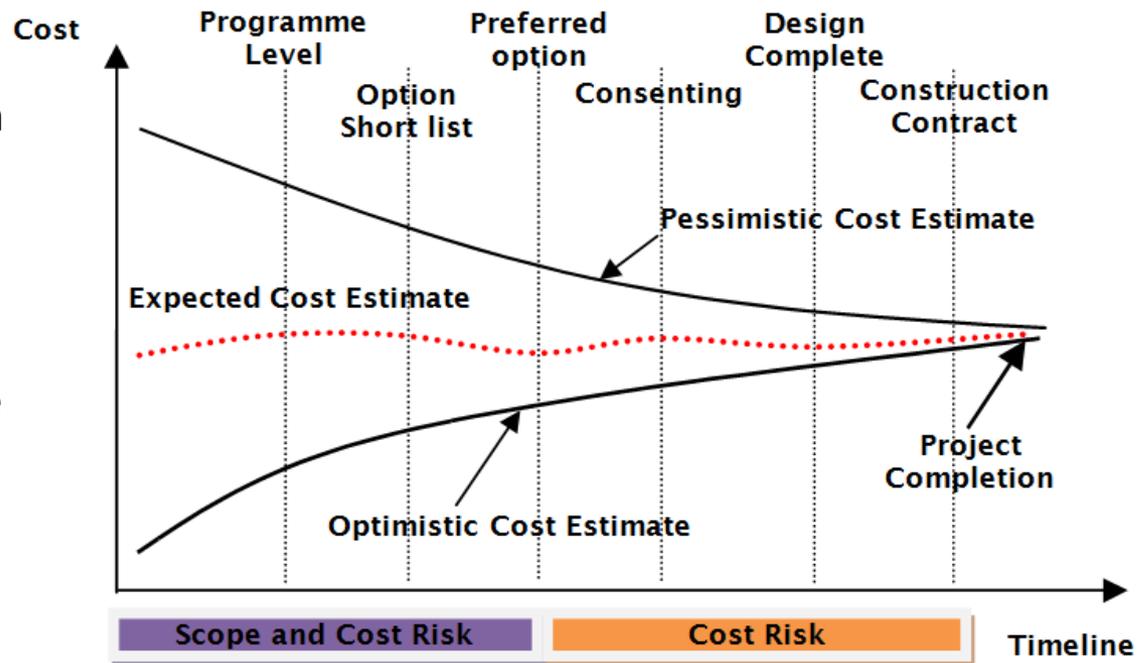
# The portfolio is complex with many moving parts

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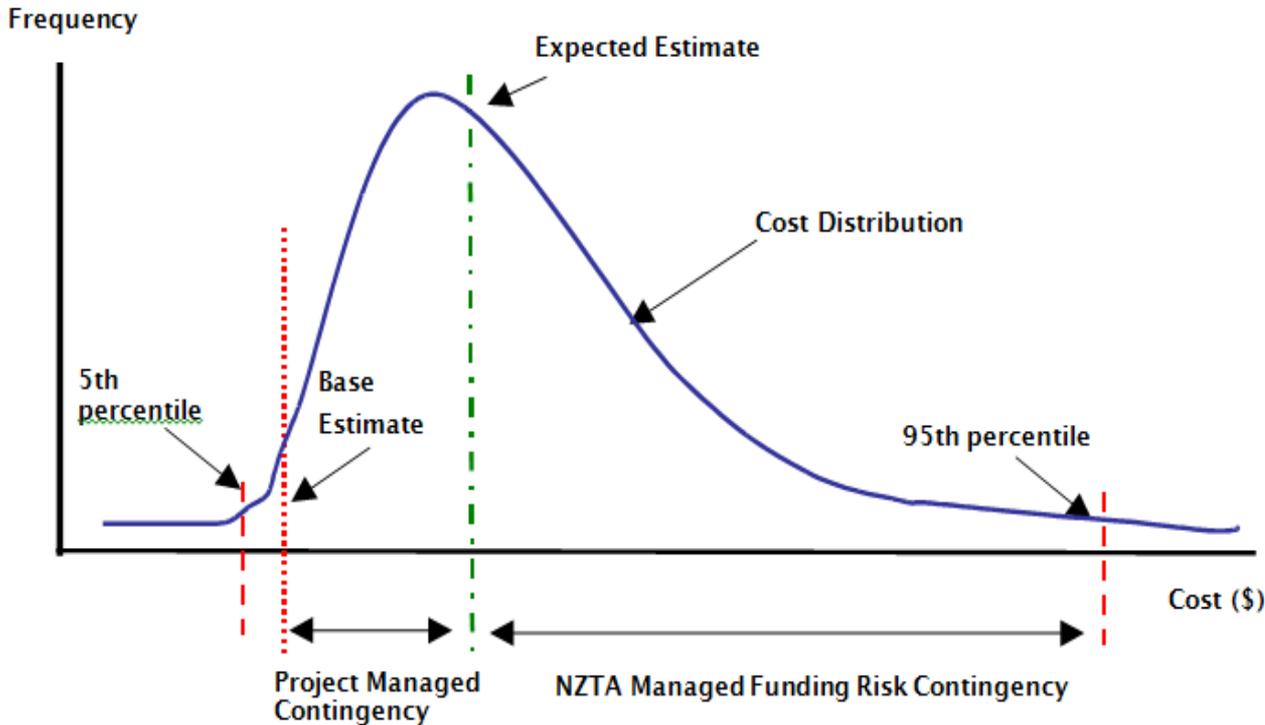
- With such a significant number of projects either in progress or planned, a portfolio view is critical.
- Only through a 'top down' approach can we maximise our investments, and deliver the promised benefits in an optimal manner.
- Through adjusting for risk (and opportunity), we are able to deliver a more predictable programme and balance individual time and cost risks. These include:
  - Cost Risks:
    - Uncertain scope
    - Uncertain quantities
    - Uncertain rates
    - Unknown mitigation
  - Time risks:
    - Delayed start
    - Uncertain durations
    - Rework
    - Disruption
    - Emerging activities

# Risk based estimates

- Our approach to cost estimation is risk based, and we expect our estimates to become more refined as projects proceed through the lifecycle (as certainty increases, and risk decreases)
- Ideally, the 'expected estimate' remains reasonably constant, with Outer ranges moving towards the centre
- All projects are funded at the expected level (50<sup>th</sup> percentile), and therefore we expect half of our projects to complete under budget, and half over budget.



# Risk Adjusted Cost Estimates Terminology

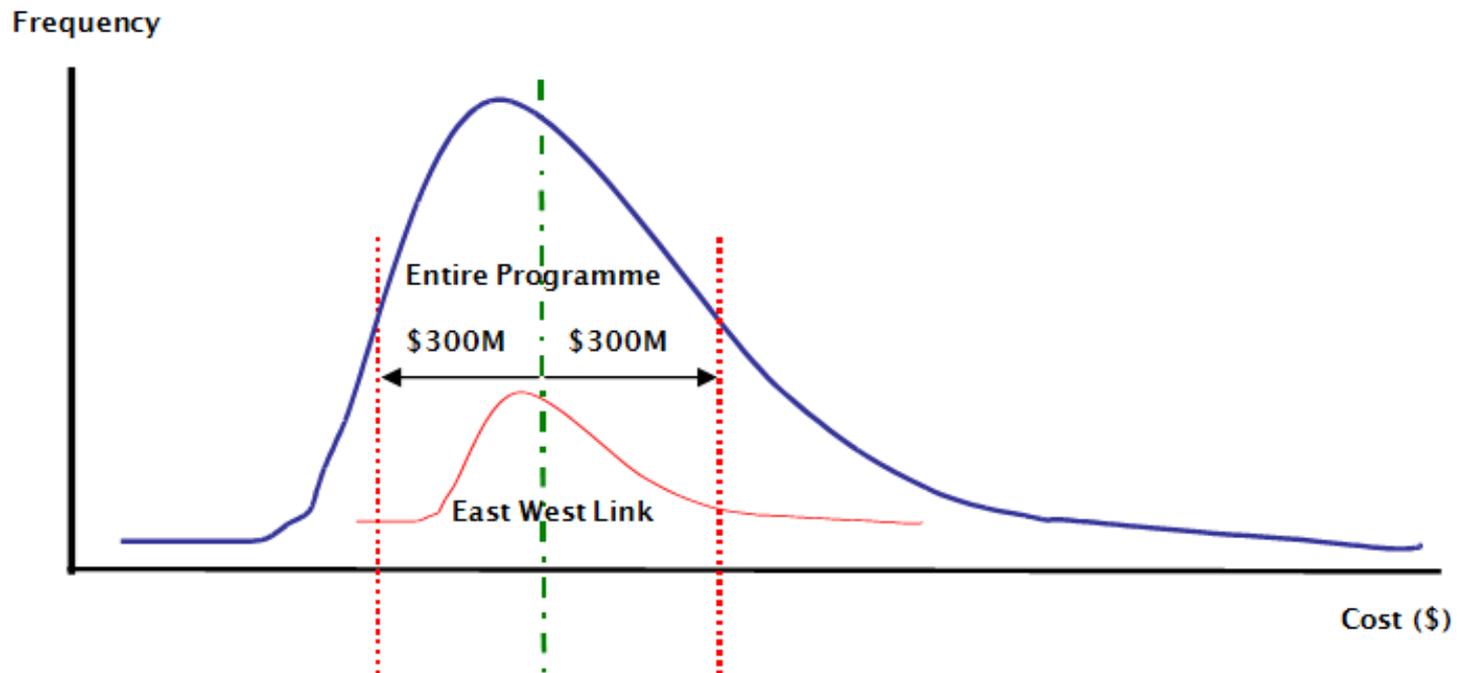


- 5<sup>th</sup> percentile: Little to no risk, and minimum quantities (5% confidence level)
- Expected estimate: 'Most likely' risk and quantities (50% confidence level)
- 95<sup>th</sup> percentile: Almost all risks occur, maximum quantities (95% confidence level)

- Base estimate: 'Most likely' quantities x rates
- Contingency: provision added to the base estimate for modelled risk

# Major Projects have a significant effect

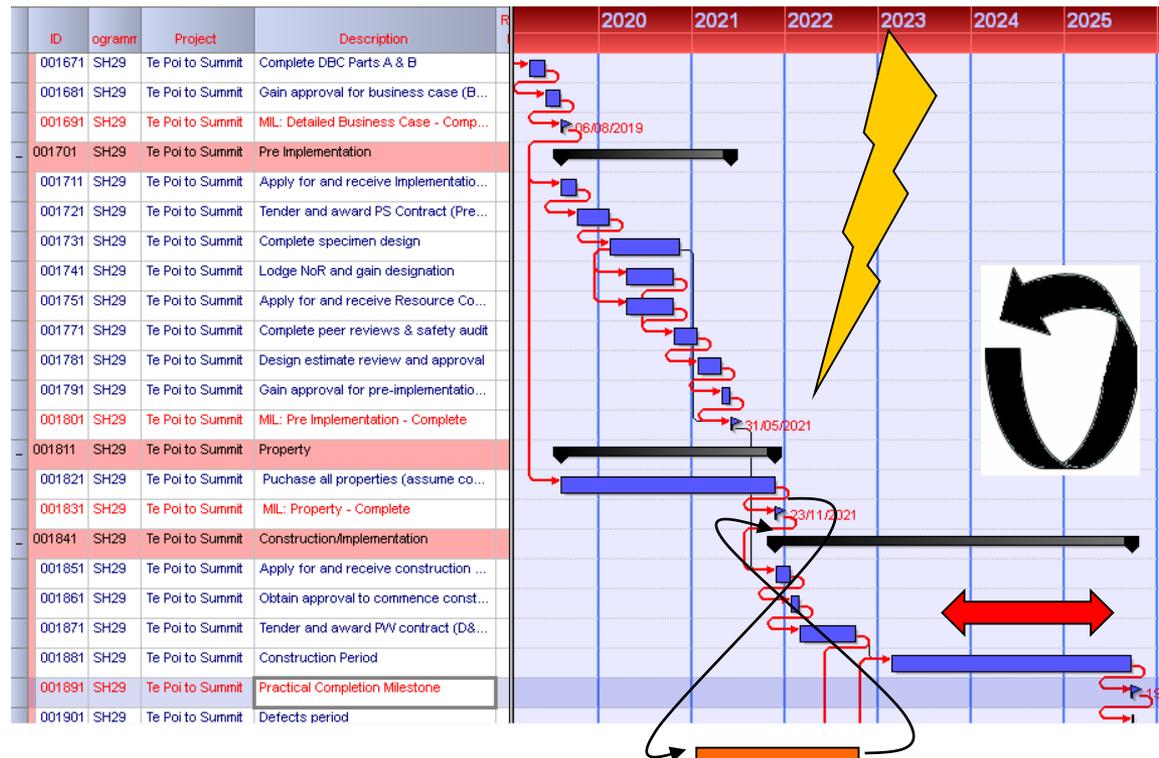
- Major projects (such as the Waterview Connection and East West Link) can have a noticeable impact on the entire programme if they exceed their expected estimate, or move outside of the stated cost range.



# There are also certain key time related risks that make our progress uncertain

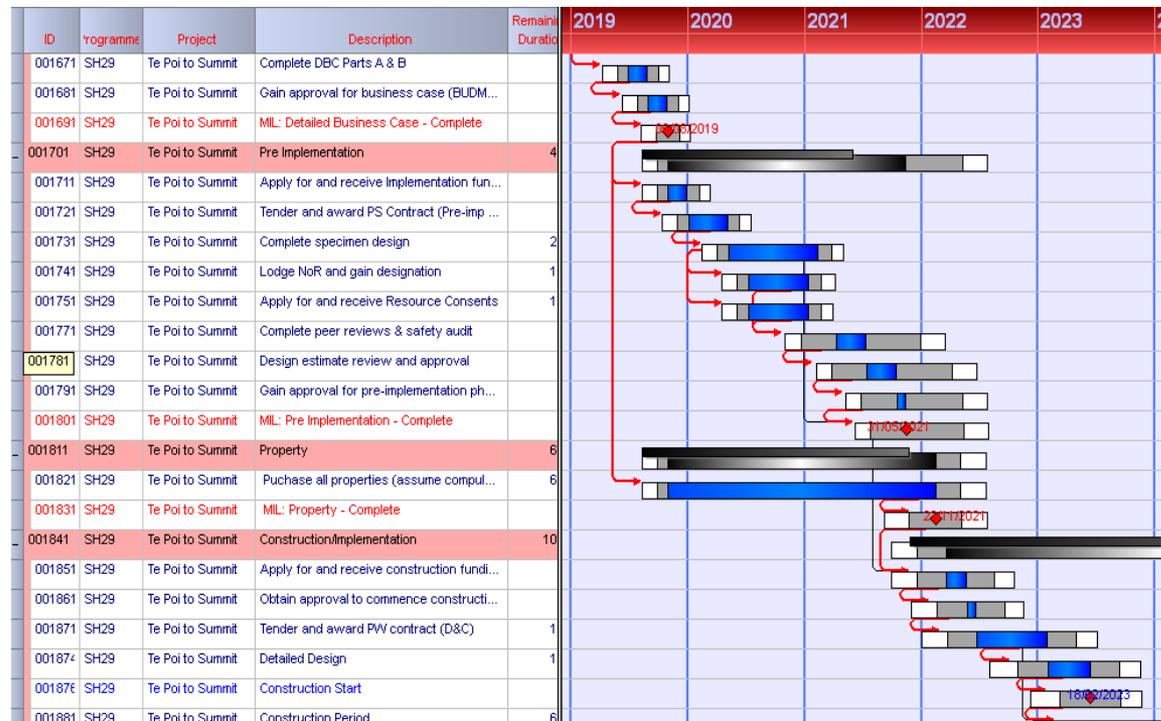
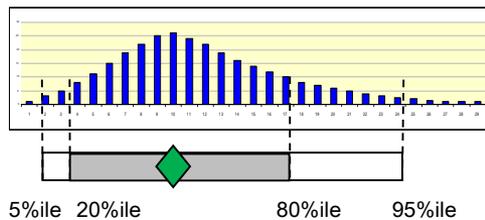
Through adding an assessment of risk to a schedule, we can consider the impact of risk and uncertainty on project timescales. We can consider:

- Delayed start
- Uncertain durations
- Rework
- Disruption
- Emerging activities



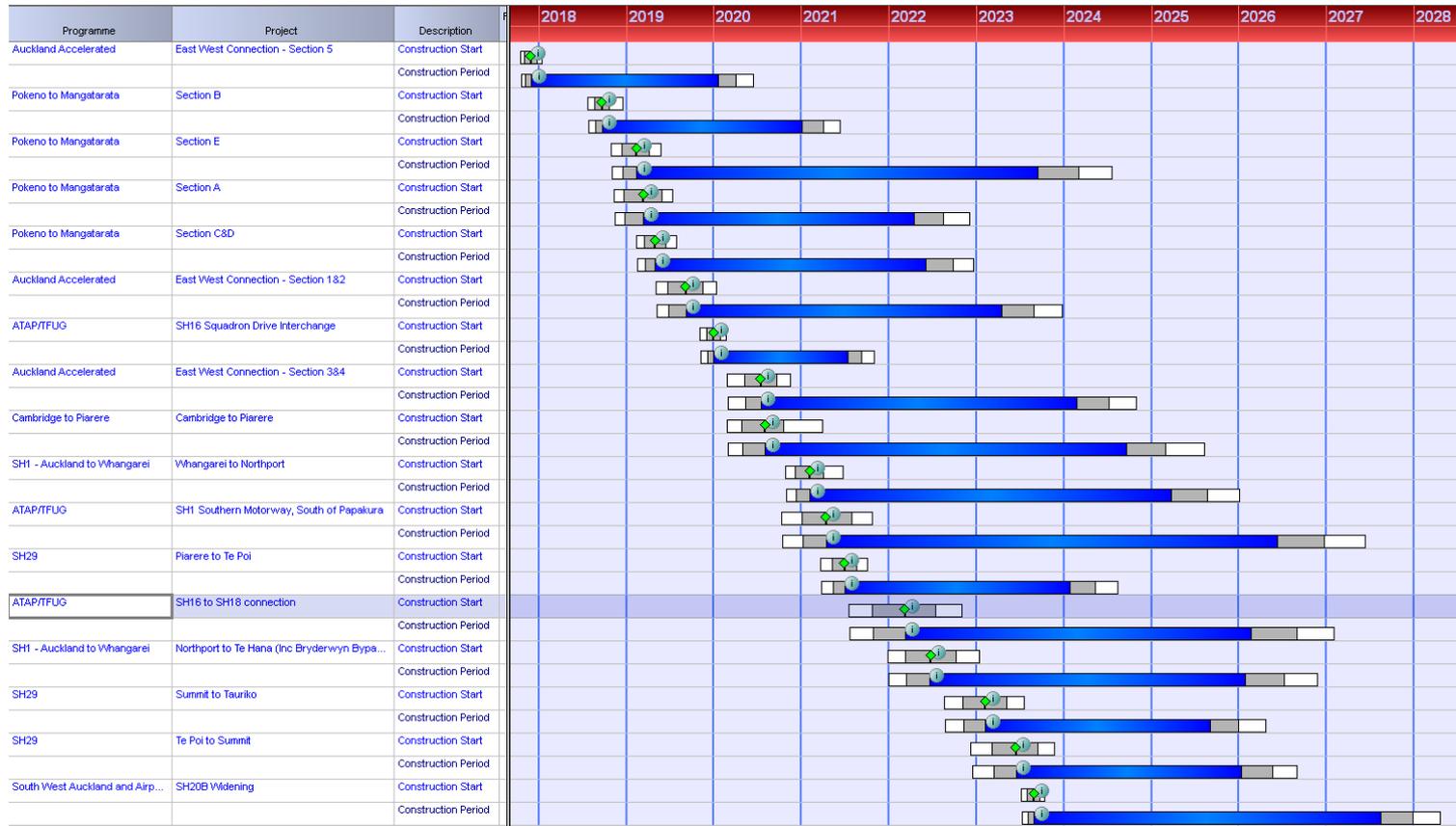
# Modelling of time risks allows variable scenarios to be presented

- A 'fuzzy' gantt displays the risk and uncertainty relating to the each task, based on modelled risks. It allows a more accurate picture of our intentions at the projects outset, shows what might happen or could happen, and sets realistic & achievable expectations



# Inter-regional projects have been schedule risk adjusted to determine their most likely progress

- Construction start milestones show time variability (risk)



# Portfolio composition also affects risk

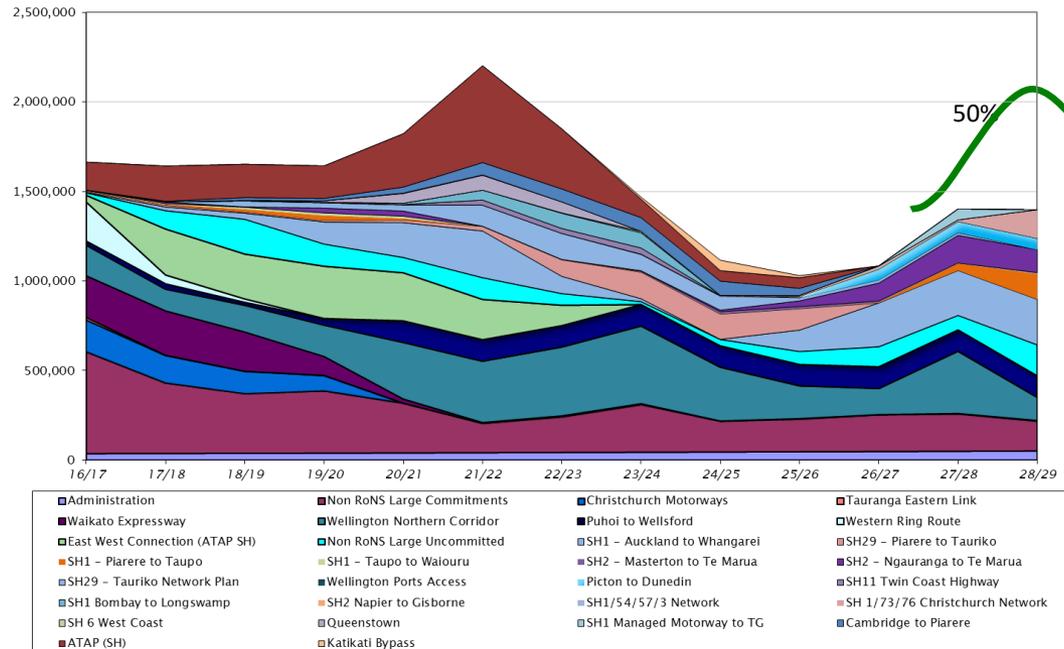
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- The composition or the portfolio also affects overall risk, and our resultant tactics
- A portfolio of many small and medium sized projects allows many trade-off's with minimal impacts
- Conversely, fewer, major projects are difficult to trade off, and 'overs and unders' do not work to the same extent.
- Our portfolio has evolved over time, and has been cyclical



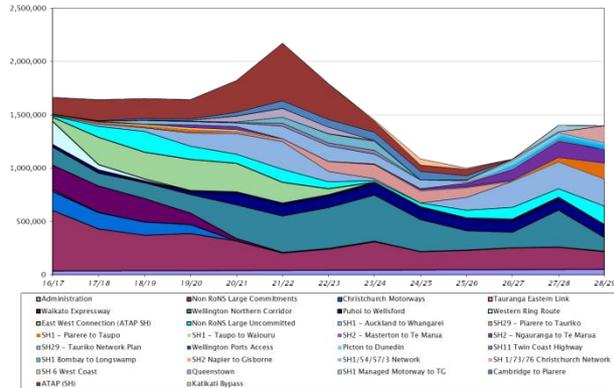
# Overall programme risk exposure

- We are able to bring time and cost risk together through our portfolio model, and look at scenarios.
- These can involve increase/decreases to costs, and the impact of time risks
- Our project teams forecast cost and time on a monthly basis, based on 'most likely (50<sup>th</sup> percentile) time and cost, and we can then run scenarios

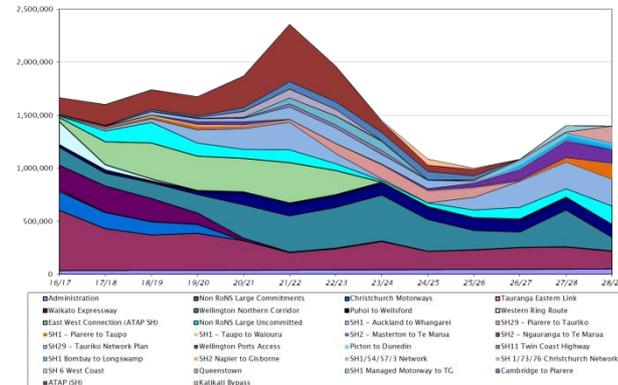


# Scenario examples (shown cumulatively)

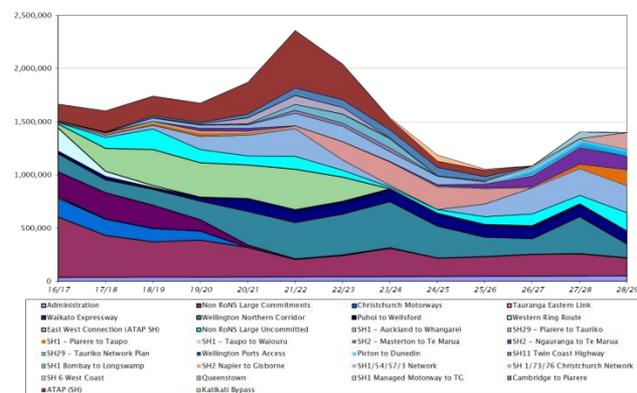
a. Base Case (50<sup>th</sup> percentile)



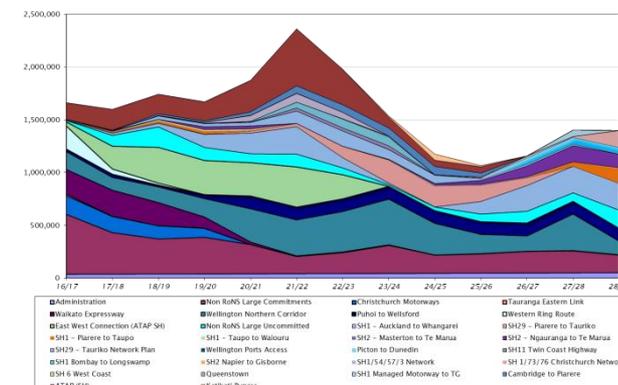
b. plus East West Link at 95<sup>th</sup> %ile cost



c. Plus SH29 programme at 95<sup>th</sup> %ile cost



d. plus SH29 at 95<sup>th</sup> %ile time



# Summary

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- With many moving parts, all subject to time and cost risk and opportunity, a portfolio view is critical as we are to successfully manage the programme
- Taking account risk in our future planning increases the predictability of programme delivery
- Over a number of years, this approach has allowed us to deliver great results, and make optimum use of funds, delivering the right benefits to customers
- We continue to make improvements to the way we manage the portfolio, and there is great opportunity as we move into the new operating model