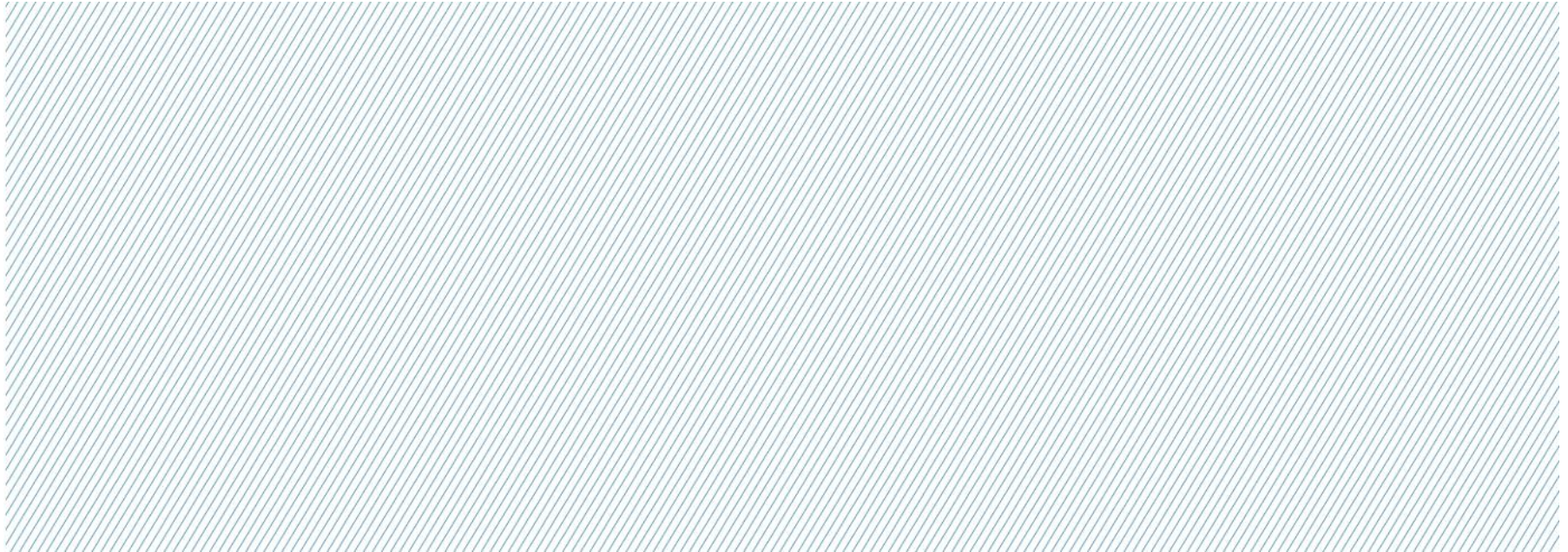


Risk Adjusted Programme Management

By Chris Young



Introduction

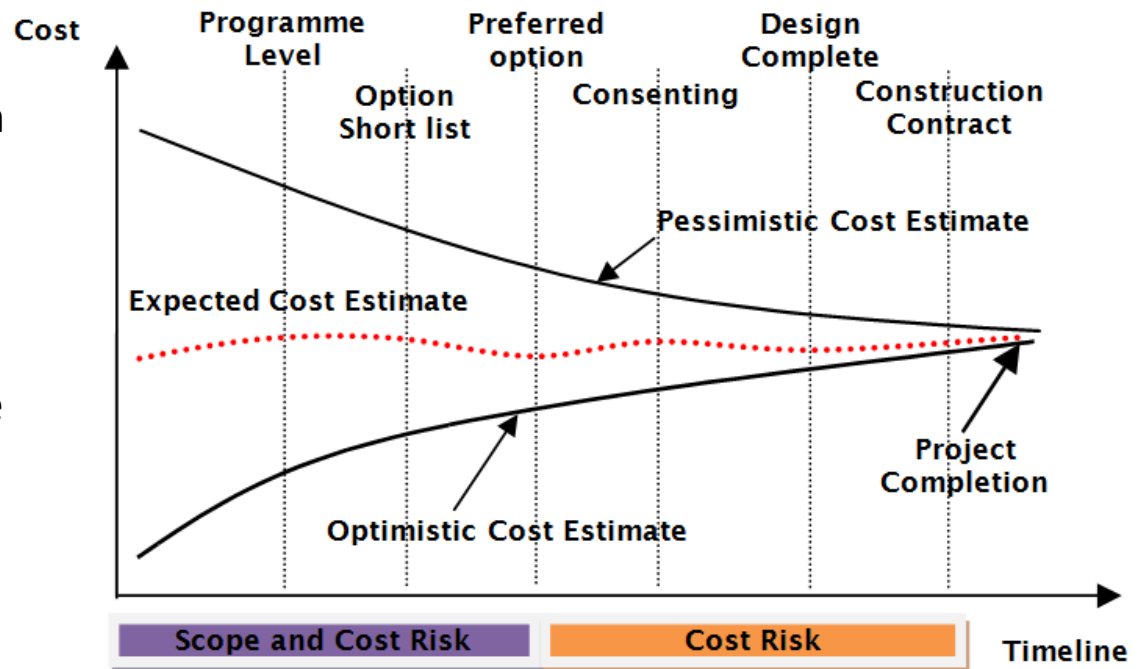
- The NZ Transport Agency are the asset owner of the national State highway network.
- The network is around 12,000 km long, and enables 50% of all vehicle kilometers travelled (VKT) , and 70% of freight VKT.
- Each length of highway is classified based on its form and functions, and the level of service 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

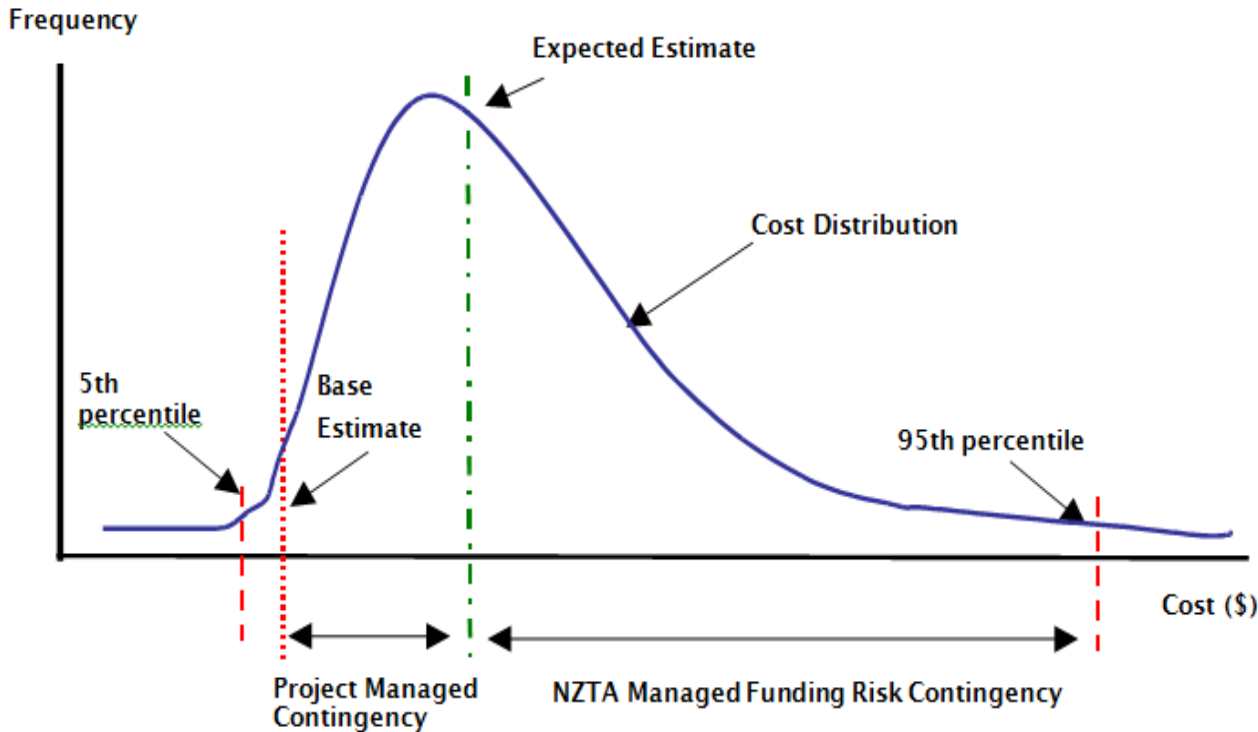
- With such a significant number of projects either in progress or planned, a portfolio view is critical.
- Only through a 'top down' approach can we maximise our investments, and deliver the promised benefits in an optimal manner.
- Through adjusting for risk (and opportunity), we are able to deliver 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 (50th percentile), and therefore we expect half of our projects to complete under budget, and half over budget.



Risk Adjusted Cost Estimates Terminology

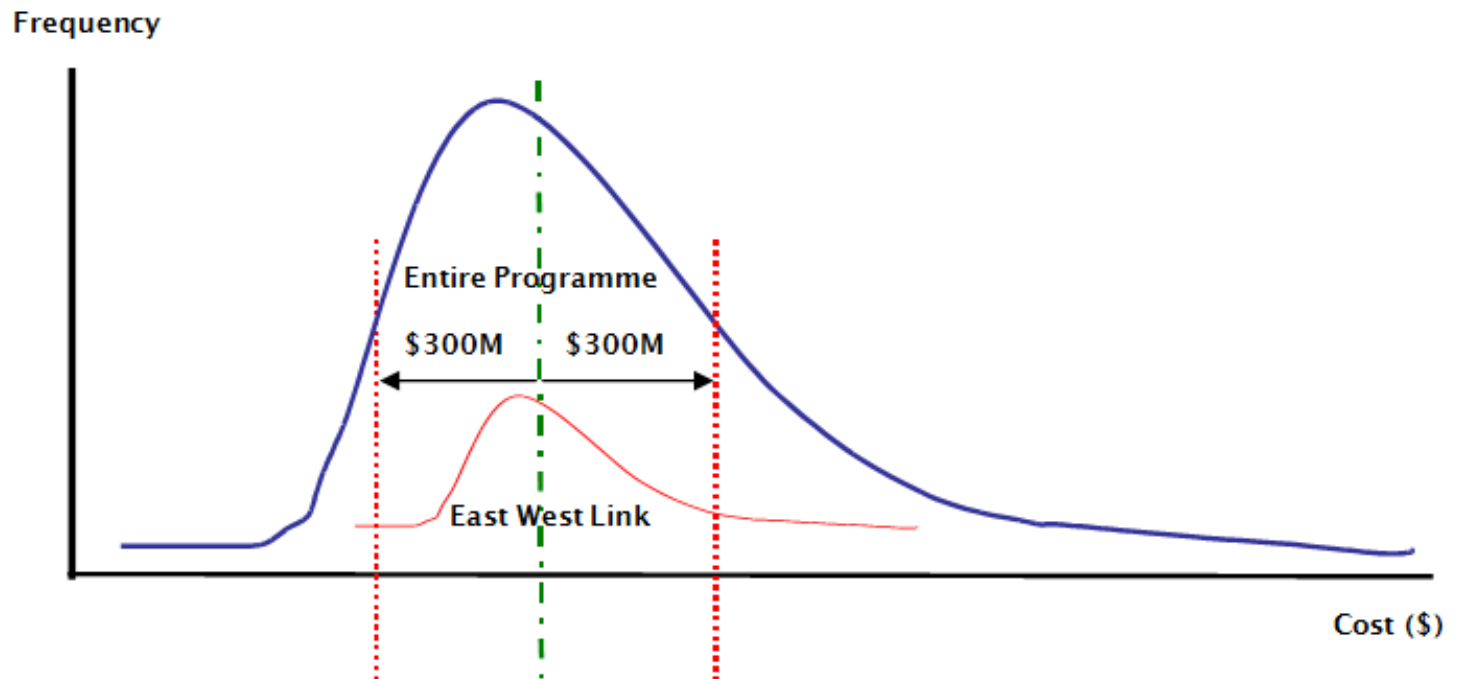


- 5th percentile: Little to no risk, and minimum quantities (5% confidence level)
- Expected estimate: 'Most likely' risk and quantities (50% confidence level)
- 95th percentile: Almost all risks occur, maximum quantities (95% confidence level)

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

Major Projects have a significant effect

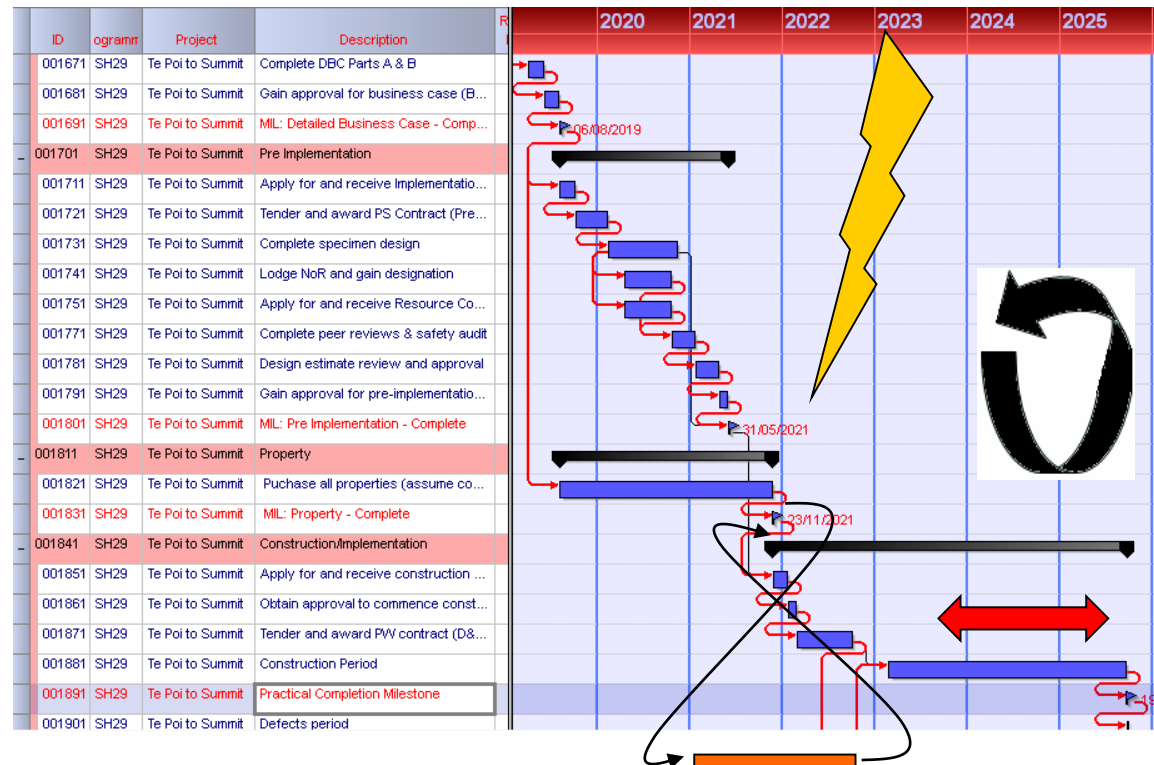
- Major projects (such as the Waterview Connection and East West Link) can have a noticeable impact on the entire programme if they exceed their expected estimate, or move outside of the stated cost range.



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

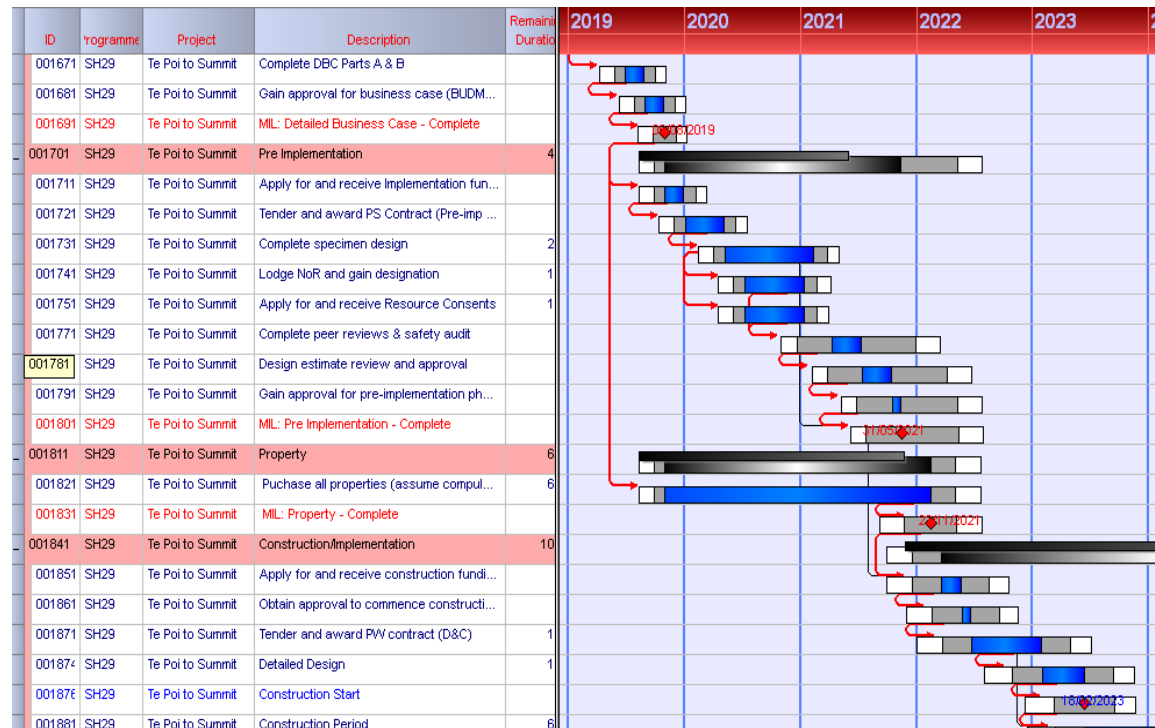
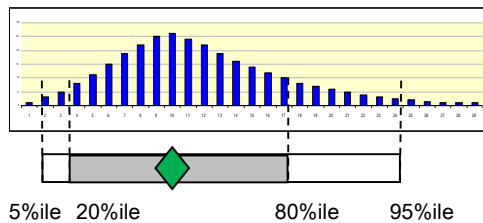
Through adding an assessment of risk to a schedule, we can consider the impact of risk and uncertainty on project timescales. We can consider:

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



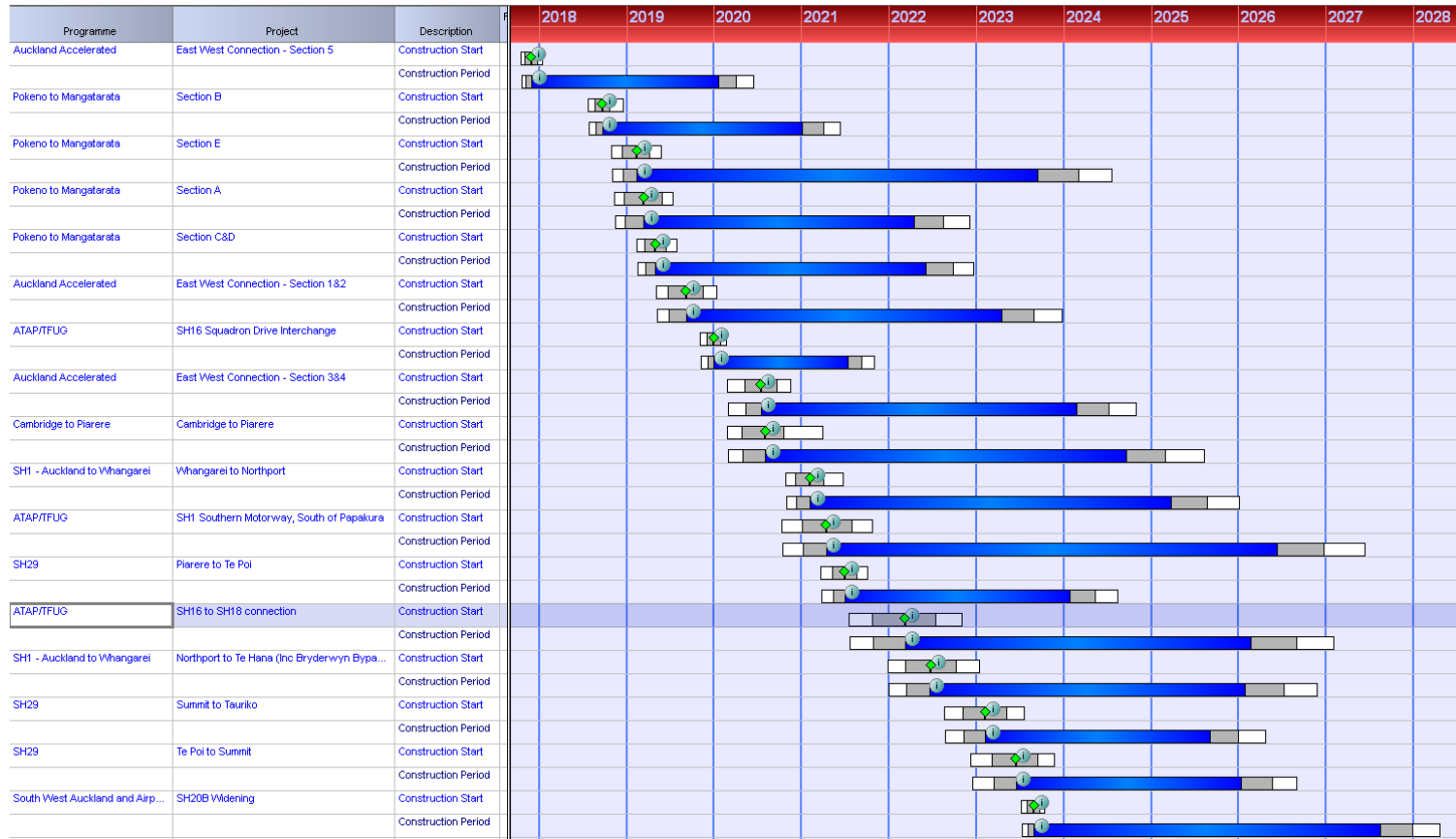
Modelling of time risks allows variable scenarios to be presented

- 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)



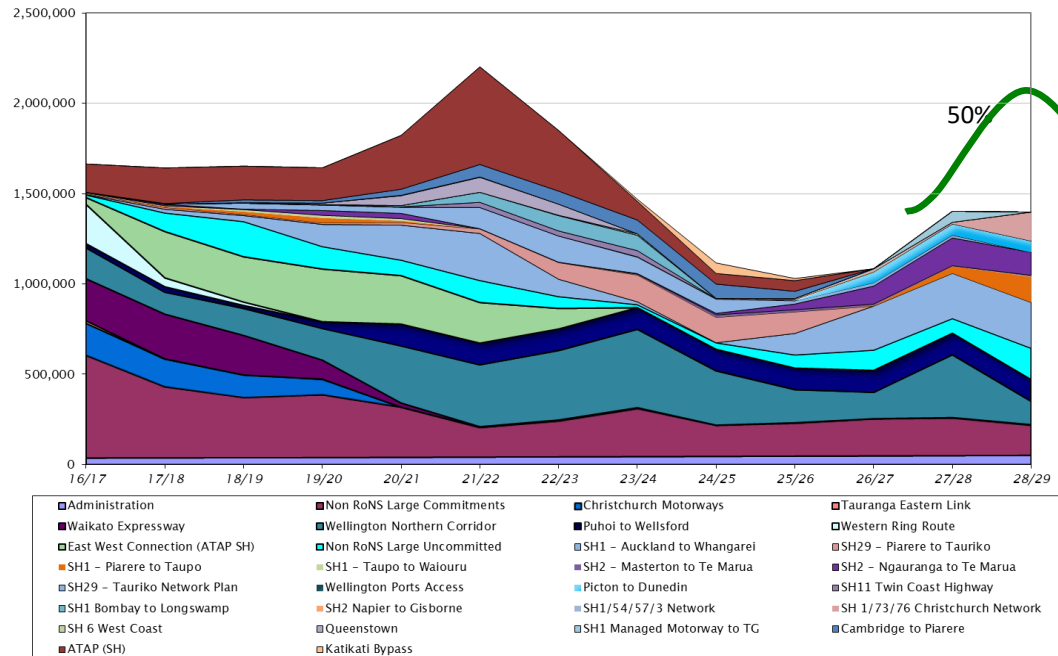
Portfolio composition also affects risk

- 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



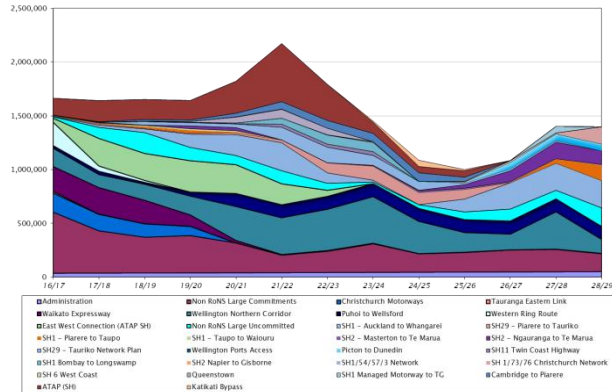
Overall programme risk exposure

- 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 (50th percentile) time and cost, and we can then run scenarios

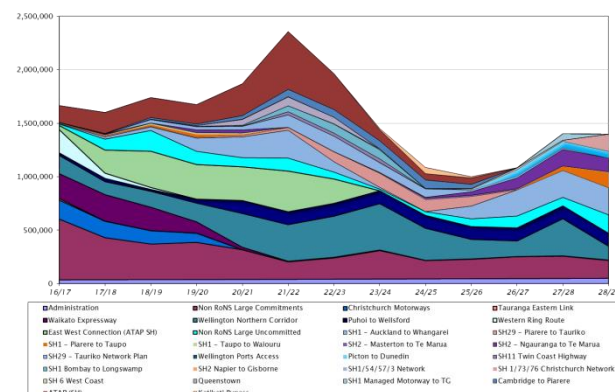


Scenario examples (shown cumulatively)

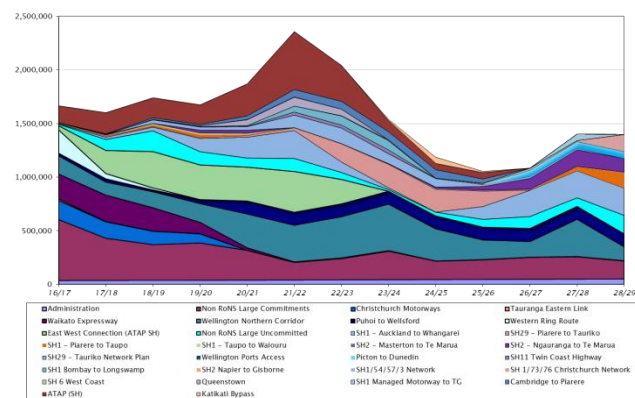
a. Base Case (50th percentile)



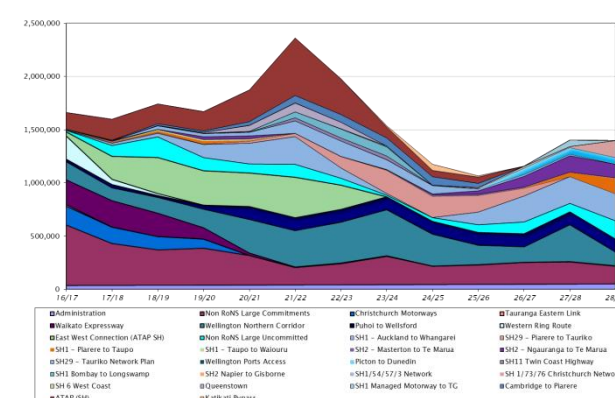
b. plus East West Link at 95th %ile cost



c. Plus SH29 programme at 95th %ile cost



d. plus SH29 at 95th %ile time



Summary

- 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