

Value creation through Risk Management in Infrastructure Projects - The TfL Story



What we do



Claudina Castelli
Professional Head
Risk and Opportunity

- 30 years combined programme and project management experience with focus on risk management
- Part of a team of 20+ risk management professionals
- Extensive risk management training experience
- Passionate about developing and introducing new tools and processes

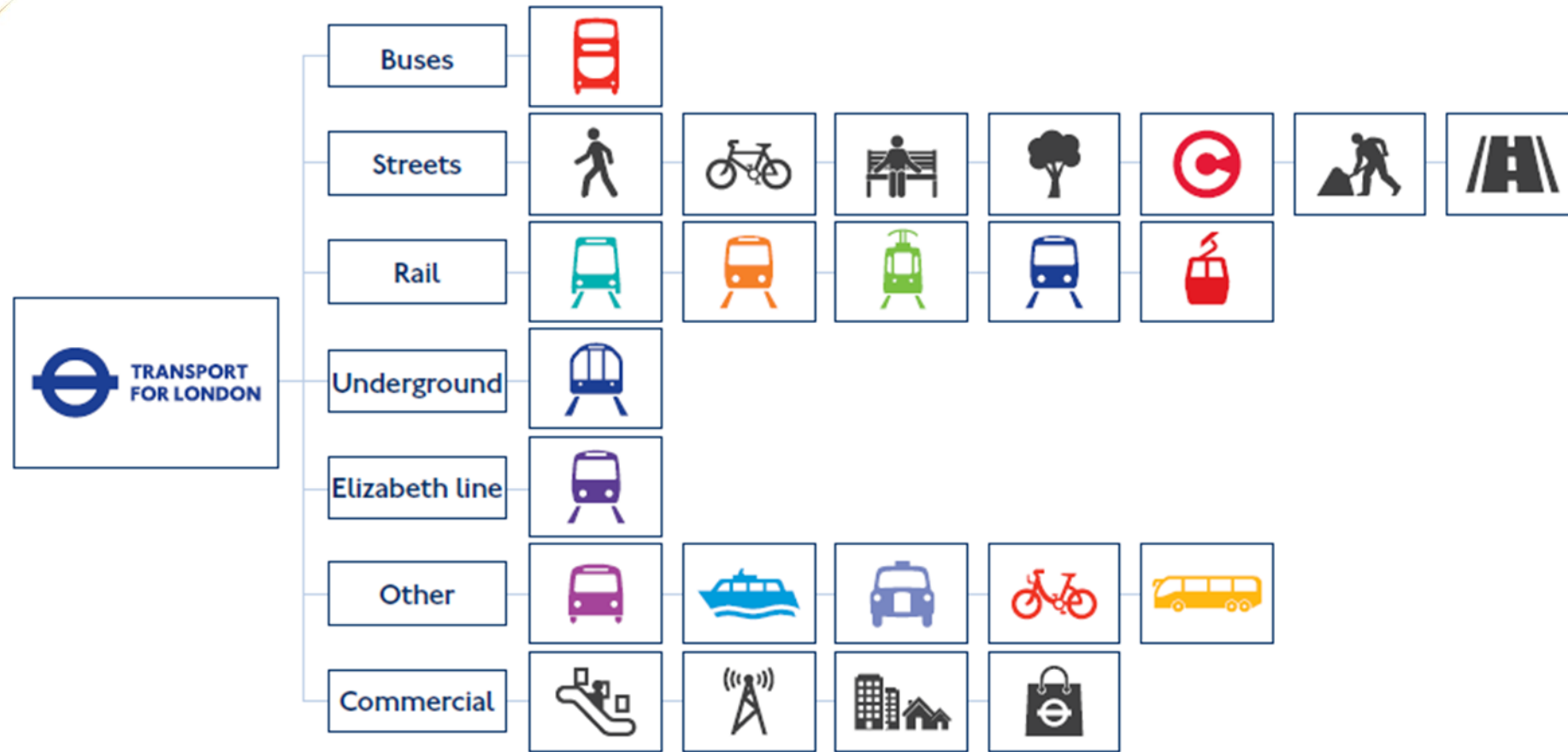


Ajay Patel
Senior Risk and
Opportunity Manager

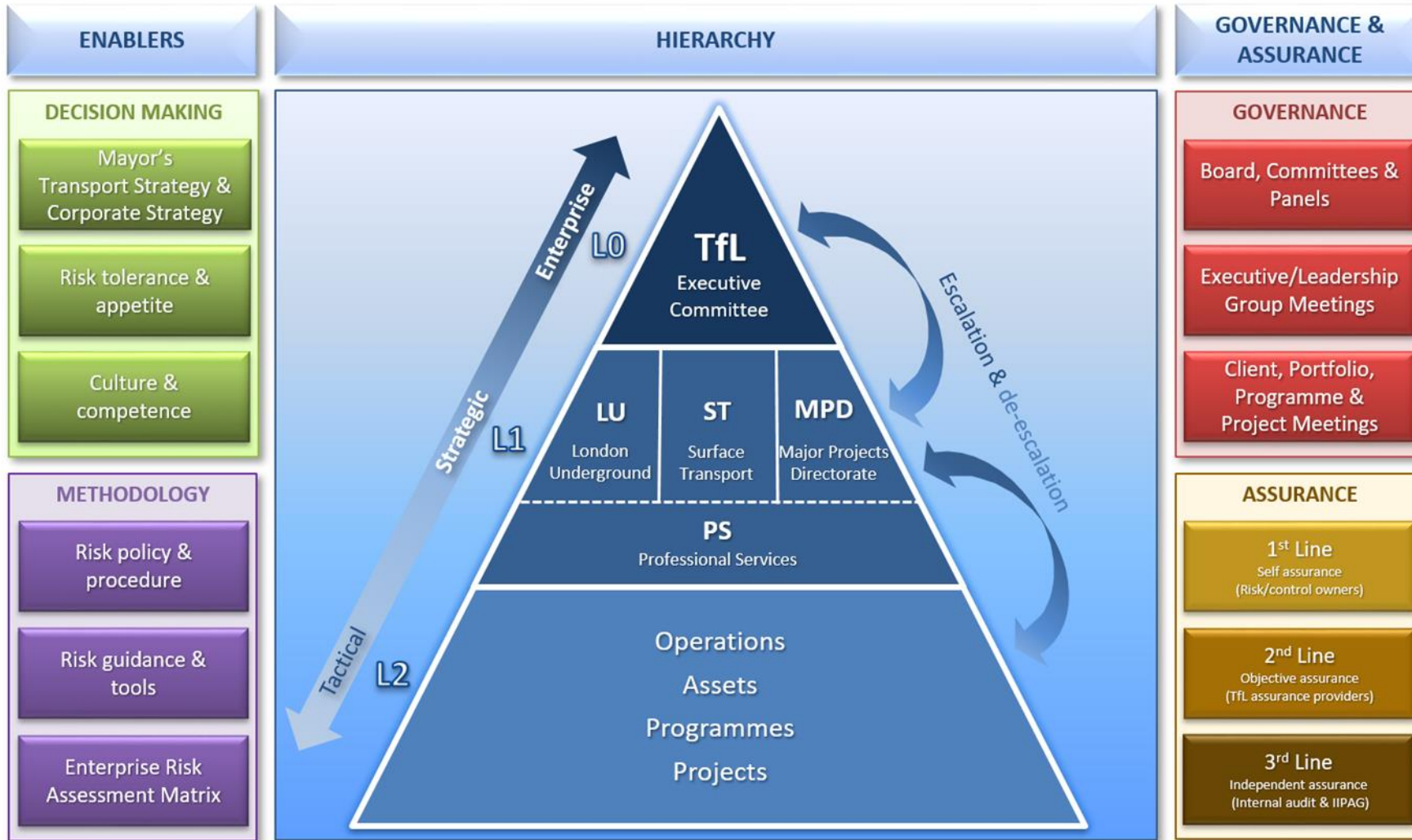
Agenda

- What we do
- Our Risk Management setup
- Risk through our project lifecycle
- Collaboration case study
- Continuous improvement / innovation
- ARM Demonstration by Riskonnect
- Closing Remarks / Questions

What we do



Enterprise Risk Management Framework (ERMF)



Scaling our approach

Bigger Projects

Risk register

- Detailed quantified risk register
- Built up by Risk team

Risk budget/ Exposure

- Thorough top down review / QRA
- Regularly revisited by Risk team

Review cycle

- Periodic/ monthly
- Led by Risk team

£15m total EFC (Estimated Final Cost) or type of project

Smaller Projects

Risk register

- Qualitatively assessed mini risk register (5-10 risks)
- Built up by Delivery team

Risk budget/ Exposure

- High-level top down review
- Built up by Delivery team

Review cycle

- As required/ quarterly
- Led by Delivery team



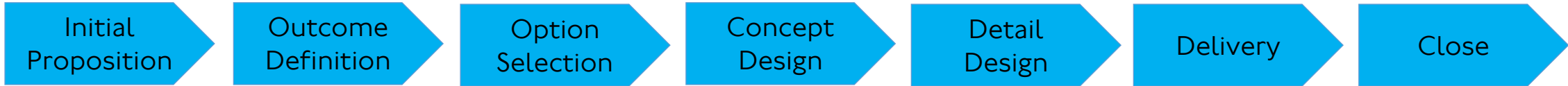
Commercial guidance

Because we've been doing this for some time

Pathway Characterisation	Risk Allowance							
	Stage 0	Stage 1	Stage 2	Stage 3	Stage 4		Stage 5	
	Initial Proposition	Outcome Definition	Outcome Selection/ Feasibility	Concept Design	Detailed Design		Delivery	
	Allowance	Allowance	Allowance	Allowance	Allowance	Benchmark	Allowance	Benchmark
<i>Simple</i>	40% - 50%	40% - 50%	30% - 35%	15% - 20%	QCRA	10%	QCRA	5%
<i>Standard</i>	45% - 60%	45% - 60%	30% - 40%	15% - 25%	QCRA	15%	QCRA	8%
<i>Significant</i>	50% - 60%	50% - 60%	35% - 40%	15% - 25%	QCRA	20%	QCRA	10%
<i>Major</i>	55% - 60%	55% - 60%	35% - 40%	20% - 25%	QCRA	20%	QCRA	10%

But projects are unique and we can't take the public's money for granted so we need to do more ...

Our approach



Top Down Range estimate built into base costs	Top Down Percentage uplifts	Hybrid approach	Bottom up Quantitative Cost Risk Analysis (QCRA)
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Benchmarking / Reference Class Forecasting / Previous Experience	+ uplifts on base cost components	uplifts + quantified risks	Statistically modelled outputs
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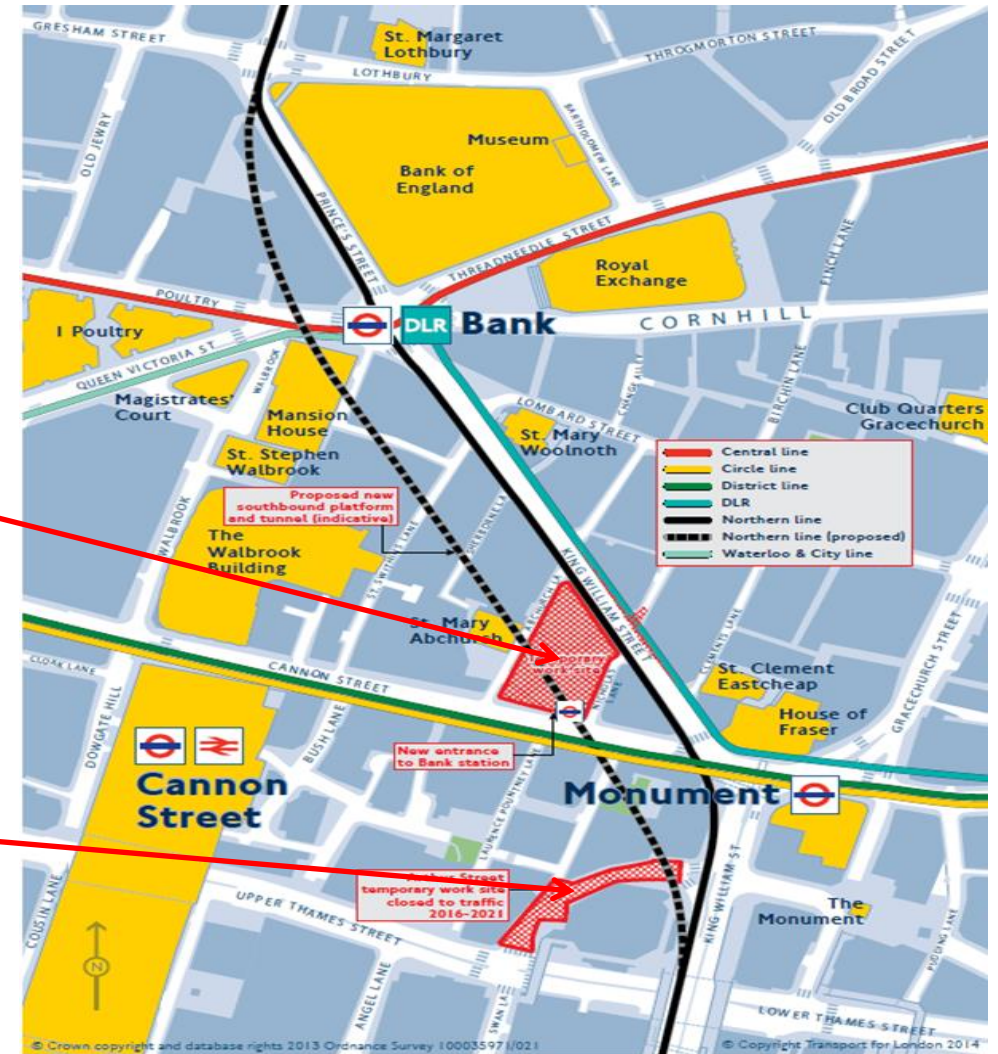
Strategic, reputational, benefits, revenue, operational	+ Scope, requirements, deliverability + <i>Contractual risks</i>
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Case study – Bank station capacity upgrade



Work sites



Arthur Street shaft – view from above



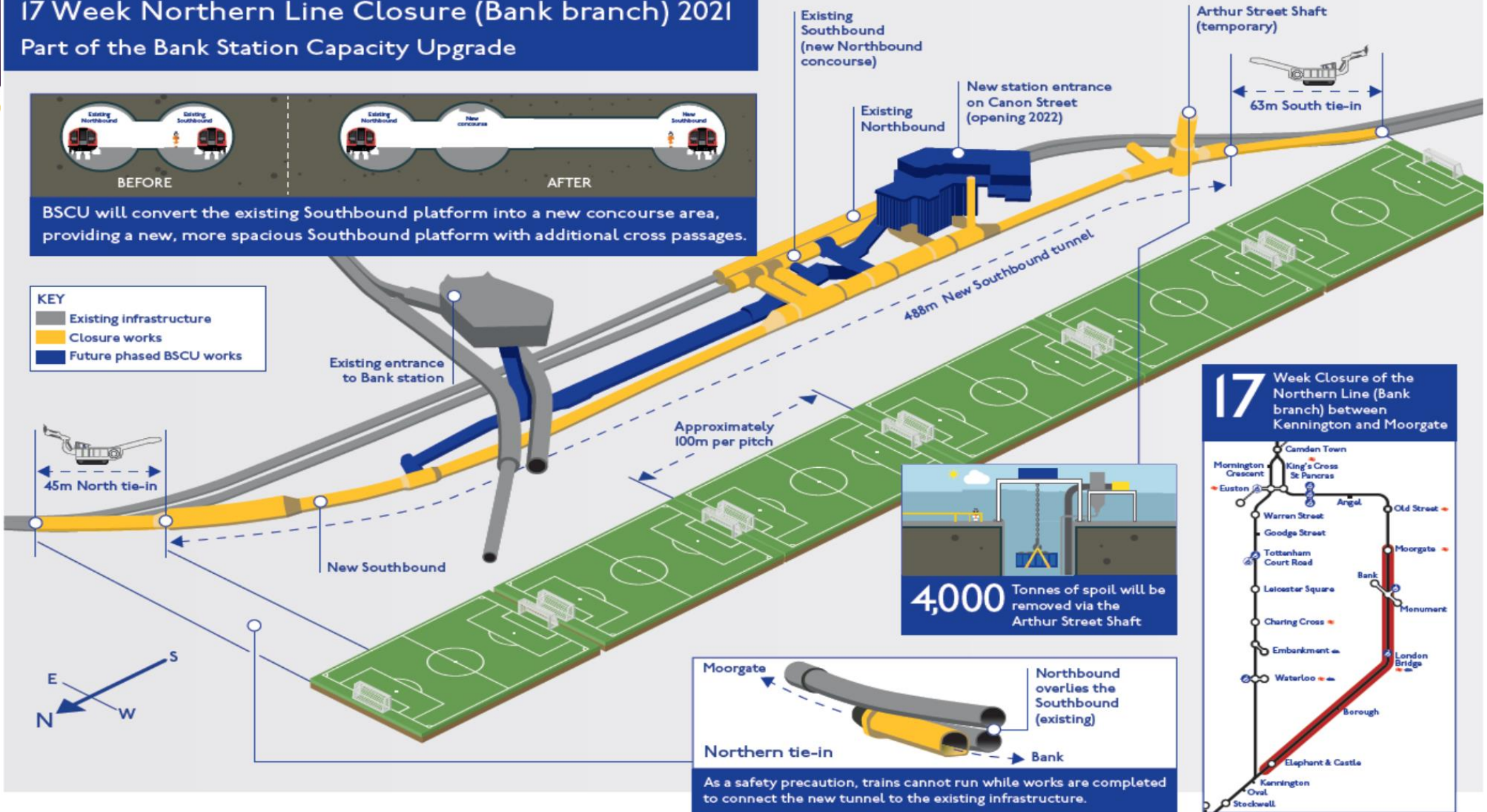
17 Week Northern Line Closure (Bank branch) 2021

Part of the Bank Station Capacity Upgrade



BSCU will convert the existing Southbound platform into a new concourse area, providing a new, more spacious Southbound platform with additional cross passages.

- KEY**
- Existing infrastructure
 - Closure works
 - Future phased BSCU works



4,000 Tonnes of spoil will be removed via the Arthur Street Shaft

Northern tie-in

Moorgate Bank

Northbound overlies the Southbound (existing)

As a safety precaution, trains cannot run while works are completed to connect the new tunnel to the existing infrastructure.



Working with our supply chain – ICE & post contract award

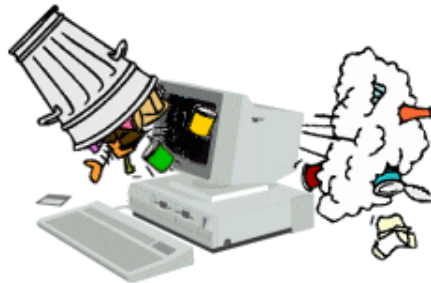
- Innovative Contractor Engagement (ICE)
 - used for the first time in TfL. Process to maximise market value through innovation in the supply chain, improve relationships with contractors and get the benefits of early contractor involvement while developing major design and build contracts.
- Post contract Award
 - TfL have a dedicated risk manager who provides risk management services to both the TfL project delivery team and the Tier 1 Contractor (Dragados).
 - Joint cost risk reviews are held monthly and the responsibility for the potential impacts are subject to Supplementary Agreement between TfL and the Contractor. The mitigation of the risks is allocated to those parties best able to manage them.
 - Opportunities are mutually agreed and responsibility for realisation is allocated, subject to an agreed pain-gain share mechanism.
 - Schedule risk analyses are carried out using the Contractor's programme, and risks and uncertainties mutually agreed between parties.

Continuous improvement

- Decision makers do not read lengthy and detailed Risk Analysis reports prior to making decisions on investment funding
- The decision makers questioning on the outputs of a risk assessment is usually limited to:
 - a) What type of assessment has been undertaken?
 - b) How does the risk provision benchmark against other similar projects?
 - c) What are the top threats and opportunities in the risk register and what mitigations are planned against them?
 - d) How is the risk provision phased?
 - e) Is the level of risk within our risk appetite?
- But there is still more information out there ...

What we can do to drive value

- Strengthen the decision making process
 - a) What are the most 'sensitive' risks on the project
 - b) What risks have been excluded from the analysis
 - c) What key are assumptions have been made and which of those if proved false would deem the analysis invalid
 - d) What the QCRA output graphs are telling us by way of P20, 50, 80, etc.
- Even if the decision makers are given all of this added information, they are still missing one key bit of information – how mature was the data that fed into the risk analysis? 'garbage in – garbage out'



<http://frjohbrian.blogspot.com/2012/05/gigo-god-in-god-out.html>



Quantitative Cost Risk Analysis (QCRA) Summary Report

Project/Programme: PJ999 – Station Upgrade

Pathway Stage / Characterisation: Concept Design / Significant

Risk Manager: Ajay Patel

Date/Version: 18/05/22 v1.0

Summary

A maturity score of 3.4 for the full project is respectable largely due to the input received via Early Contractor Involvement. Whilst the project is externally funded and there are constraints to bridge the gap between any potential cost overruns, the use of Target P80 is deemed appropriate but efficiencies in base or additional funding may be required for this (see remaining budget). A QSRA has taken place and outputs incorporated into the QCRA but considers prolongation as a key exposure driver given the length of the project. Programme level risk has been considered (qualitatively) but may need to be incorporated into the project forecast should this station be the only significant project to proceed.

2. Outputs of Risk Assessment

Current P50	Target P50	Stage Benchmark	Remaining Risk Budget
£7.3m	£6.4m	15-25% 17%	£6.3m

Commentary:

Project is using Target P80 (£7.9m) to forecast risk which brings in line with lower end of suggested benchmark CTG (17% of CTG of £45.3m).

Level of mitigation is at 12% which is a conservative estimate at this stage. Exposure is higher than remaining risk budget (P80) at present.



3. Top Threats

Risk Title	Cost Exposure		Key Mitigation/s
	Prob (C/T)	EMV (C/T)	
QSRA – Prolongation for staff, contractor and 3 rd parties. Also inclusive of potential acceleration / resource thickening.	80% 60%	£1,920k £1,440k	a) Continuing with the ECI and experienced delivery team to provide further confidence in the estimates and assumptions.
Disruptive Possessions can't be agreed with Operations (26 possessions and 6 full station closures)	80% 50%	£781k £488k	a) Set up senior level forum with operations to gain approvals b) Utilise Rules Of The Route (ROTR) Availability as a possible fall-back in the event of issues around disruptive possessions.
Market Volatility – Experience over 8 months has seen prices of materials & components increase sharply in the last 8 months	65% 50%	£555k £427k	a) Proposal to introduce X1 to the contract to clarify and reduce uncertainty around cost volatility and reducing impacts of potential cost increases.
Protection or Diversion of Rail Infrastructure Services, Cables, Pipes and DNO to accommodate Station design	70% 70%	£530k £530k	a) Undertake the tag and trace exercise to identify owners and notify them of any moves/ relocation.

Risk Title	Schedule / Milestone Exposure		
	Prob (T)	Time (ML)	Milestone at risk
XX-005 - Final Acceptance for the M&E (IDC)	15%	18 weeks	XX-DES-6250 GRIP 5 Design Acceptance (25/08/23)
XX-008 - Lineside cable relocation design	70%	9 weeks	XX-CON-5405 Rail & Station Services Diversions Design [by others] (27/11/22)

4. Key Assumptions & Exclusions

Assumptions

- a) All planning permissions will be granted
- b) no major works required to existing equipment and infrastructure

Exclusions

- a) Revenue, maintenance, Ops & benefits risks
- b) Inflation over and above base costs estimate

5. Opportunities

Description	Prob	EMV
XX152 Gulam roof - Review the material used for the roof and investigate alternative options	40%	£120k
XX153 Decrease Depth of Attenuation tank On platform 1 to remove sheet piling requirement	40%	£172k

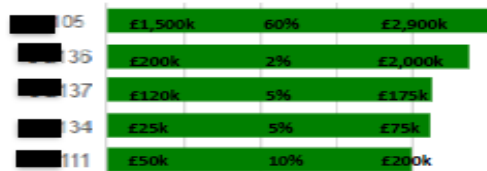
Opportunities NOT netted off against threats

6. Information Used For Assessment

Info	RAG
Subject Matter Expert Engagement	GREEN
Key Assumptions	GREEN
Contractor Estimate	Early contractor involvement
High Level Contractor Programme	Detailed programme
Client Estimate	GREEN
High Level Client Programme	GREEN
Benchmarking data	Other projects historic risk breakdown data
Previous project experience	Used return of experience on NLE
Contractor Claims History	N/A
Scope/Requirements document	GREEN
Tender Returns	EC Estimates
Other (please specify)	

RED: Not reviewed AMBER: Partial review GREEN: Reviewed
Notes:

7. Most Sensitive Risks



Risk ID	Risk Title
05	Project is delayed and there is resulting Staff Prolongation or Acceleration may be required to meet funding obligations
136	Complexities of using Tower Crane at [redacted] site (Crane platform locations & conditions)
134	Injury to the public during works at [redacted]
137	Industrial Action impacts access to [redacted] worksite
129	Interface with other local projects

Notes:

Project Risk Assessment Quality Matrix

Scoring System	1-2 <ul style="list-style-type: none"> No basis of assessment (scoring rationale) recorded in the risk register Current and target assessments are either unrealistic or are based on an uninformed guess Assessments do not relate back to base costs or key assumptions Assessment contains elements of 'double counting' with base costs and/or other risks Assessment has not been informed by any documented estimates and / or logic Assessment is restricted by risk budget and/or EFC and therefore is suppressed / underestimated 		3 <ul style="list-style-type: none"> Basis of assessment recorded but does not fully align back to base costs / schedule / key assumptions Rationale recorded for a single impact rather than by scenarios (where appropriate) Range estimate provided with further work / information required to refine figures Only time or cost impacts justified but not both (where appropriate) Drop on target assessment not clear Assessment detail is dated & requires a refresh / re-check. Stakeholders / interested parties have significantly different views of the risk assessment 		4-5 <ul style="list-style-type: none"> Current and target assessments are documented and based on good documented estimates driven from run rates / live schedules / contractor estimates / benchmarking data / historic claims data / previous drawdowns, etc. Assessment refers back to base cost estimates and key assumptions noting their sensitivity to the project's objectives Scenarios are well documented for impact assessments Time assessments are linked back to critical activities on a detailed schedule Estimates have been agreed to by key stakeholders / interested parties 							
	Identification & Assumptions <i>Assessments take place throughout the project lifecycle underpinning the overall assessment</i>	Requirements Sponsor sign-off on the identification of top risks Sponsor is confident that key variables between the risk register and assumptions register have been addressed		Scope Engineers sign-off on the identification of top risks Engineers are confident that key variables between the risk register and assumptions register have been addressed		Delivery PM sign-off on the identification of top risks PM is confident that key variables between the risk register and assumptions register have been addressed		Cost Commercial sign-off on the identification of top risks Commercial are confident that key variables between the risk register and assumptions register have been addressed				
Lifecycle Stage	Outcome Definition		Option Selection		Concept Design		Detailed Design		Delivery		Project Close	
Evaluation Technique	Range Estimate		% Uplift		QCRA and Uncertainty Placeholders		QCRA		QCRA		QCRA	
Methodology	Statement In Authority Paper + single line item in ARM		Top down estimate with components broken down. (May also include bottom up of risk to the end of option selection). Could be for each potential option if feasible.		Top down & estimate for future stages & bottom up of risk to the end of concept design where practical.		Full bottom up assessment unless the length/scale of detailed design is significant. In these cases, uncertainty placeholders could be used alongside defined risks.		Full bottom up assessment.		Full bottom up assessment.	
Indication of Available Information to Inform Assessment/s <i>Items in bold are core information sources. Not all sources will be available. Not all sources need to be referenced in the risk assessment</i>	1. Key Assumptions 2. Subject Matter Expert Engagement 3. Base cost estimate 4. Business Case. 5. Requirements/Scope documents. 6. Stakeholders Analysis 7. Benchmarking Data/ Previous Project experience 8. Lessons Learnt Reports		9. High Level Schedule 10. Early Contractor/Consultant Estimates 11. Tfl Commercial estimate 12. In stage team run-rates and utilisation forecasts 13. Previous Authority Paper 14. Project Execution Plan 15. +/- estimating uncertainty provisions in base estimate		16. Option selection report. 17. Detailed Schedule 18. Procurement Strategy 19. Invitation to tender Docs 20. Tender Return Docs 21. Integrated Assurance Review reports		22. Contractor claims/ drawdown /early warnings history 23. Concept design report 24. Construction/delivery methodology report		25. Detailed design report 26. Contractor progress reports		27. Assessment of contractual liabilities 28. Progress against handover requirements	
Suggested Scoring Range <i>Scores for individual risks, range estimates, uplifts or uncertainty placeholders</i>	1-2 (on range estimate) Undefined scheme with uncertain time & cost estimates.		1-3 (on % uplift) 1-5 (on Risk) Single option not in place. Absence of detailed schedule. Low scope maturity.		1-4 (uncertainty placeholders) 1-5 (on Risk) Outline level design, high level estimate, reasonable scope maturity.		1-5 (on Risk) Increased design maturity, clear scope, detailed cost estimates.		1-5 (on Risk) Finalised design, committed scope, full costs available.		1-5 (on Risk) Delivery complete - handover and contractual liabilities remaining.	

8. Assessment Maturity Score



16 Risks Assessed
Representing £5.2m
(circa 80% of overall
Target P50 value)

Areas for development:

- 1 Consider if any qualitative programme level risks require quantitative input into the analysis.
- 2 Re-run QSRA based on next accepted contractor's programme.
- 3 Additional mitigation sessions with contractor.

1. Consultation	Req's Sponsor	Scope Engineer	Delivery PM	Cost Commercial
Identification - top risks signed off by stakeholder	Y	Y	Y	Y
Assumptions – key variables between risks & assumptions agreed by stakeholder	Y	Y	Y	Y



EVERY JOURNEY MATTERS



Project Controls
EXP

TfL's ERM Solution - Active Risk Manager



Nick Wells
Solutions Consultant
Riskconnect

- Integrated Risk, Audit, Incident and Assurance Management
- Configurable out of the box to fit your existing risk management processes – speeds up time to value.
- Promotes collaborative working – real time data in a single location = single source of truth
- Simplistic, configurable and repeatable reporting of risk management data that facilitates effective risk-based decision making

Closing remarks

- Tailored approaches to suit project needs
- Internal & External collaboration to drive value
- Transparency for better informed decision making

- Long term - savings / efficiencies targets



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