Transport for London's Climate Change Adaptation Programme



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Workshops

Risk Assessments

Asset Management Plans

Communications

Next steps

Transport for London

London Underground

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• 2 9m trips per day

 Walking
 Traffic nanagement
 Seengers last year

 • 5.7m walk trips par day
 Traffic nanagement
 erated

 • 5.7m walk trips par day
 Annual revenues = £3.3bn (£2.4bn from fares)
 els)

 • Annual operating expenditure = £5.0bn
 els)

£10bn capital programme completed 2009/10

£39bn settlement to 2017/18

44,000 licensed nire venicles

DLR and London Overground

TfL's Existing Adaptation initiatives



Simple interventions where possible:

- White painted roofs on buses
- Industrial-sized fans on the Tube

Tube cooling represents a major challenge:

- Groundwater cooling at Victoria station
- Air-conditioned sub-surface trains
- Testing systems for deep Tube lines



Legal and Political Requirements





 The United Kingdom's Climate Change Act of 2008 requires government agencies (including the publicly owned transit authorities) to report on how they have evaluated and planned for climate change impacts



 The Mayor of London is developing a strategy, which has had its public consultation

Government Requirements for Evaluation

- 1. Climate change risk assessment is a clear component of corporate risk appraisal;
- 2. Risk assessment enables authority to make evidence based decisions;
- 3. Demonstrable use of relevant and appropriate data, information, knowledge and tools;
- 4. Explicit consideration of uncertainty and response;
- 5. Risk assessment generates priorities for action;
- 6. Risk assessment identifies opportunities (where applicable);
- 7. Clear demonstration of an adaptive management approach to the adoption of measures; and
- 8. Monitoring and evaluation of adaptation effectiveness.

Reports are evaluated by Cranfield University Risk Assessment Department

TfL's analysis of climate change information

• The UK government provided climate change projections for the country in 2009 that include a range of scenarios and confidence levels



Communicated by stories, backed up by data

Eg By the 2040s, European summers like 2003 could become normal; by the 2060s they would be cool

Assets

Tracks Drainage Bridges Embankments Signals Stations Green estate



Surfaces – platforms, footways, pavements Transport interchanges And ...?

Planned build eg stations, upgrades

Services, people and customer information

TfL's Climate Change Risk Analysis Workshops

Communicate the climate projections

Assess the impacts on services and assets

Quantify and prioritize the risks

Review the plans

Using TfL's Main Risk Assessment Methodology

Measure	Probability	Cost	Time	Customer	Reputation
Risk	% likelihood occurrence this financial year or numbers of events in terms of year(s)	Decrease in revenue/increase in cost in financial year	Delay to achievement of key milestone	Reduction in customer service	Level or type of media coverage/ impact on relationship with stakeholders
Very high	≥75% Once or more per year	>£250m	≥52 weeks delay	Catastrophic asset loss for several weeks/months, affecting several lines. Repair timescales in months with total loss of service during that time Example: Major inundation of several lines from river tidal surge flooding	Prolonged and targeted hostile media campaign lasting at least 1- 5 years – -aimed at decreasing net advocacy amongst external stakeholders -challenging organisational competence in key public safety areas Example: Sustained media campaign against Railtrack following various safety incidents
High	50% - 75% More than once in 2 years	£175-250M	36-52 weeks delay	Major adverse impact such as: •disruption/loss of customer service on more than one line for several weeks •major event resulting in injuries and fatalities Example: Kings Cross Fire	 Continuous hostile media coverage of up to 1 year Significant decrease in net advocacy amongst external stakeholders Major organisational changes resulting from an event. e.g. removal of accountable individuals from post
Medium	20% – 50% Between once in 2 to once in 5 years	£100-175M	24-36 weeks delay	Adverse impact such as: •Loss of train service on one line for several weeks •loss of a single-ended train depot/ train staff depot/ station •no injuries or fatalities •significant & ongoing disruption to core business services Example: Chancery Lane Derailment; Moorgate accident	 Ongoing critical & aggressive media campaign coverage lasting the duration of an event Decrease in net advocacy amongst external stakeholders. Significant challenge by regulators & stakeholders into relation to management of organization. Targeted and critical parliamentary questions being asked Severe & ongoing disruption actions taken by internal stakeholders (employees, unions, equality groups etc)
Low	5% - 20% Less than once in 5 years	£50-100M	12-24 weeks	Disruption to customer service for several days, or series of days Example: •series of network-wide 1 day strikes loss of train service on one line for several days	 Sporadic media coverage triggered by related events e.g. in print for several days over a period of time Regulators and stakeholder intrusion is heightened by the event Greater scrutiny by regulators & stakeholders in relation to management of organisation Internal stakeholders (employees, unions, equality group etc) carrying out limited industrial action e.g. series of 1 day strikes

Using TfL's Main Risk Assessment Methodology

Very Low	≤5% Less than once in 20 years	Increase revenue/decrease costs by less than £250K in one financial year	Milestone would be achieved less than 13 weeks early	Improvements to customer service eg: •improved ambience/information •minor improvement to journey times •small increases in satisfaction	 Positive 'word of mouth' by customers Positive public awareness
Low	5% - 20% Less than once in 5 years	Increase revenue/decrease costs by between £250K-1M in one financial year	Milestone would be achieved more than 13 weeks but less than 26 weeks early	Improvements to customer service as above	 Minor/short-term positive local media coverage Improved relations with regulators & stakeholders
Medium	20% – 50% Between once in 5 years & once in 2 years	Increase revenue/decrease costs by between £1-5M in one financial year	Milestone would be achieved more than 26 weeks but less than 39 weeks early	Improvements to customer service Permanently improved customer satisfaction ratings (between 1-5% improvement on current scores)	Positive media coverage and enhanced relations with regulators & stakeholders eg headline television coverage or front page In Evening Standard for one day
High	50% - 75% More than once in 2 years	Increase revenue/decrease costs by between £5-10M in one financial year	Milestone would be achieved more than 39 weeks but less than 52 weeks early	Noticeable & permanent improvement in customer service resulting in significantly improved customer satisfaction ratings (a ≥5% improvement on current scores)	Significant positive media coverage and enhanced relations with regulators & stakeholders for more than a week
V High	≥75% Once or more per year	Increase revenue/decrease costs by more than £10M in one financial year	Milestone would be achieved over 52 weeks early	Major & permanent improvement in customer service resulting in significantly improved customer satisfaction ratings (a ≥10% improvement on current scores)	Significant positive media coverage and enhanced relations with regulators & stakeholders for a period of weeks

licrosoft Excel TfL's tracks and civils risk assessment 👗 Cut Σ AutoSum * Z Wrap Text Arial - 10 - A A = = >>--General 15 🐺 Fill 🕆 Copy B I U · · · · · A · 📻 🚍 🗐 📰 🖬 Merge & Center 🔹 · % , *.0 .00 .00 →.0 Conditional Format Cell Insert Delete Format Sort Paste 🏈 Format Painter 🖉 Clear 🔻 Formatting * as Table * Styles * Filte 5 5 Alignment 5 15 Clipboard Font Number Styles Cells Editing C68 fx • C D F F G 1 2 3 Track & Civils Climate Change Risk Identification 4 Description Consequence Asset Weather Type Potential Change 5 Extreme Hot Higher temperatures and increased Track weather frequency of hot weather Derailments, remove from service, TSR/Suspensi Buckling increased cost of maintenance due to more re-sti 6 more signalling failures 7 Points move, detection system can't cope increased friction = higher maintenance. Increase Lubrication - range of operation - change treatment orders due to wheel screech 8 viscosity Drought Longer periods of drought and loss of rail support - tight gauge = inc wheel wear increased frequency of drought wheel screech 9 Track shrinkage of timber sleepers (current 30-40%) Rain/Flooding Track (3rd party impact over current Heavier rain and increased Drainage (change in frequency and rainfall drainage is main issue) - known high legal & financial impacts frequency of high rainfall patterns) - back surges into our systems risk areas 10 increased cost of discharge into 3rd party drainage systems - issues over capacity enabled to discha General track drainage which could lead to need to store water 11 Loss of access to track due to extreme wet or heat conditions 12 Track flooded 13 14 Ballast wash out Increased SPADs 15 Wheel rail interface loss Lower temperatures and increased Cold/Freeze frequency of cold/freezing weather loss of service and potential derailment 16 Track increase rail breaks in welds and joints Snow Heavier snow and increased track covered, increased point failures, difficult

Example of climate change impacts risk map

- 1- Extreme Hot Weather Key track, signals, & communications assets and staff & passengers.
- 2- Rain & Flooding Track & signal drainage
- 3- Cold & Freeze Impact on track integrity
- 4- Rain & Flooding Key infrastructure drainage
- 5- Drought Vegetation impact
- 6- Snow track, signalling and depot operations
- 7- Cold & Freeze Train system components
- 8- Cold & Freeze Slips/trips for staff and customers.
- 9- Rain, Flooding and snow Damage to inside of carriages
- Wind- Damage to infrastructure, track and vegetation.
- 11- Drought Ground stability impacts



Weather management and adaptation plans

Implemented through:

Emergency Plans and audits

Standards eg Civil Engineering Gravity Drainage Systems

Asset Management Plans eg for stations, signals, rolling stock, civils





The Importance of Communication







Key findings

People and services (as well as assets)

Managing Customer Expectations:

• Planned and real time information

Stakeholders:

- Liaising with key employers
- Organisations with interdependencies



What next?



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