LONDON FIRE BRIGADE

Appendix Eight
Assessment of Risk Methodology
2026

Contents

Layer 1. Public Concerns and Public Risk Perception 3

Layer 2. Risks relating to property, places, and incident type 7

2.1 Risk Matrices 9
2.2 Calculation of likelihood 9
Table 1. Likelihood score table 9
2.3 Calculation of severity by casulaty rate 9
Table 2. Consequence by casualty rate score table 9
2.4 Calculation of severity by wider consequence score 9
Table 3. Wider consequence score table 10
2.5 Using the Risk Matrices 10
2.6 Risk Score: Worked example 10

Layer 3.1 Extraordinary risks and risks from the London risk Register. 11

Layer 3.2: Extraordinary risk scenario modelling. ..... Error! Bookmark not defined.

Layer 4. New and Emerging Risks 11

Neighbourhood densities and local risk profiles 10

NFCC Definition of Risk Maps 11

Layer 1. Public Concerns and Public Risk Perception

LFB assess public concerns and public risk perception in three ways;

1. Community workshops

2. Analysis of website traffic

3. YouGov polling

1 Community Workshops.

LFB Strategic Planning worked in Partnership with the Brigade Engagement Team. The Strategic Planning team provided the overall objectives for the piece of work and provided risk information and risk content. The Engagement team carried out an Equalities Impact Assessment, identifying specific groups for targeted engagement who represented either seldom heard or at-risk groups. The Engagement team facilitated focus groups with the LFB Community Forum and organisations/representatives who work with communities (in particular on community risk and resilience). Contact and administration was provided by the LFB Engagement Team.

In addition to identified groups an open public workshop was held that any member of the public could attend. Groups within the demographics referenced in the EIA were approached via existing relationships, links made through previous LFB engagement, or contacts provided to the team by colleagues, partners and other organisations.

A target number of attendees was not set, as this engagement piece was designed to speak to a number of groups to understand how they might perceive risk, rather than to be a fully representative sample of London.

Workshop attendees received a presentation on the nature and purpose of the AoR followed by a discussion around what, "Risk," meant to individuals.

Workshop attendees were then asked about the level of threat perceived in their lives currently of various pre identified risks taken from the higher risks identified at the start of the engagement work based on the AoR from 2023. These categories of risk have been maintained to allow comparison between assessments and to allow changes to be tracked.

Attendees were able to either use an interactive online tool (via Mentimeter) or fill out a paper form, rating each risk category on a scale from 0-100 to represent how personally concerned they were about each one.

Attendees were then asked open-ended questions, asking them to share any underlying causes of fires and of non-fire incidents, and any other risks that they are concerned about.

This data was recorded in spreadsheet format, to be analysed by the Strategic Planning team for the public perception of risk portion of the Assessment of Risk.

The following workshops were held.

Group	Number of Attendees
Southwark Adults with Learning Difficulties	7
Age UK Older People's Reference Group - City & Hackney	9
ChargeSafe	10

Open public session	8
Action Disability Kensington & Chelsea	3
Brent borough	6
Westminster borough	3

To make risk information more accessible during focus groups AoR risk identifiers were grouped into more general categories to aid public understanding, and examples were provided for each. The table below shows the AoR item from 2023, (selected due to risk score at time engagement was initiated and maintained to provide year-on-year comparison.

AoR Risk Descriptor (highest risks)	**Descriptor for Public Engagement**
Fire involving warehouses and bulk storage.	Large commercial fires
Fire involving manufacturing and processing plants.	
Fire involving landfill or wasteland.	
Fires in large public and commercial buildings	
Fire involving food and drink outlets	
Fire involving offices and call centres	
Fire involving retail outlets	
Fire involving rural land (urban rural interface)	Wildfire and grass fires near buildings
Non-fire incidents involving trains and transport buildings.	Car and train collisions and entrapments
Non-fire incidents involving road vehicles and urban infrastructure.	
Non-fire incidents involving outdoor water and boats	Water rescue
Fire involving purpose-built flats.	Fires in flats and shared living
Fire involving converted flats or HMOs	
Fires in purpose built high-rise flats	High rise and/or major fire
Major Fire	
Fire involving short stay accommodation	Fires involving vulnerable people.
Fire involving care homes and specialised living	
Fire involving houses and bungalows	House fires
Fire involving private garages and sheds	
Surface Water Flooding	Flooding
Fluvial Flooding	
Groundwater Flooding	
Coastal/Tidal Flooding	
Low temperatures and heavy Snow	Cold weather, snow, and disruption
Accidental Release of a Biological Substance	Accidents with hazardous materials
High Consequence Dangerous Goods	
Attacks on Infrastructure	Malicious attacks and terrorism
Attacks on Transport	
Medium Scale CBRN Attacks	
Larger Scale CBRN Attacks	

Data Sources:

The focus groups and workshops were delivered either in person or online. Attendees were asked to score predefined risks from 0–100 (0 = "never think about the risk"; 100 = "think about the risk every day"). Participants were also asked an open-ended question to identify any additional risks of concern. Responses to this were provided in free-text form, allowing multiple answers per person.

Data was recorded by attendees using the Mentimeter application and raw data was exported as Excel files to allow for cleaning, preparation and analysis. Where attendees couldn't use the application for any reason, paper copies were provided and data was manually entered.

Tools used:

- Mentimeter application for polling
- Paper copies of Mentimeter questions
- Microsoft Excel for data processing, analysis and visualisation.

Analysis techniques

Pre-defined risk scores: Scores for predefined risks were analysed separately from the free-text submissions.

Initially, scores were analysed on a group-by-group basis. For each group, the average score for each risk was calculated and the risks were ranked from highest to lowest perceived concern. Blank responses were left blank so that they did not incorrectly lower averages; the Excel AVERAGE function was used as it automatically excludes blank answers.

Group average scores were then tabulated and compared to assess differences in how groups perceive risk. The difference between each risk's highest and lowest group average was used as a proxy for the level of agreement across groups (larger differences indicating greater divergence).

Once all group datasets were collated, overall averages were calculated for each risk across all participants. The risks were then ranked from highest perceived risk to lowest based on the overall averages. These results were compared with AoR 2024 and AoR 2025 averages to assess changes in perceived risk over time.

Free-text submissions:

Free-text responses were reviewed and assigned short, standardised topic labels to group related themes, avoiding interpretation beyond what participants explicitly stated. These topic labels were then organised into the following broader categories:

- Public realm & transport safety
- Building safety, standards & maintenance
- Open flames, smoking & fireworks
- Crime, anti-social behaviour & deliberate hostile acts
- Lithium-ion batteries & charging
- Health, vulnerability & safeguarding
- Accessibility & evacuation
- Information, communication & education
- Environmental & infrastructure hazards
- Emergency response capacity & access
- Electrical, materials and ignition safety
- Egress, clutter & hoarding (blocked exits)

This categorisation enabled basic analysis such as counting occurrences of each topic and comparing themes across focus groups.

Assumptions and constraints

The following considerations apply to this analysis:

- Sample size: 46 participants took part across seven groups. These findings reflect the perceptions of these individuals, not a wider population.
- Nature of the data: The scores are perceptions, not measured levels of risk or danger.
- Score interpretation: Minor differences of a few points were assumed to be noise. Differences of 10+ points were considered potentially meaningful patterns.

2. Analysis of website traffic

Analysis was conducted examining user traffic to LFB safety information pages over the past two years to assess whether access patterns reflect areas of public concern. Traffic was examined by meteorological season to identify recurring or emerging trends, with the intention that this approach can be replicated in future years to strengthen understanding of public information needs or emerging topics of concern.

Data sources: User data from the LFB Safety webpages was exported from Google Looker Studio, which provides downloadable access metrics over custom date ranges to support seasonal analysis.

Data was extracted using meteorological season definitions:

- Winter: 1st December to 28th/29th February
- Spring: 1st March to 31st May
- Summer: 1st June to 31st August
- Autumn: 1st September to 30th November

For this analysis, two seasonal years were compared:

- Year 2024: 01/12/2023 to 30/11/2024
- Year 2025: 01/12/2024 to 30/11/2025

The dataset contained only the webpage 'page path' (e.g. /safety/the-home/home-fire-safety/home-fire-safety-checker-hfsc/) and the total number of users who accessed each page within the defined period. A small number of webpages were excluded from the analysis as they consisted of information notices, webforms, or tools rather than content-based information pages:

· /safety/property-management/fire-safety-in-heritage-and-historical-buildings/contact-the-heritage-team/

· /safety/calling-999/live-video-streaming-of-fires/

· /safety/carers-and-support-workers/using-a-fire-risk-checklist/fire-risk-checklist/

· /safety/fireworks/fireworks-map/

· /safety/the-home/booking-a-home-fire-safety-visit/

· /safety/the-home/booking-a-home-fire-safety-visit/?code=ladder

· /safety/the-home/booking-a-home-fire-safety-visit/?code=radio

· /safety/the-home/booking-a-home-fire-safety-visit/?code=uniform

· /safety/the-home/home-fire-safety/how-was-your-home-fire-safety-visit/

· /safety/the-workplace/have-you-spotted-a-serious-fire-risk/spotted-a-serious-fire-risk/

· /safety/carers-and-support-workers/using-a-fire-risk-checklist/

· /safety/flooding/flooding-advice/my-street-is-flooding/

· /safety/property-management/fire-safety-in-heritage-and-historical-buildings/emergency-response-and-salvage-plans-for-heritage-buildings/how-to-write-a-salvage-plan/

· /safety/the-home/booking-a-home-fire-safety-visit/?status=error

· /safety/flooding/flooding-advice/flood-water-is-coming-into-my-home/

Tools used:

- Data cleaning and preparation was undertaken in Excel.
- Visualisations were produced using the webtool Flourish and Microsoft Excel.

Analysis techniques:

Data was first analysed and visualised across a full seasonal year to provide an overarching view of webpage engagement. Webpages were ranked from highest to lowest based on total unique users. Quartile ranges were calculated to understand the distribution of traffic and to identify which webpages fell within the top 25% of visits.

The data was then analysed and visualised by individual season to explore whether any seasonal patterns or trends emerged.

Specific webpages relating to risks identified by LFB as high and increasing from an operational perspective were then reviewed to assess whether user traffic patterns aligned with LFB's perception of risk.

Assumptions and constraints:

The analysis is subject to several limitations that affect interpretation, particularly in relation to traffic attribution and external influences:

- Data coverage: inability to isolate website traffic generated by LFB staff during webpage maintenance.
- Granularity: Limited access to more detailed day-by-day traffic patterns).
- External influences: potential impacts from AI-generated summaries, media coverage or other external drivers of web traffic. The effect of AI-generated summaries will need monitoring over coming years as they could impact the reliability of website traffic data for subsequent annual Assessments of Risk analyses

3. YouGov polling

Polling data from YouGov was used to broaden the reach of engagement and achieve a more representative spread of respondents. All respondents were asked the following question:

"Thinking about potential risks within your local community (e.g. fires, adverse weather conditions, natural events etc.) Which ONE, if any, of the following are you MOST concerned about within your local community".

In addition, respondents were asked an open-ended question about risks or concerns in their lives. These free-text responses were analysed for common themes using the same approach applied to the workshop data (see section 2.2).

Data Sources:

YouGov polling has been conducted in the same format across four waves to date:

- March 2024
- September 2024
- March 2025
- September 2025

Polling results were provided in Excel format, containing percentage-based and respondent counts for each answer option.

Each wave was analysed individually, before being aggregated to provide an overall picture of changes in perceived risk over the past two years.

Tools used:

- Microsoft Excel for data processing, analysis and visualisation.

Analysis techniques:

Scores for predefined risks were analysed separately from the free-text submissions.

Predefined risks:

Percentage results for each risk were visualised for the most recent wave (September 2025). Risks were sorted from highest to lowest perceived concern and then presented in a simple column chart.

Percentage results from the three earlier waves were then examined alongside the most recent wave to identify cumulative patterns across all four waves.

Free-text responses:

Free-text responses were reviewed and assigned short, standardised topic labels to group related themes while avoiding interpretation beyond what respondents explicitly stated. These topic labels were then grouped into the following broader categories:

- Crime & Social Disorder
- Fire & Safety
- Social & Political Tensions
- Urban Living & Infrastructure
- Socioeconomic Issues
- Environmental & Climate Concerns
- Health & Wellbeing
- Housing & Homelessness
- Technology & Media

This categorisation supported basic analysis such as counting occurrences of each topic and comparing themes submitted for September 2025 only. However, during analysis it was determined that visualising the standardised topic labels (rather than the broader categories) provided a clearer representation of respondent concerns. As a result, the broader categories were not included in the final report.

Assumptions and constraints

The following considerations apply to this analysis:

- Nature of the data: Results represent perceptions, not measured levels of risk or danger.
- Short timeframe and limited data points: Small fluctuations (around 5%) between individual waves may reflect typical sampling variability rather than meaningful changes in public concern. Trend assessment will become more robust once additional waves are available over a longer period

Layer 2. Risks relating to property, places, and incident type

2.1 Risk Matrices

Risk information is presented both by incident type and location and by incident type code. The calculations for likelihood and severity are the same in each matrix. LFB incident data is linked to Power BI for automated reporting. The most recent five full calender years years of incident incident data are analysed. Information is presented by both type and location and by Incident Type Code to allow disaggregation of specific incident types from the wider location data.

2.2 Calculation of likelihood

Likelihood score is based on frequency of incidents occuring. This is calculated by, Number of occurences in data/ data period. The score is then taken from Table 1.

Table 1. Likelihood score table

Score	Descriptor
1	Between once a year and once a week
2	Between one a week and one a day
3	Between one and five a day
4	Between five and twenty a day
5	Twenty or more a day

2.3 Calculation of severity by casualty rate

Casualty rate is determined by calculating the number of incident type required on average to generate a casualty. This is calculated by number of incidents in data period/number of casualties for incident type in data period. Severity score is taken from Table 2.

Table 2. Consequence by casualty rate score table

Score	Life consequence
1	One casualty occurs per 100 or more incidents
2	One casualty occurs per 25 - 100 incidents
3	One casualty occurs per 10 - 25 incidents or a fatality occurs in 300 or more incidents
4	One casualty occurs per 5 – 10 incidents or a fatality occurs per 100 – 300 incidents
5	One casualty occurs per 5 or fewer incidents or a fatality occurs per 100 or fewer incidents

2.4 Calculation of severity by wider consequence score

The wider consequence of an incident is indicated by the sum of fire appliances used over the full duration of the incident including the operational and post-operational phases, initial attendance, and all required reliefs. This measure serves as a proxy for the wider impacts of an incident on the community as well as the overall scale and the impact on LFB. Where the wider impact score is higher than the life consequence score it has been used to moderate the score upwards. Below is an indicative worked example. The low threshold of frequency used to capture wider consequence allows for incidents that are occasionally very widespread or resource intensive to be measured alongside those that have more frequency but less widespread impacts.

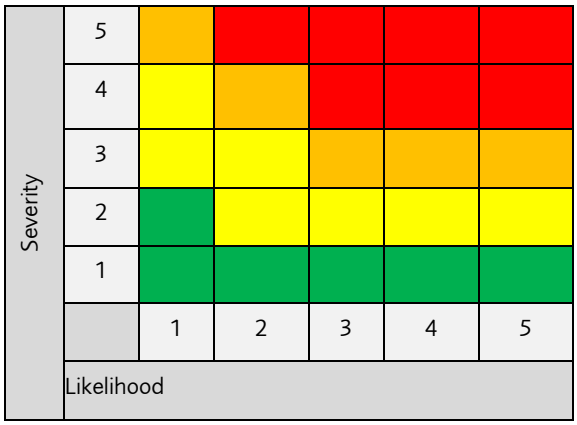
Table 3. Wider consequence score table

Score	Wider impact consequence
1	One or more incidents of this type have needed over 4 pumps in the last five years
2	One or more incidents of this type have needed over 40 pumps in last five years
3	One or more incidents of this type have needed over 60 pumps in last five years
4	One or more incidents of this type have needed over 80 pumps in last five years
5	One or more incidents of this type have needed over 100 pumps in last five years

2.5 Using the Risk Matrices

Once incidents have been scored for likelihood and consequence they are placed on the relevant matrix and displayed either by individual incident type code or by incident type and location. Incidents displayed by type code are placed in matrix 1 and incidents displayed by type and location are placed in matrix 2. The base data is the same. The different presentation allow the same risk data to be viewed by location and by individual incident type.

Incidents with high severity but low likelihood are prioritised in this matrix over high frequency low severity incidents.



2.6 Risk Score: Worked example

An incident of *fire* in the location *purpose built flat*, occurs in London on average 7.26 times per day giving a likelihood score of 4. On average, one casualty occurs every 7 incidents in this location type, giving a consequence score of 4. The combination of likelihood and consequence returns an overall risk score of 16 for the incident type *fire in a purpose built flat*. However, the wider consequence score of fires in purpose built flats is 5 due to the large number of resources required to resolve these incidents, indicating a higher overall impact. The score is therefore moderated up to a 5 for consequence as per the table. The overall risk score is now 20.

Neighbourhood densities and local risk profiles

Neighbourhood Density Zones highlight the areas of London with different densities of people and buildings.

The map graphic is created by a third party contractor, ORH.

Urban Centres are the areas with highest population and building density (more than 15,000 people per sq. km) and are shown in red. Urban areas have above average population and building density (between 9,000 and 15,000 people per sq. km) and are shown in amber. Suburban areas have below average population andbuilding density (between 2,000 and 9,000 people per sq. km) and are shown in grey. Semi-Rural areas have the lowest population and building density (below 2,000 people per km) are shown in green.

NFCC Definition of Risk Maps

Maps showing dwelling fire and road traffic accident risk are produced by a third party contractor, ORH. The method published by the NFCC is used to produce maps to identify areas of risk based on demographic, geographic and socio-economic factors associated with incident frequency and outcomes.

NFCC Definition of risk methodology is used to produce risk maps for

- Dwelling Fire
- Non-dwelling-building fire (NFCC Draft methodology used
- Road Traffic Collison

Layer 3 Extraordinary risks (risks from the London Resilience Forum - London Risk Assessment).

These risks are taken directly from the London Risk Assessment. The London Risk Assessment is produced by the London Resilience Forum (LRF). The London Risk Assessment reflects risks recorded on the National Risk Register and National Security Risk Assessment as appropriate.

These risk registers deal with low frequency, high impact events and take a subjective approach to assess the reasonable worst-case scenario for each risk identified. Due to the limited data available on rare events subject matter experts and partners use indicator tables, professional judgment and extrapolate from past events to produce risk ratings.

The risks for which LFB is the lead are scored using input from LFB subject matter experts and with input and scoring from partners. Risks on which other partners lead are scored in a similar way. This gives the Brigade and the London Resilience Forum a wider, partner perspective on risks faced in London and England. This register includes risks that LFB will not directly respond to, however the inclusion of risks on the register indicates that LFB should plan for continued delivery of core functions during an event. If there are changes to scores for any of the risks, we would seek to get the risk rescored by the LRF rather than show a different score on our own risk register for that year.

Both the London Risk Register and the National Risk Register are available publicly and include method statements with the main documents. The national security risk assessment is not published publicly but is reflected in the national risks register.

Risk of note outside of the London Risk Register are identified through cross departmental engagement and through the workshop series that leads to production of layer four. These represent risks for which there is insufficient data for them to appear in other layers but for which there is sufficient concern from stakeholders to warrant inclusion in the AoR.

Layer 4. New and Emerging Risks 2030 Horizon Scan.

Layer four of the Assessment of Risk (AoR) is a forward looking, "Horizon Scan," at emerging risk, changing operational demand, and plausible future scenarios. It is an assessment of how external drivers may impact risk and demand for LFB response up to 2030.

This assessment focuses on operational risks and how these may manifest in London. Where a wider focus has been used, it is to identify drivers of increasing likelihood or consequence of risks to which LFB may have to respond or will impact response. It comprises the outcomes of three strands of work:

(i) PESTLE analysis; used to identify drivers of changing likelihood or severity of risk and to provide broad subjective analysis of the operating environment and context up to 2030.

Drivers identified in this section are assessed for:

- change to LFBs operating environment
- impact on LFBs service delivery up to 2030
- evidence of early signals of existing impact.

PESTLE analysis has been carried out by the LFB Risk team as a desk top review, with reference to the listed sources, SME engagement, and professional judgement. This analysis provides an understanding of the external drivers impacting LFB's operational service delivery to 2030 and informs both demand forecasting and scenario development, presented later in this document.

Sources:

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- 2. World Economic Forum (2025). Global Risks Report 2025.
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- 5. London Resilience Group (2025). Exercise Helios and Extreme Heat Exercise for London – Post-Exercise Report.
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- 12. Financial Conduct Authority (2023). CP23/8: Multi-Occupancy Building Insurance.
  https://www.fca.org.uk/publications

- 13. Fire Technology (2025). Heatwaves and Firewaves: The Drivers of Urban Wildfires in London in the Summer of 2022, 61:3451–3460. https://link.springer.com/journal/10694
- 14. London Fire Brigade (2023). Major Incident Review: Extreme Weather Period 2022. https://www.london-fire.gov.uk
- https://www.gov.uk/government/publications/chronic-risks-analysis
- Internal LFB Subject matter engagement
- **LFB Emerging Trends and Future Risks workshops series 2025**

(ii) Demand Trend Analysis and Demand Forecasting; using historical incident data to track trends in demand and to provide forecasting of possible future demand. This approach uses statistical forecasting tools, exceedance analysis and historical incident data analysis.

Analysis in this section focusses on changes to:

- type of demand (what is happening)
- pattern of demand (when is it happening and how much/often)
- demand as a capacity risk, "exceedance analysis." (how likely are LFB to use lots of resources or to reach capacity for individual capabilities).

Incident data was exported from LFB data base and analysed using Microsoft Excel to identify initial trends.

Further analysis including ETS and SIRIMAX forecasts were coded in PYTHON by LFB analysts.

Code:

```
 mport pandas as pd
from statsmodels.tsa.statespace.sarimax import SARIMAX
# 1. Load & Clean
df = pd.read_csv('Daily Demand Data 2016-2024.csv')
df['Date'] = pd.to_datetime(df['Date'], dayfirst=True)
df = df.sort_values('Date').set_index('Date')
df['Peak_Pump_Util (IncS7)'] = pd.to_numeric(df['Peak_Pump_Util (IncS7)'].astype(str).str.replace(',', '').str.replace('$', '').str.strip(), errors='coerce')
df = df.dropna(subset=['Peak_Pump_Util (IncS7)'])
# 2. Set Frequency
# Input assumed: D
if df.index.freq is None:
    df = df.asfreq('D')
    df['Peak_Pump_Util (IncS7)'] = df['Peak_Pump_Util (IncS7)'].ffill()
# 3. Resampling
# Select only the target column, then resample
df = df[['Peak_Pump_Util (IncS7)']].resample('MS').max()
# 4. Model
exog = None
mod = SARIMAX(df['Peak_Pump_Util (IncS7)'], exog=exog, order=(1, 1, 1), seasonal_order=(1, 1, 1, 12), enforce_stationarity=False, enforce_invertibility=False)
results = mod.fit(disp=False)
import matplotlib.pyplot as plt
# ... (Previous code: Load, Clean, Resample, Model fit) ...
# 5. Forecast
forecast = results.get_forecast(steps=60)
# SAVE THE ORIGINAL BEFORE MODIFYING
predicted_original = forecast.predicted_mean.copy()
# Create a separate copy for adjustments
predicted_adjusted = forecast.predicted_mean.copy()
# Manual Adjustments (Apply to predicted_adjusted only)
adj_months = [6, 7]
adj_pct = 14
for date_idx, val in predicted_adjusted.items():
    if date_idx.month in adj_months:
        predicted_adjusted[date_idx] = val * (1 + (adj_pct / 100))
# ------------------------------------------------------------
# Plotting Both Forecasts
# ------------------------------------------------------------
plt.figure(figsize=(12, 6))
# 1. Historical Data
plt.plot(df.index, df['Peak_Pump_Util (IncS7)'], label='Historical', color='black', alpha=0.6)
# 2. Base Forecast (Blue Dashed)
plt.plot(predicted_original.index, predicted_original, label='Base Model Forecast', color='blue', linestyle='--')
# 3. Adjusted Forecast (Red Solid)
plt.plot(predicted_adjusted.index, predicted_adjusted, label='Adjusted Forecast (+14% Summer)', color='red', linewidth=2)
# 4. Confidence Intervals
conf_int = forecast.conf_int()
plt.fill_between(conf_int.index,
                 conf_int.iloc[:, 0],
                 conf_int.iloc[:, 1],
                 color='gray', alpha=0.2, label='95% Confidence Interval')
plt.title('Peak Pump Utilization: Base vs Adjusted Forecast')
plt.ylabel('Peak Pump Util (IncS7)')
plt.xlabel('Date')
plt.legend(loc='upper left')
plt.grid(True, linestyle=':', alpha=0.6)
plt.tight_layout()
plt.show()
```

(iii) Forward-looking operational scenario modelling. Three types of scenarios have been developed:

- Probabilistic Scenarios– Where trends are modified to explore increasing or decreasing likelihood of certain outcomes in the future – PESTLE was used to identify factors to apply to the forecast and manipulate the data to reflect expected change.
- Deterministic Scenarios – Creating plausible extreme events, that have not yet happened, based on trends and PESTLE analysis - For deterministic scenario of wildfire: Historic periods of high appliance unavailability were identified by using the saved data in the Dynamic Cover Tool (DCT). By navigating back to periods of 99th percentile appliance unavailability the Risk team were able to identify periods of operational stress. Wildfires risks were then modelled using historically similar incidents, mobilising policies and subject matter expert input to build a mobilising profile - These incident profiles were then added to the DCT at the pre identified periods of demand and impacts on projected attendance time were measured.
- Contingent Scenarios – Assuming the occurrence of a specific adverse condition, e.g. a deterioration in international conflict, to explore exposure. This scenario was created with subject matter expert input.