Determination of Vessel Traffic Capacity in Central London: A Practical Methodology.

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Dr Ed Rogers – Marico Marine

Introduction

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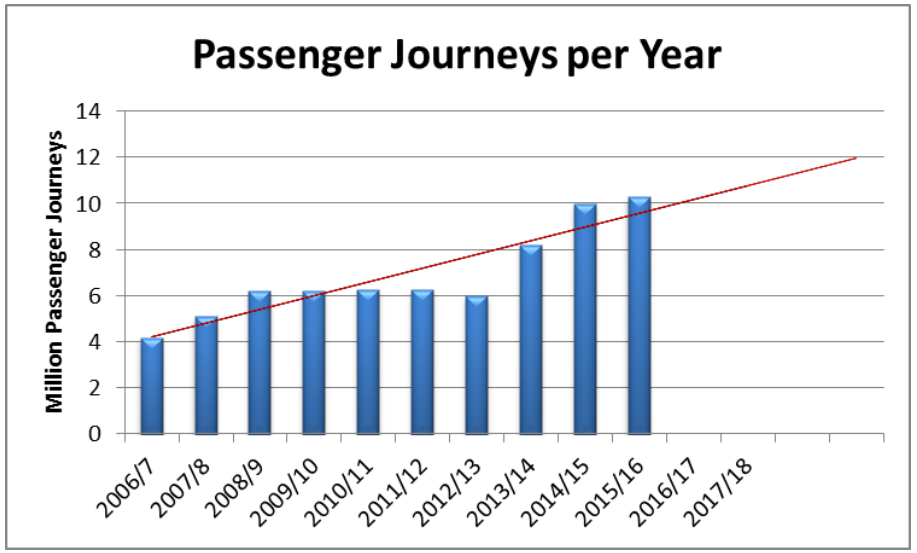
Growth of Passenger Numbers



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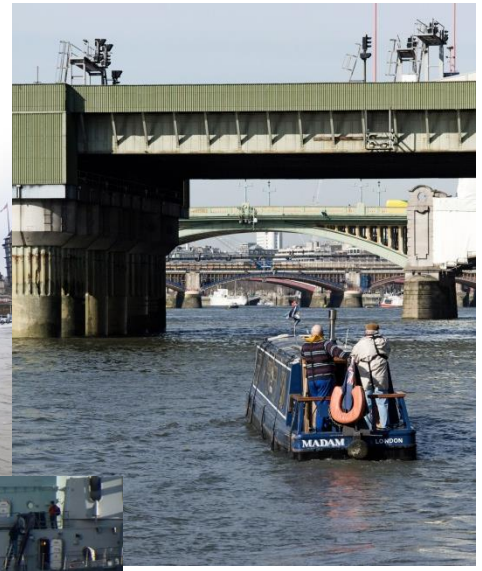
Growth in Freight & Recreation



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Introduction

* To ensure growth can be supported safely – a capacity study was commissioned to answer the following questions:
  * *What is the current capacity for vessel traffic in Central London;*
  * *What measures, mitigation or actions can be used to increase capacity; and*
  * *What are the implications and benefits of undertaking these actions?*
* Part of Thames Vision project
* Based on 2011 Thames Traffic Model
* Led by Steering Group (Port of London Authority / Transport for London / Marico Marine)

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What is Capacity?

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What is Capacity?

Level of Service

* The ‘Utility’ of the Thames
* Efficiency of navigation
* Two aspects:
  * Navigation;
  * Pier Availability.

Level of Safety

* Risk of collisions
* PLA’s appetite for risk

Thames Traffic Model is able to answer theses questions

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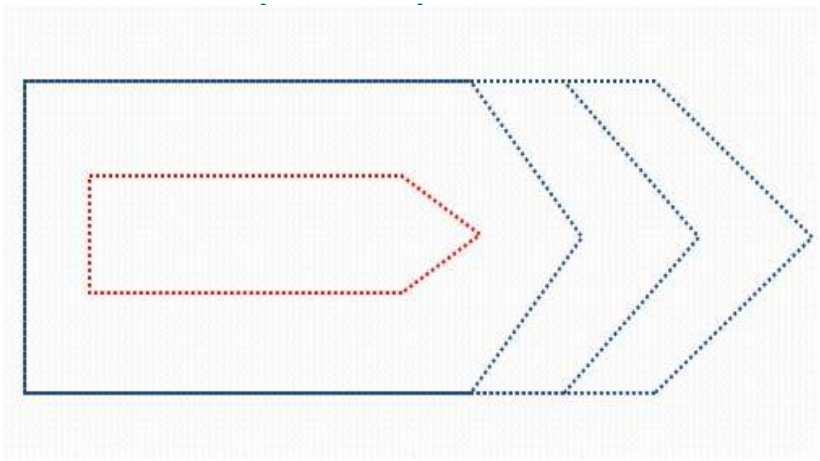
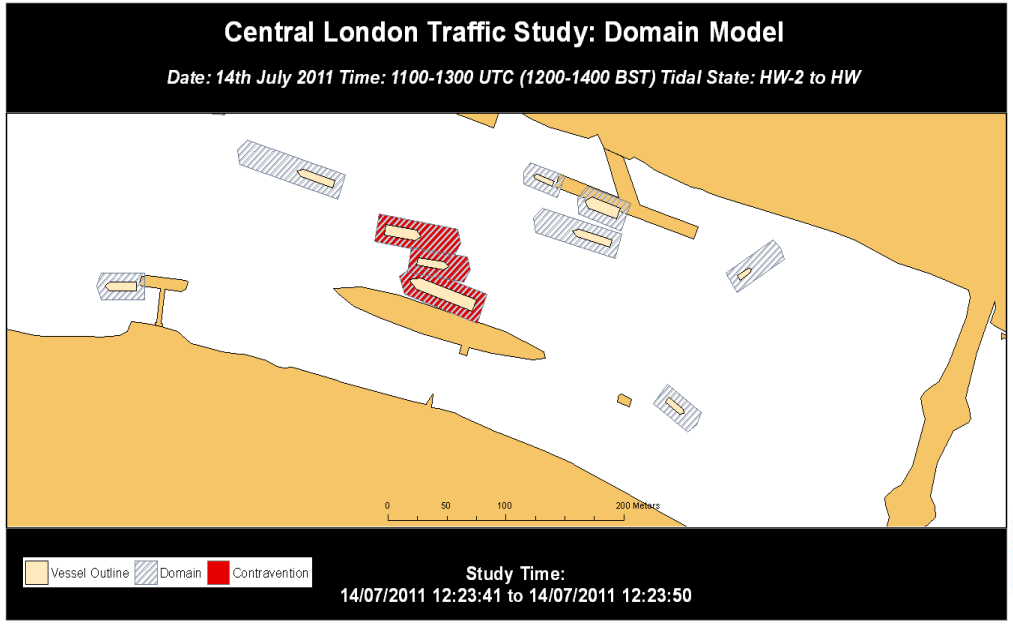
Quantitative Analysis

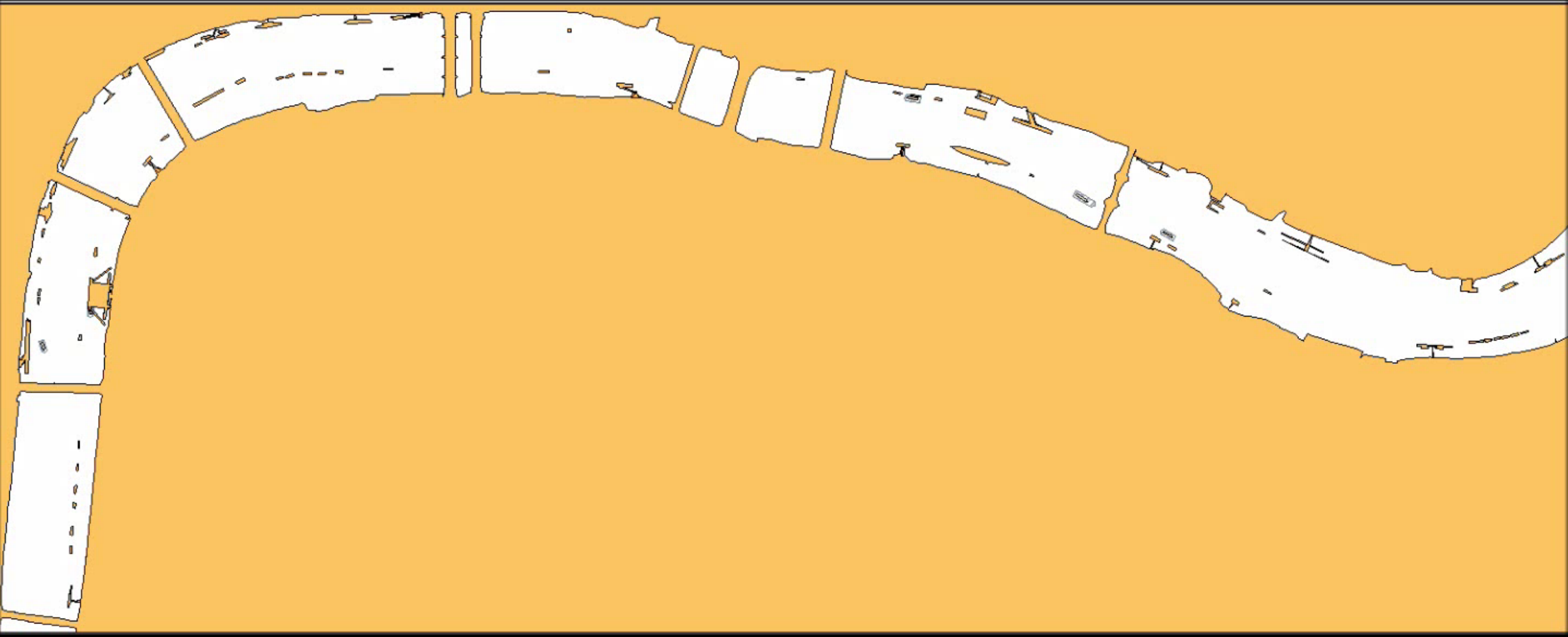
* Level of Service
  * Analysis of vessel traffic data
* Level of Safety
  * Dynamic safety buffer around vessels - “Domains.”
  * Count the number of vessel encounters at different times of day and number of





Central London Traffic Study: Domain Model

Date: 14th July 2011 Time: 1100-1300 UTC (1200-1400 BST) Tidal State: HW-2 to HW



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Study Time:
14/07/2011 10:59:51 to 14/07/2011 11:00:00

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Level of Service

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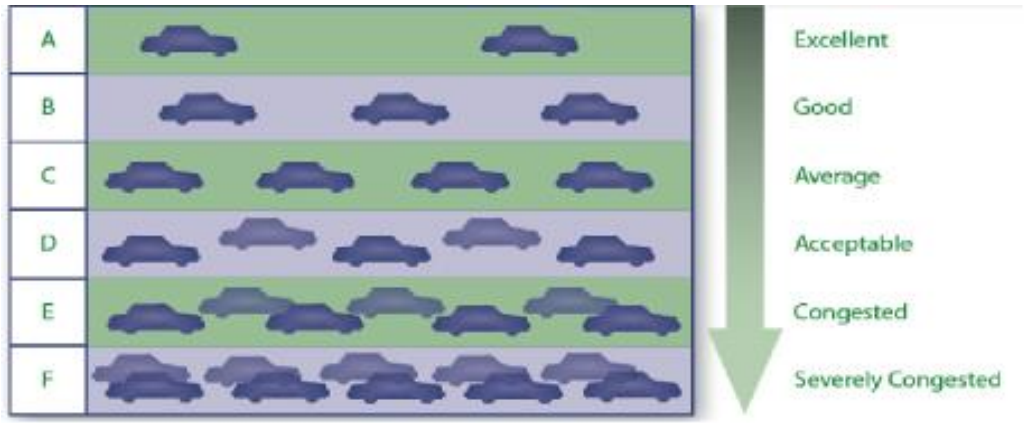
Level of Service Navigation

* A measure of the utility of a waterway i.e. congestion/queueing etc.
* Function of Traffic Density
* “Practical Capacity” vs “Theoretical Capacity”
* Measured by adapting Level of Service (LOS) from road transportation



LoS	Detail – Thames – Central London
A	Excellent
B	Good
C	Acceptable
D	Unacceptable

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Level of Service - Categories

Level of Service	Description
A 	Excellent – Clear waterway. Most likely to occur at night. Any additional vessels will have complete freedom of navigation.
B 	Good – Generally uninterrupted flow with very minimal disruption. Typical day time operation with between one and four or five vessels in a section of the river. Spare capacity for additional services. Vessels able to overtake freely.
C 	Acceptable – Interrupted flow, occasional congestion in localised areas and adjacent to piers. Navigation is constrained and river is at or near to capacity. Any additional services will not be able to run to timetable.
D 	Unacceptable – Significant disruption, capacity reached or exceeded in localised areas. Any additional services would not be able to navigate through existing traffic. Navigational freedom is limited. Reduction in vessel speeds is evident and an increase in vessel encounters is recorded. Examples of queueing for bridge arches and very little overtaking can be seen.

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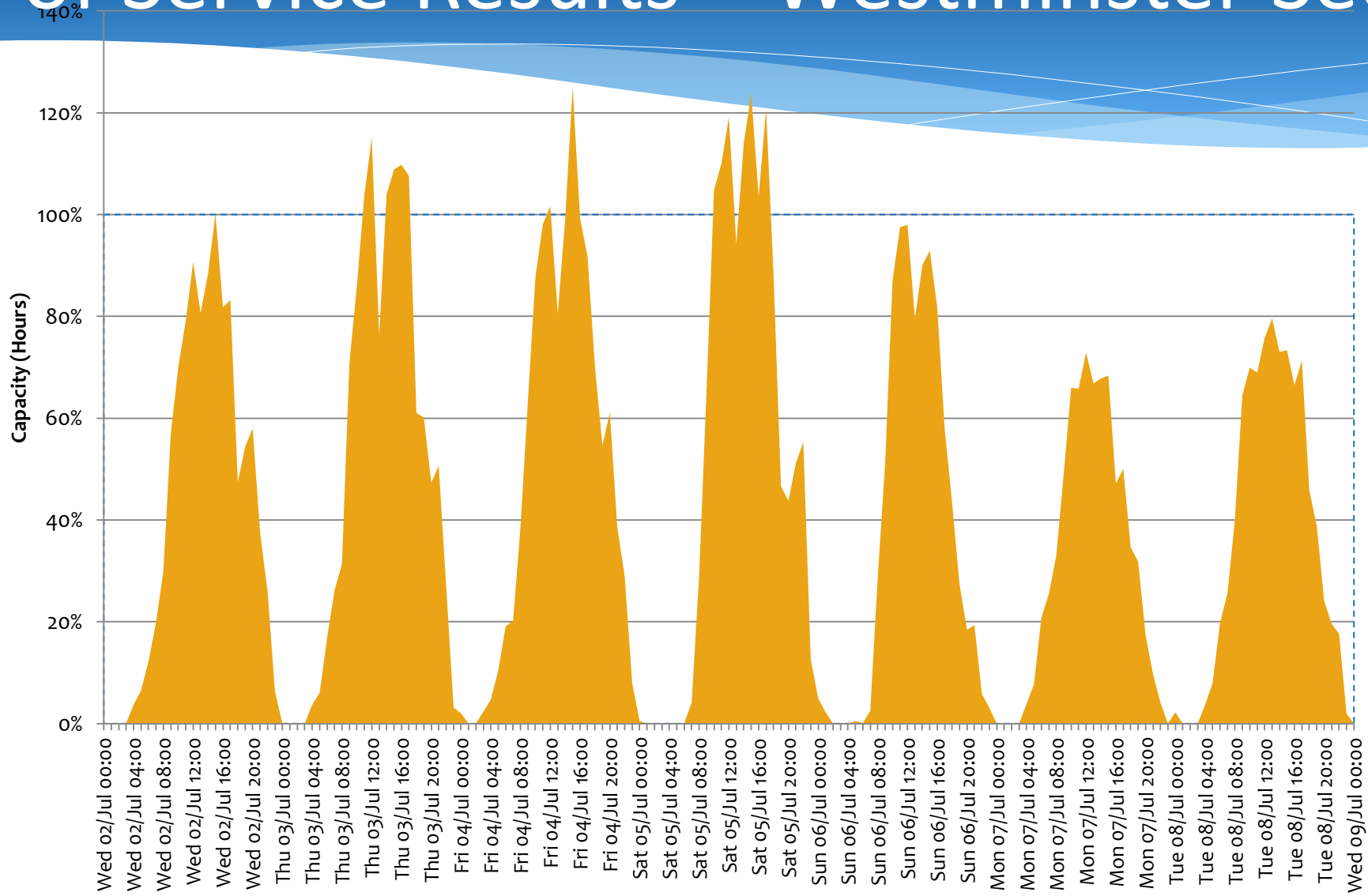
Level of Service Results – Westminster Section



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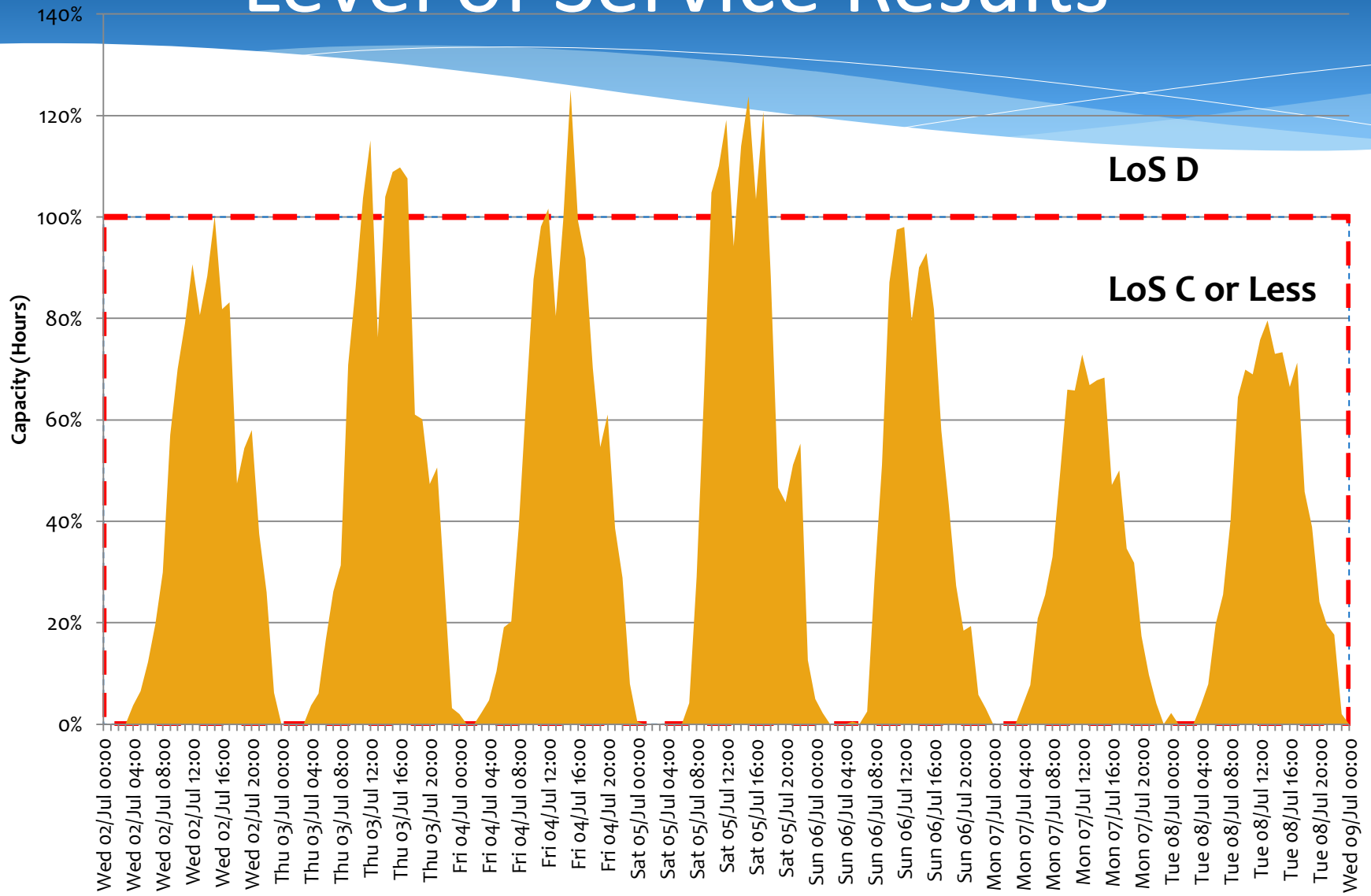
Level of Service Results



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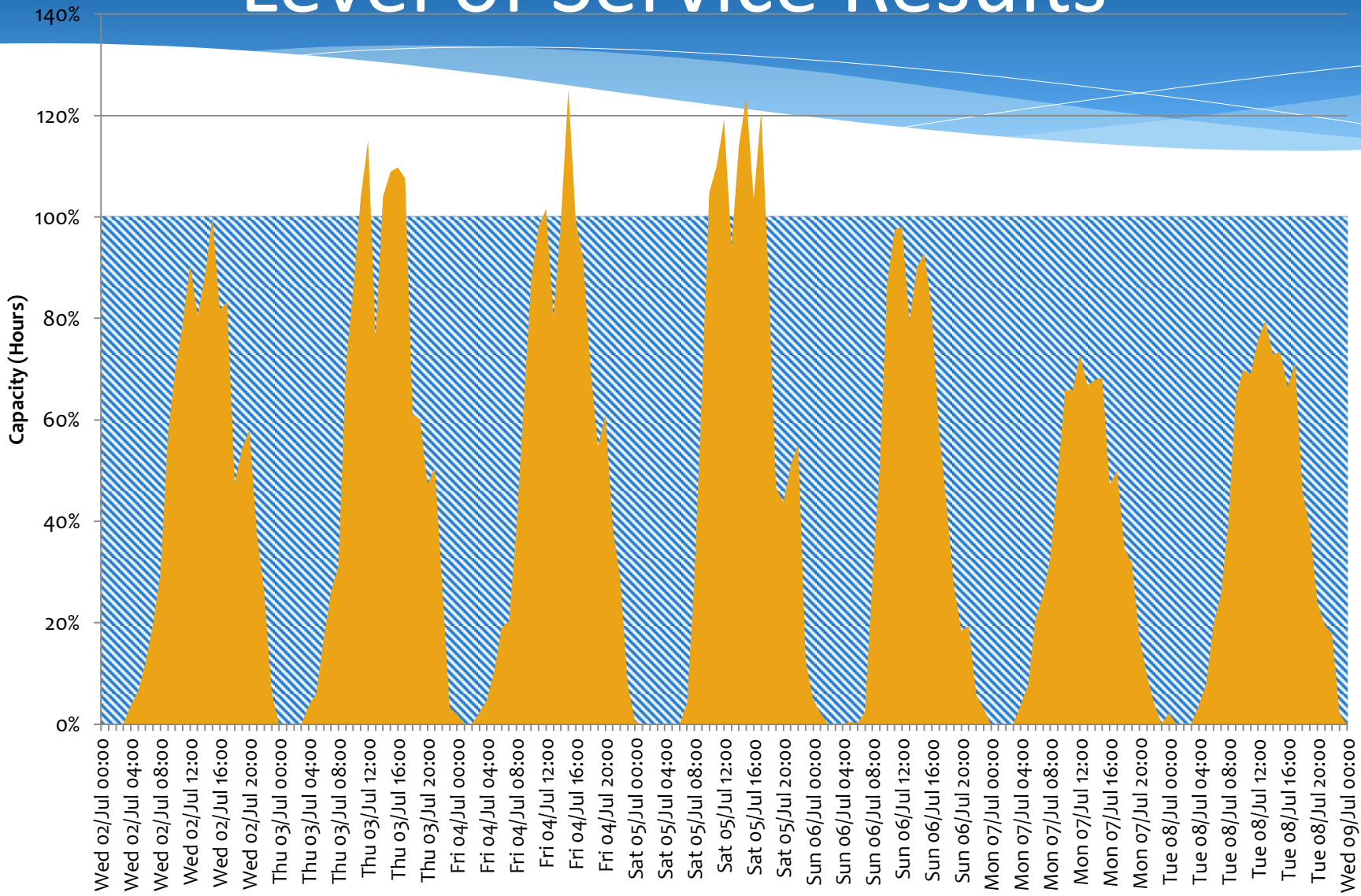
Level of Service Results



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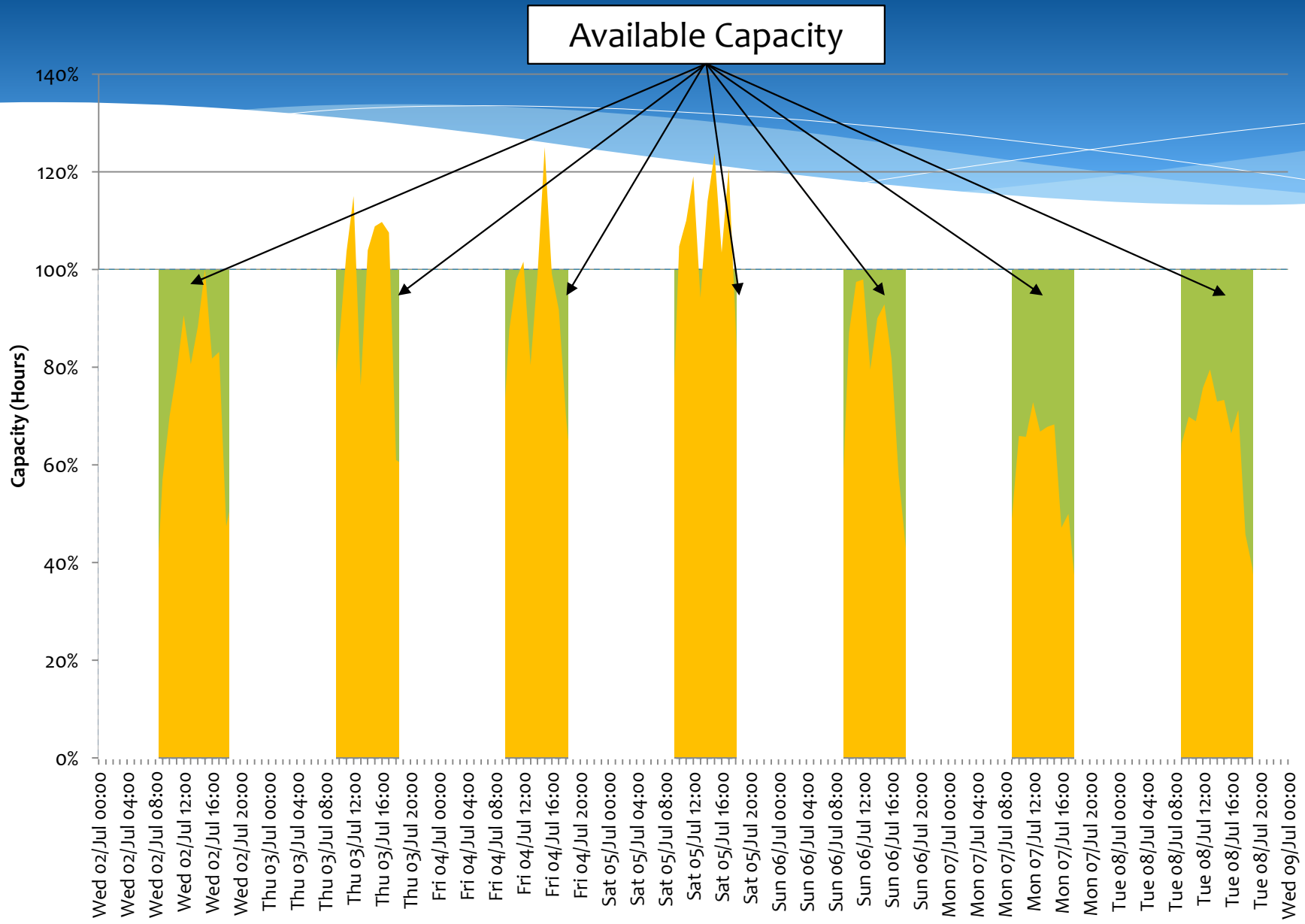

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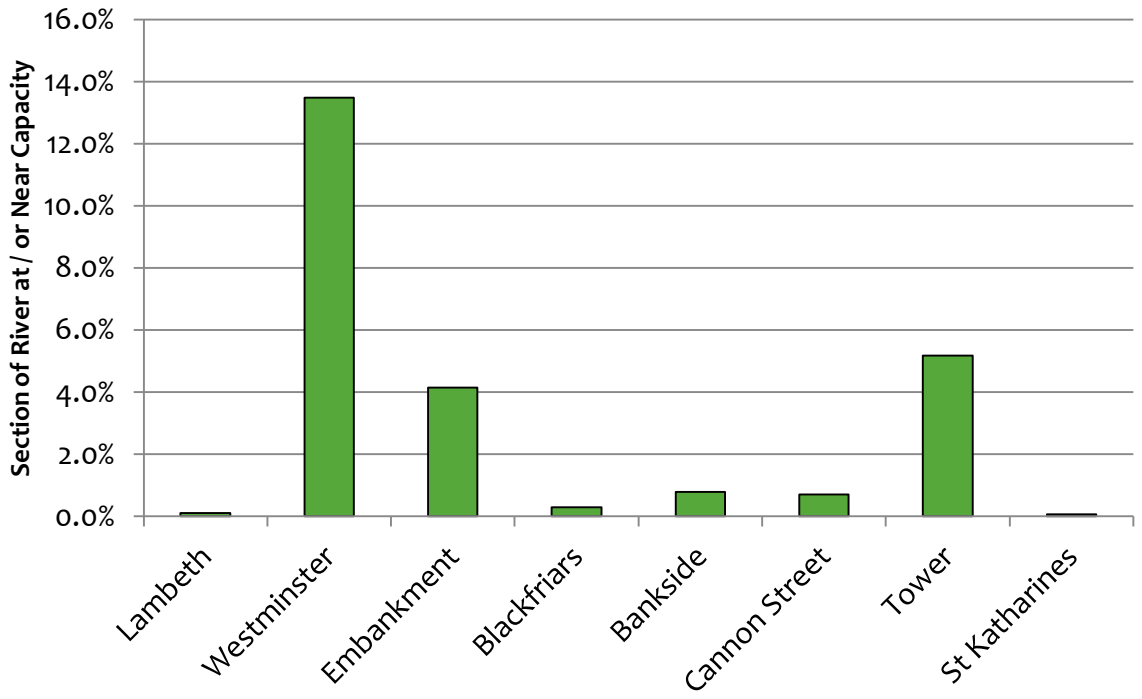
Level of Service

* Sections of the River Thames are at capacity for short durations in terms of “Level of Service” metric
* Small increases in vessel traffic can lead to capacity being reached at other times
* Spare capacity exists but mostly during none-peak times
* Additional capacity could be created by putting in place control measures



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Level of Safety

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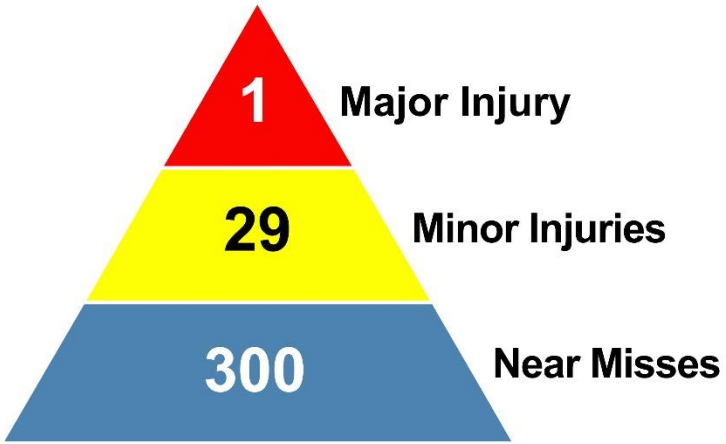
Level of Safety

* Level of Safety – Quantitative risk based measure of safety using encounter analysis comprising:
  * Risk Likelihood
    * Each encounter represents a probability of collision which in turn is a probability of a fatality using safety triangle
  * Risk Consequence
    * Characteristics of each encounter used to create consequence based on
      * encounter speed,
      * direction (head on / crossing / overtaking), vessel survivability (age / construction) and
      * passenger carriage (no. of people on board).



Heinrich 300-29-1 Model

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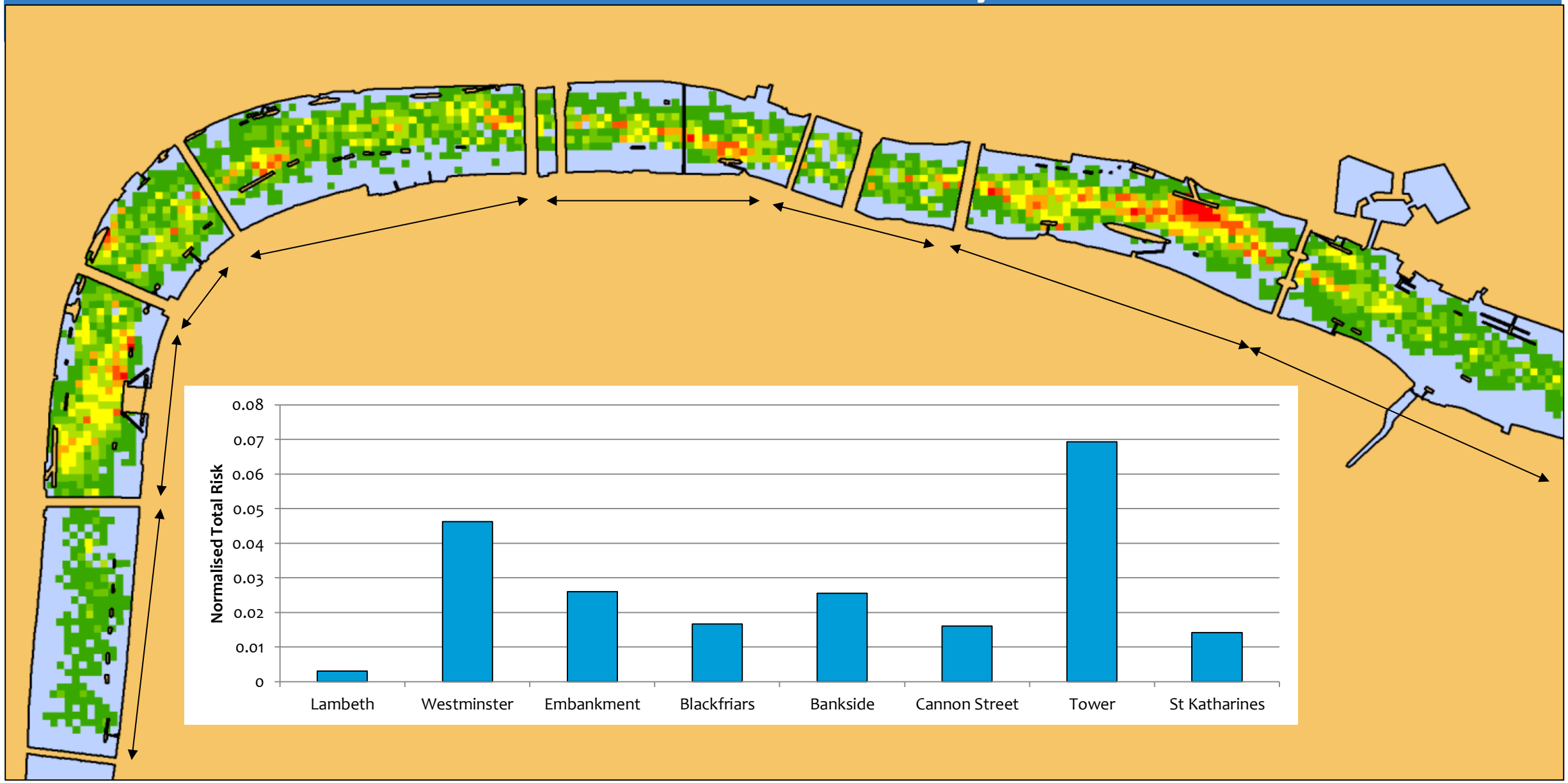
Level of Safety



Level of Service Vs Level of Safety

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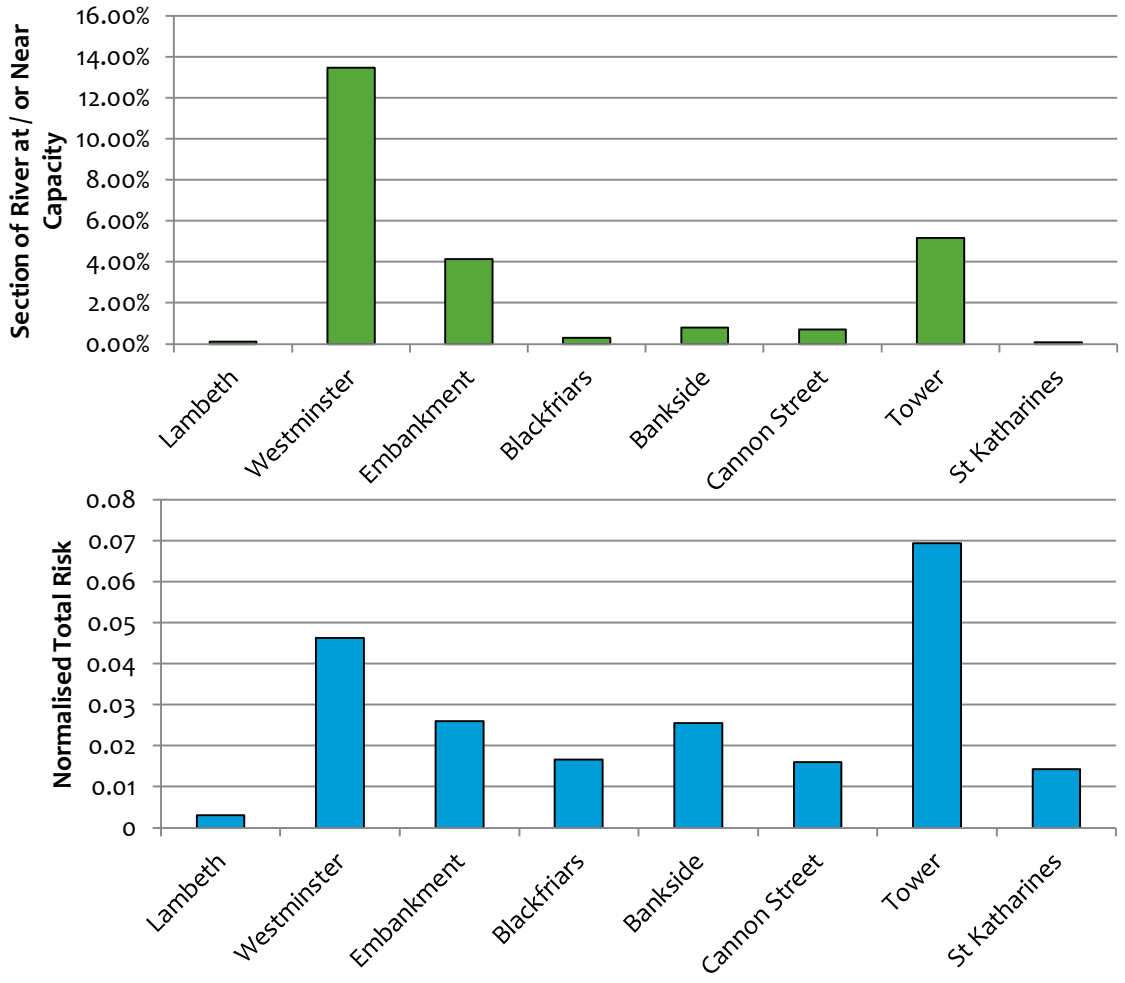
Level of Service and Level of Safety Summary



- **Level of Service**
  - Westminster, and Tower
- **Level of Safety**
  - Tower and Westminster

- Possible to focus geographically on why these areas – but system wide actions preferable as will apply to all areas.

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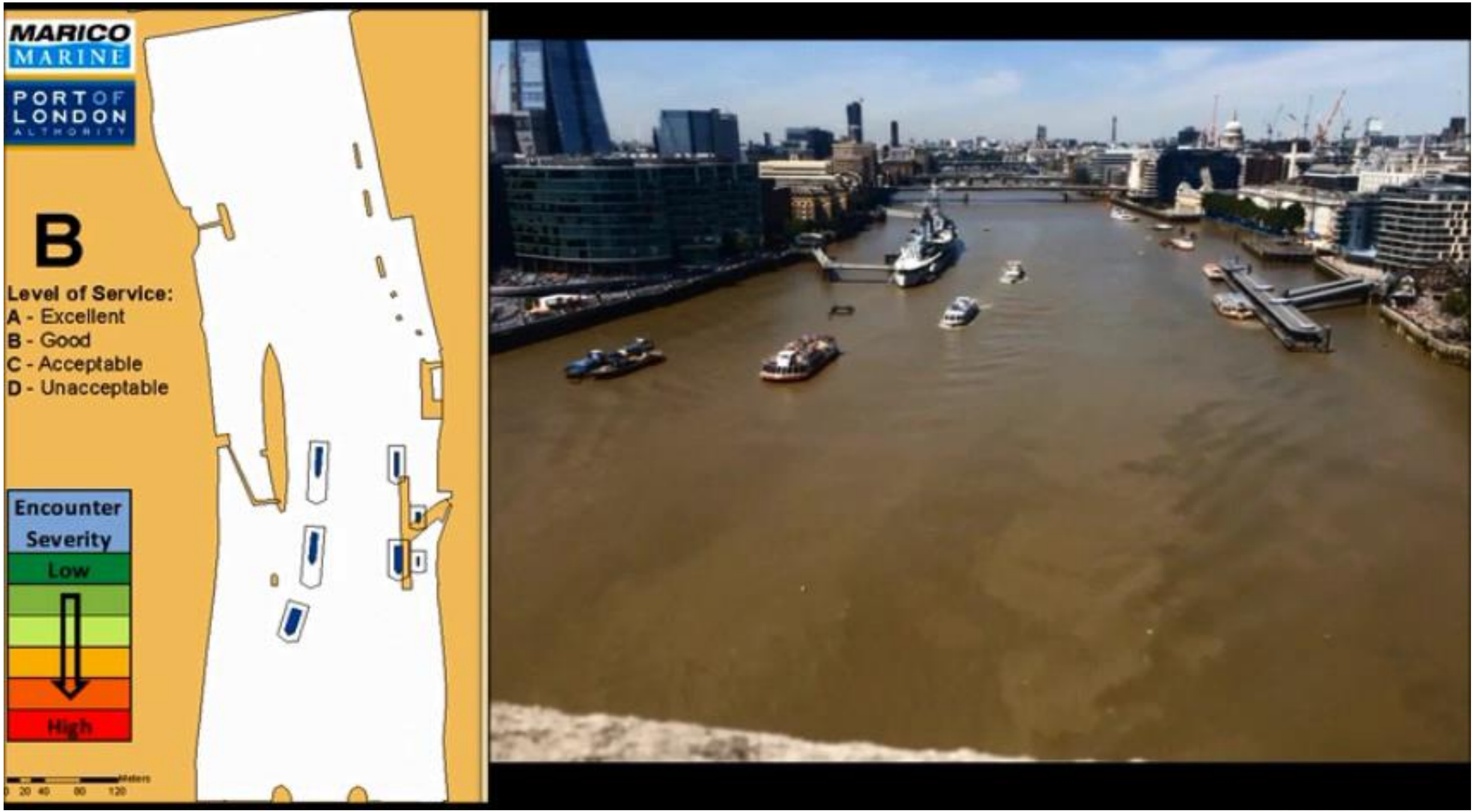
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B
Level of Service:
A - Excellent
B - Good
C - Acceptable
D - Unacceptable
Encounter Severity
Low
High
Meters
0 20 40 80 120

Limits to Capacity

* Possible impacts to capacity were also analysed to quantify their effects and develop contingency / alternative plans – impacts included:
  * **“Bunching”;**
  * Pier Queuing;
  * Bridge Arch Closure;
  * Cruise Ships at HMS Belfast;
  * General increases in Vessel Traffic.

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Controls to Improve Capacity

* Requirement to increase available capacity both from a navigation, pier and collision risk perspective;
* The following possible risk control measures were investigated:
  * Improving Vessel Design;
  * Scheduling of Freight;
  * Channel Geometry;
  * Reducing Speed Limits;
  * **Timetables;**
  * Pier Holding;
  * Anti Clockwise Navigation.

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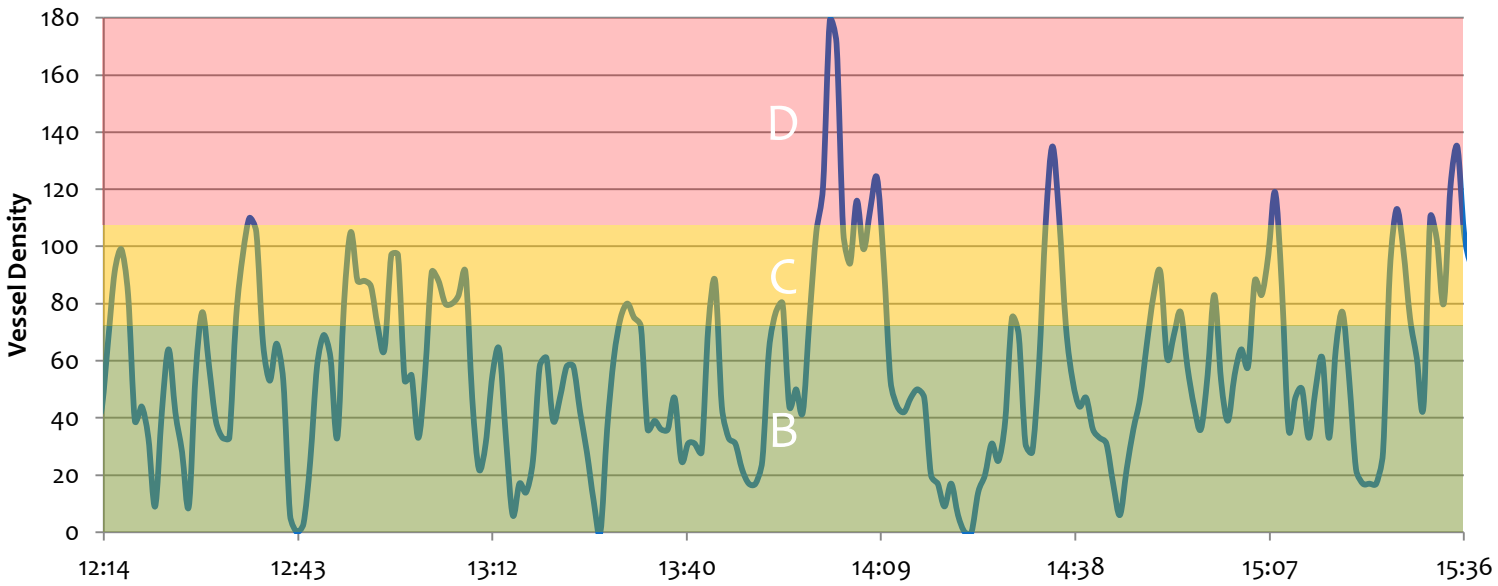
Reducing Bunching - Equally Spaced Traffic Density



Westminster – 23/08/2015 – Highest LOS Reached @ 14:02

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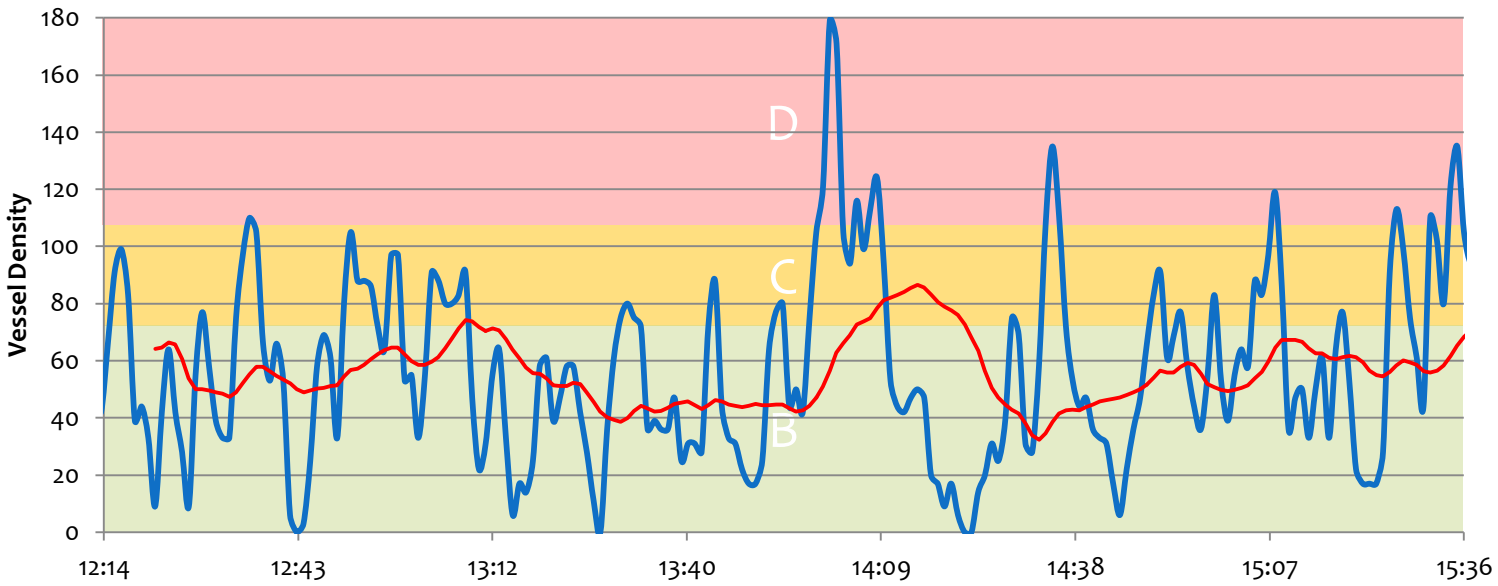
Equally Spaced Traffic Density



Westminster – 23/08/2015 – Highest LOS Reached @ 14:02

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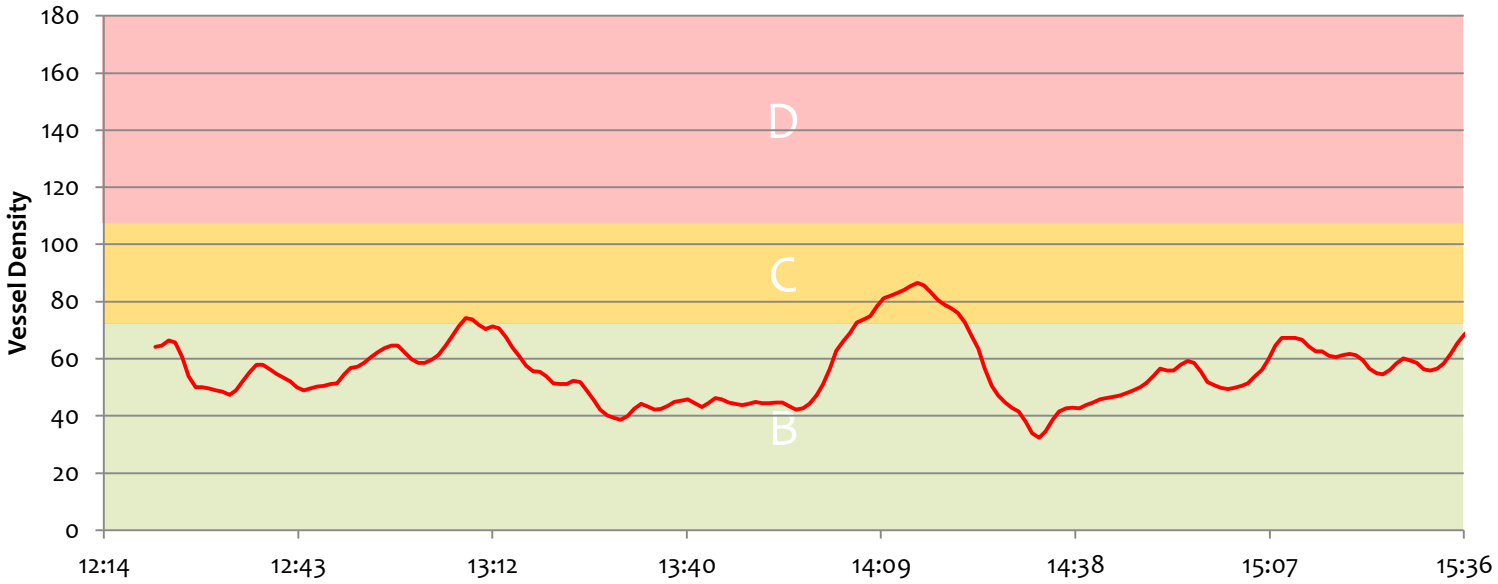
Equally Spaced Traffic Density



* Perfect timetable would allow number of scheduled services to be doubled without exceeding current capacity.

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Conclusions and Actions Taken

Summary

* Considerable demand for new services anticipated
* Capacity is reached and exceeded during peak hours in Summer (esp. Westminster, Embankment and Tower);
* Considerable scope to increase capacity in Central London to meet 12 million pax. target;
* Significance of “bunching” to both services and safety; and
* Active waterway management to reduce congestion and improve safety is required to enable input of additional services to the system.

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PLA Action Plan

1. Collaborative timetable development between PLA, Transport for London and operators – Measure and Enforce;
2. Supports the business case to increase pier capacity in key locations;
3. Improved passage plans / water space management to reduce congestion and improve safety
4. Better use of non-peak hours/seasons for freight movements, maintenance works and alternative services (evening cruises);
5. Developing plans to relocate key mid stream moorings to quieter areas;
6. Greater consideration of capacity when evaluating new development applications;
7. Future capacity reviews to monitor progress and validate anticipated gains.

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END

* Thank you

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