Using data and evidence to effectively plan:
A case study in toilets

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Women's toilets in stadia

How many women's toilet cubicles do you need to make sure nobody queues for more than 5 mins?

- 1 per 220 women
- 1 per 200 women
- 1 per 140 women
- 1 per 120 women
- We don't know

Data and evidence is important for planning

How quickly can crowds move through spaces and get out in an emergency?	**Flow rates** (ppmm)
What levels of crowding is safe when people are standing or walking?	**Densities** (ppm^2)
At what rate will people arrive at the ground and how close to kick-off?	**Arrival distributions** (and variance for event type)
How many entrance points, turnstiles, security search points are needed to accommodate this arrival rate?	**Processing rates** (people per minute, bags per minute, ticket per minute, etc)
What toilet provision will improve customer experience, and minimise extended queueing?	**Toilets per person** (per toilet type)

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These parameters can get set in stone as guidance

… and audiences are changing

We conducted two new studies to collect new data on crowd parameters

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We conducted two new studies to collect new data on crowd parameters

Flow rates

Arrival and departure profile and timings

Turnstile throughput and ticket handling

Number and type of bags

Bag search and security screening

Spectator behaviour *(dwelling, meeting, leaving the bowl)*

Use of F&B and merchandise

Use of toilet facilities

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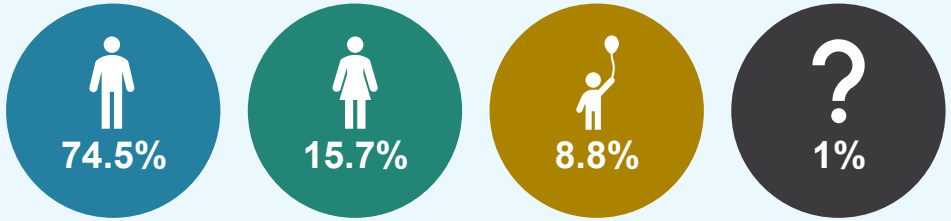
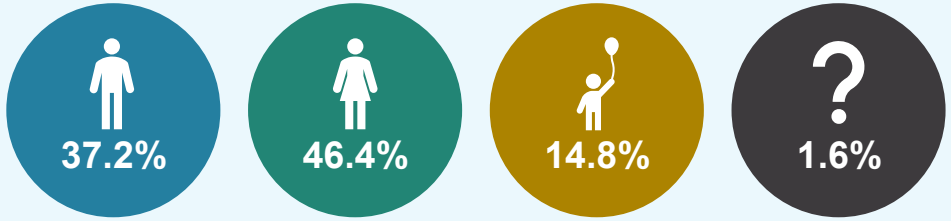
Events and demographics

Men's Premier League
16th March 2025

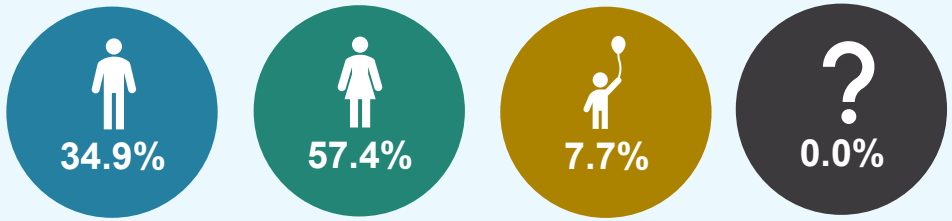


Women's Super League
22nd March 2025



Robbie Williams Concert
7th June 2025

Women's Super League
8th November 2025



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Total Usage (over a 5-hour period)

		Men's Premier League 16th March 2025	Women's Super League 22nd March 2025	Robbie Williams Concert 7th June 2025
	Men's Toilets	2,555	897	2,355
	Women's Toilets	780	1,867	2,520
	Accessible Toilets	30	52	176
Total		**3,365**	**2,816**	**5,051**

- Compared to the Premier League match, **demand for the women's toilets was 240% higher for the Women's Super League Match** and 320% higher for the concert.
- This doesn't count the women who used the men's toilets in this period (which would bring this up to 340%).

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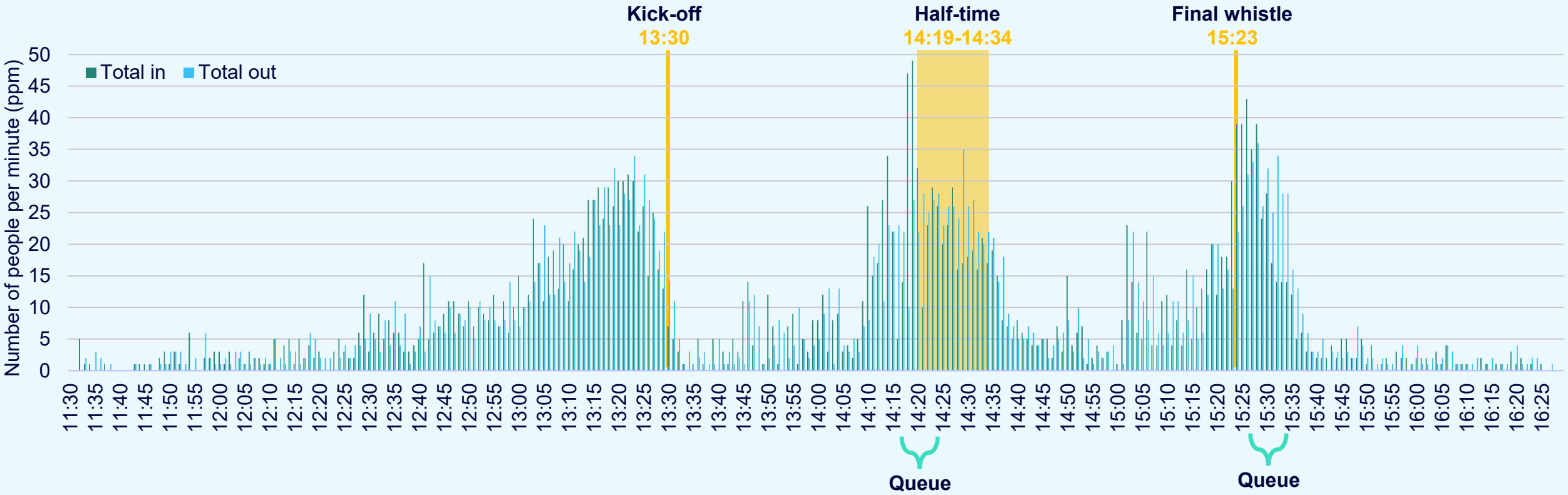
Men’s football match | Men’s toilets



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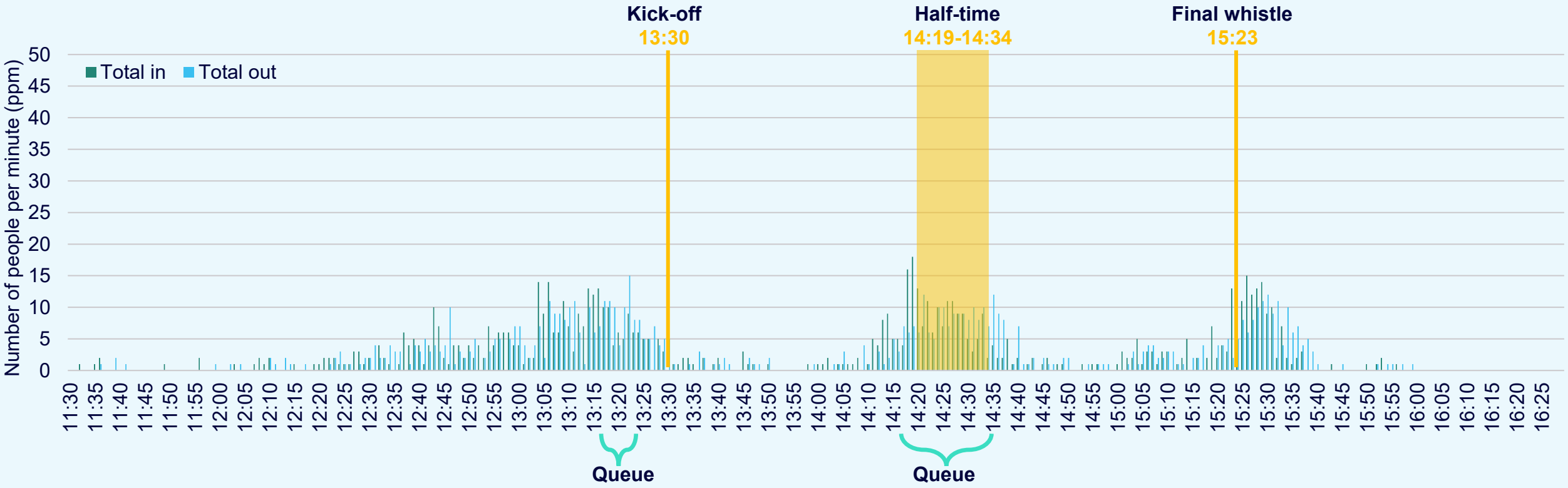
Men’s football match | Women’s toilets



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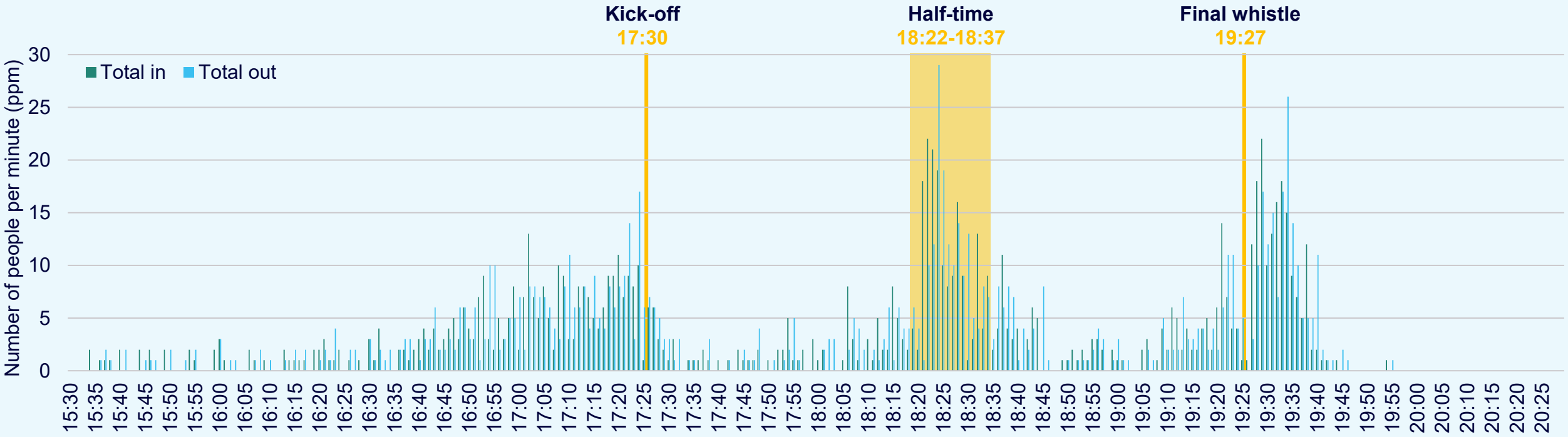
Women’s football match | Men’s toilets



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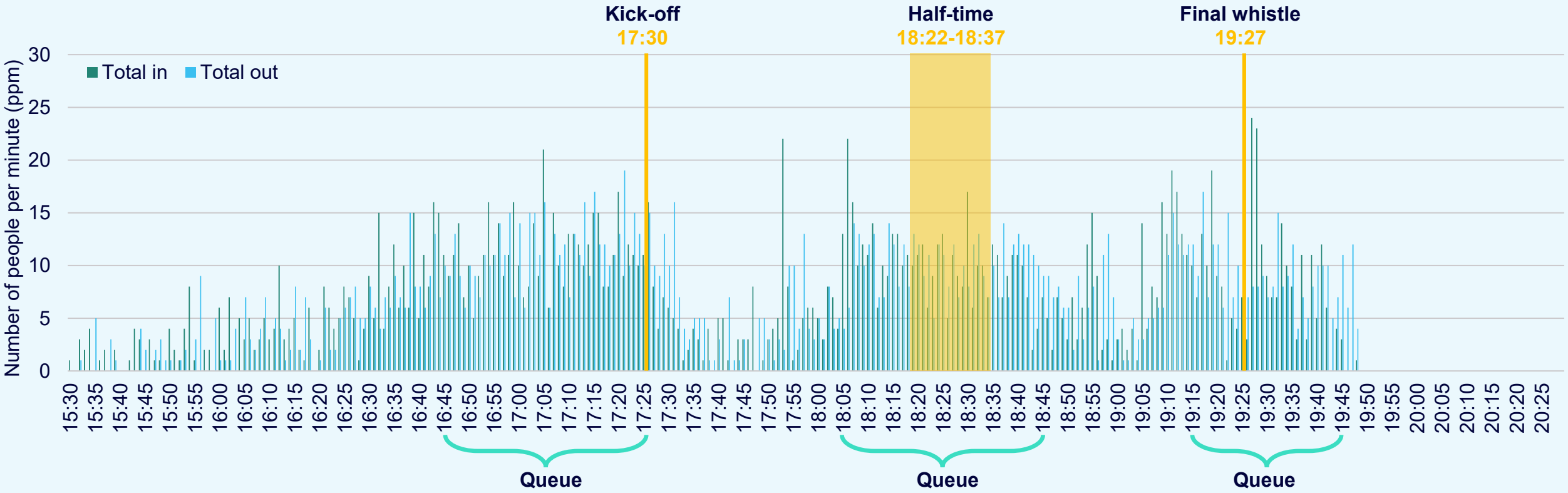
Women’s football match | Women’s toilets



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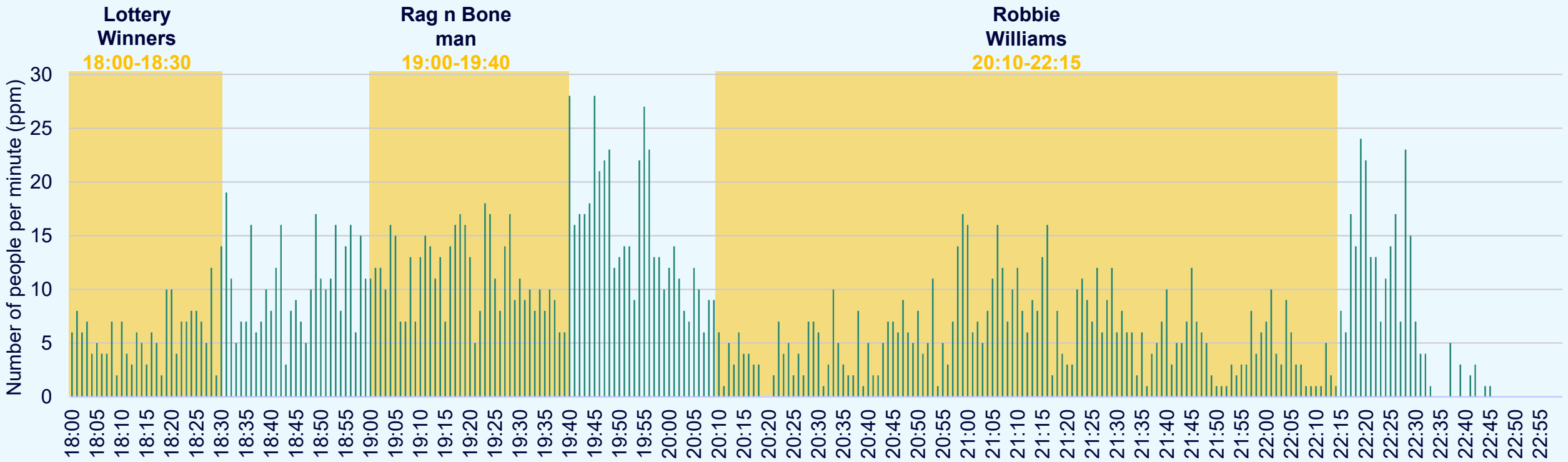
Concert | Men’s toilets



*There were no queues for the men’s toilets at any time. However, it was noted that women used the men’s toilets at times during the event, most notably between 18:00 and 19:30, where approximately 126 women used the men’s toilet until security personnel were positioned to prevent women entering the men’s toilets.

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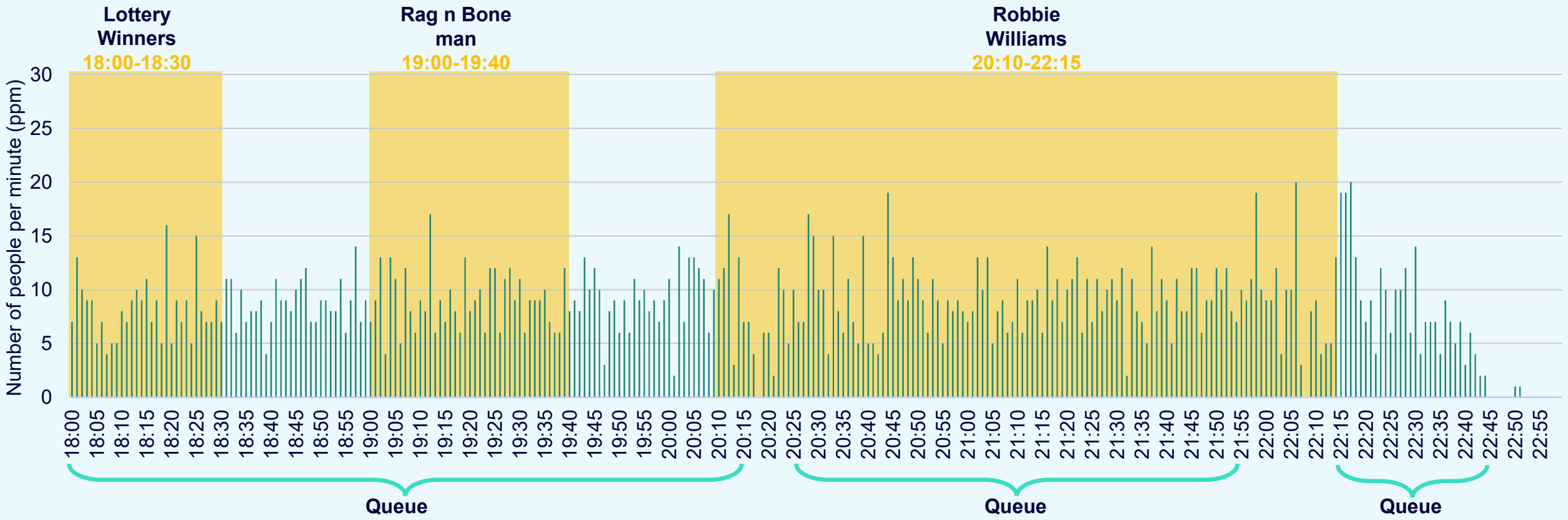
Concert | Women's toilets



*There was a queue for approximately 87% of the studied event time.

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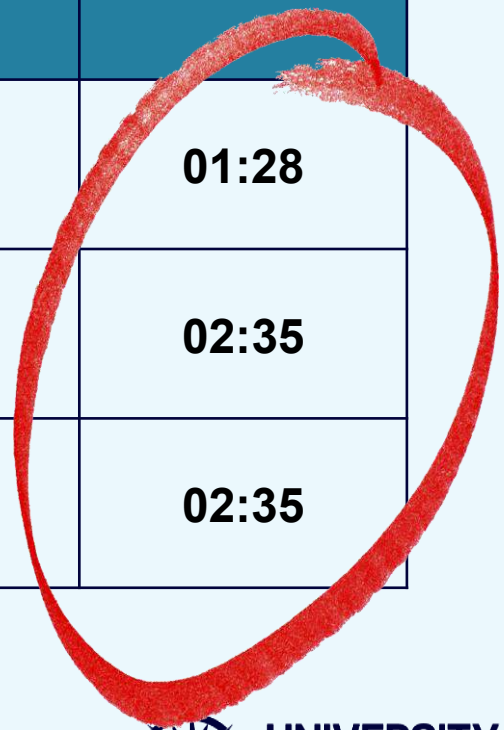
Toilet dwell time

	PL match 16th March 2025	**WSL match** 22nd March 2025	**Concert** 7th June 2025	**WSL match** 8th November 2025	**Average**
Men's Toilets	01:41	01:24	01:13	01:34	**01:28**
Women's Toilets	03:02	02:22	02:07	02:51	**02:35**
Accessible Toilet	02:51	02:52	01:43	02:54	**02:35**



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Key findings

Compared to the PL match, **demand for the women's toilets was 240-250% higher for the WSL Matches and 340% higher for the concert**.

For WSL matches and the concert, women's toilet usage was spread throughout the event duration, with **39-45% of trips to the women's toilet occurring during match play (or the concert)**.

Most **people used the same door to enter and exit the toilet**.

Users of the women's toilets spent an average of 2m 35s in the facility (between entry and leaving), more than a minute longer than users of the men's toilets (average of 1m 28s).

Across all events there was more queuing for the women's toilets compared to the men's toilets. For the concert event, which had the highest proportion of women, there was a queue at the toilets for approximately 87% of the studied event time.

Ok, so what number of cubicles will address these issues?

How the number of women's toilet cubicles is calculated

Proportion of men/women

~~90/10~~
or
80/20
or
45/45 (+10% gender neutral)

Number of WCs per a number of women

~~1 per 200, or 1 per 220~~
or
1 per 100 (first 400), then 1 per 250
or
1 per 120

Number of cubicles

Varies
(Note: the toilets we studied complied with the most generous guidance)

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Women’s toilet queues are too long

Women's toilets in stadia

How many women's toilet cubicles do you need to make sure nobody queues for more than 5 mins?

1 per 220 women

1 per 200 women

1 per 140 women

~~1 per 120 women~~

We don't know

(… but we know the above doesn't work)

#itscomplicated

Why is the answer complicated?

1

A single number of toilet cubicles doesn't account for the different numbers of men and women at different events.

People don't use the toilets evenly over the course of an event; there are peaks, and they change in different events.

People don't spend the same amount of time in the toilet as each other, there is a big range.

There is no current consensus on an acceptable wait time or queue length.

Try loads and loads of permutations

Half-time simulation: 14 cubicles

Using real data:

- For 35 mins around half time (10 mins before and after half time)
- 353 women
- Real arrival distribution
- Real dwell times

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Half-time simulation: 14 cubicles

	14 cubicles
Max queue length	111
Average queue length	64
Max wait time	18:01
Average wait time	09:32

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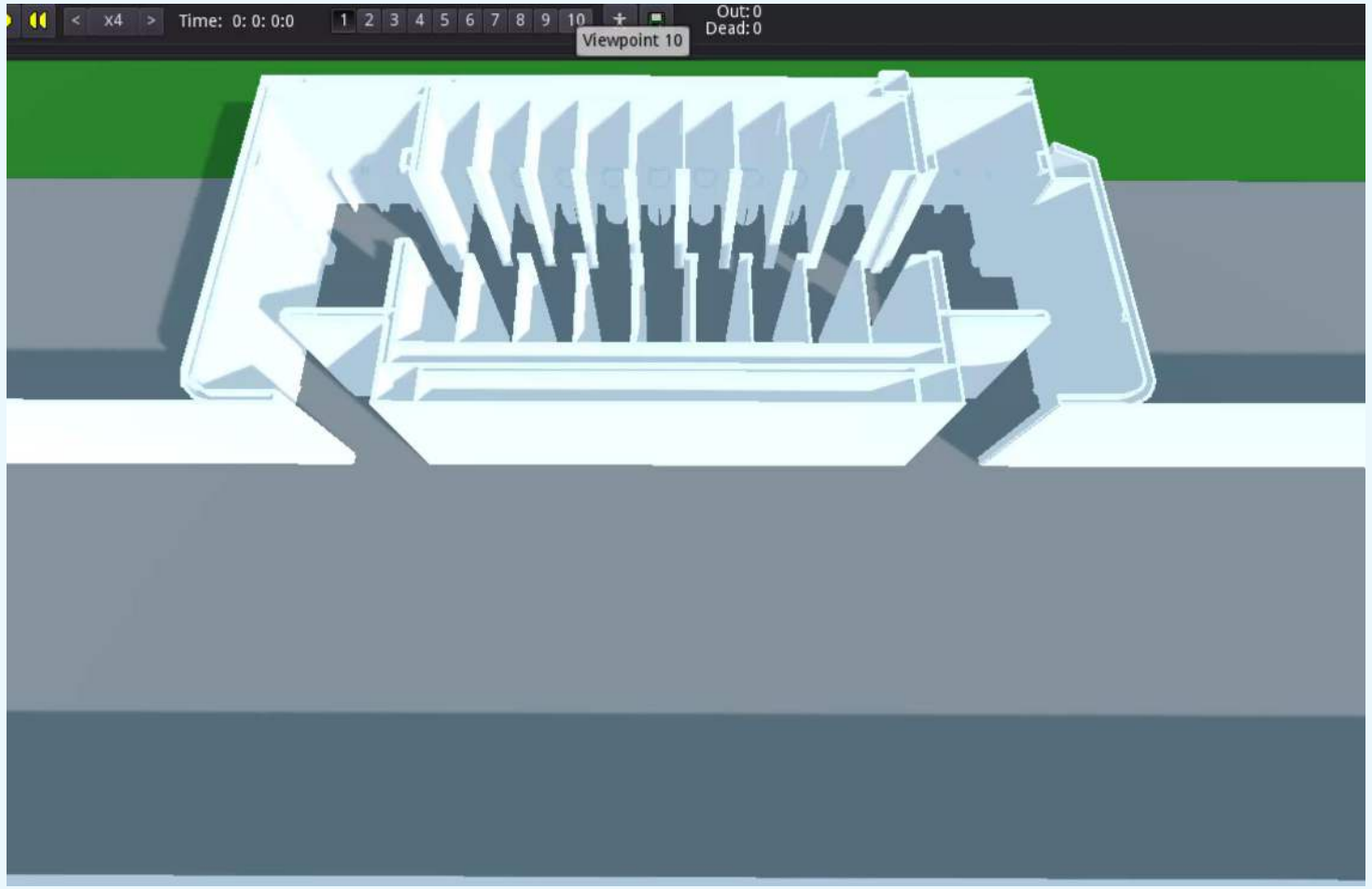
How about if we increased it from 14 to 18 cubicles?

- That’s almost a 30% increase in cubicles.
- How much do you think that improves queue sizes and wait times?

10% improvement	30% improvement	50% improvement

Half-time simulation: 18 cubicles



	14 cubicles	18 cubicles	% reduction
Max queue length	111	55	50%
Average queue length	64	36	44%
Max wait time	18:01	08:26	53%
Average wait time	09:32	04:30	53%

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Other factors that impact waiting times

- People not using the queue evenly
- Women being more likely to bring young children in with them
- Whether there are queues outside
- Weather (and type of clothing)
- Size and type of bags
- Type of sanitary facilities
- Toilet roll

What's next?

Data collection

Collect data at a range of fixtures (different venues, with different toilet provision):

- Dwell times
- Arrival rate at back
- basins).

Data analysis

From the additional fixtures and also gaining more dwell times from 2025 footage

identifying appropriate inputs when modelling behaviours.

Model development and validation

Once the model layout has been agreed, it is proposed that

Simulations

Following validation, we will run sufficient models wh

Data analysis and reporting

The vide

data this would be described.

Initial qualitative considerations from the research team will accompany the numerical outputs.

Workshop with stakeholders to

representatives, Architects) to agree the extent to which this can be fed into future publications.

We are planning on running a bunch of simulations based on new data to work out queue times for lots of different numbers of toilets.

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Using results for planning

Number of cubicles per 1000 women	Expected waiting time in queue (average/max)	Expected queue length (average/max)
5		
10		
15		
20		
etc		

We need you!

Thank you.

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