

**Rail and Electrification**

**MORGAN  
SINDALL**

# Fatigue Management

Judith Devlin



# Agenda

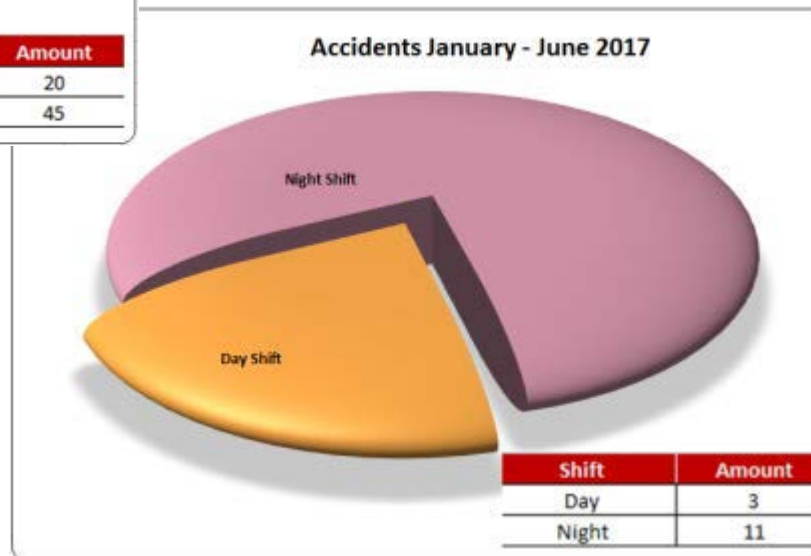
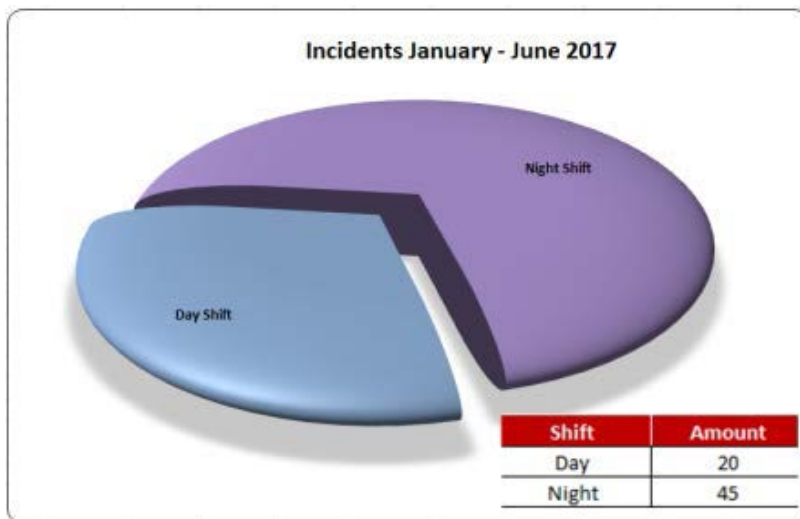
- Purpose
- Accidents/Incidents
- Solution
- Measuring & Results
- Strategy
- Questions

## Purpose

- Fatigue is seen by Morgan Sindall as one of the key risks to our business.
- This is highlighted by its inclusion as one of our top 5 risks
- Following a series of low level incidents on our EGIP project a correlation was noticed between these and teams that were working a pattern of 6 night shifts per week.
- Although none of the incidents had fatigue listed as a root cause the Morgan Sindall SHELТ highlighted that fatigue was likely to be a cause.

# Accidents/Incidents

## Review: Night vs Day



## Solution

### Monitoring

- In early 2017 we commenced a fatigue monitoring scheme with 100 people on the EGIP project, using a fatigue prevention company Fatigue Science.
- The initial pilot programme equipped our staff with Readibands and ran for 30 days to establish fatigue baselines and trends for use across the wider business.
- These Readibands use movement and algorithms to monitor and predict fatigue.
- We coupled this trial with a programme of education on fatigue and medical interventions where it was identified they were required.



# Measuring Comparison

## Readiband alertness score

- the effects of fatigue can be equated to those of alcohol (but they're not identical)
- a lower score is a result of cumulative poor sleep quality and quantity, or from being awake for a long period of time

Readiband score	100	90	80	70
Reaction time slowed by	0	10%	25%	43%
Like being awake for				21hr
Blood alcohol equivalence				0.08

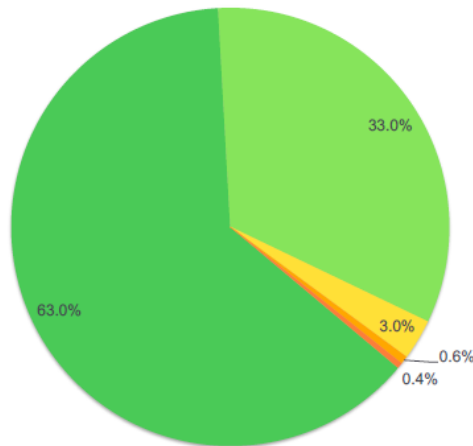
# Initial Results

## Day

- The results highlighted that groups working in an office or working on sites in the day were at very low risk of fatigue.\*

### % of Daytime Working Hours by Fatigue Level

3,890 working hours with hourly fatigue data between March 20 - and May 2, 2017



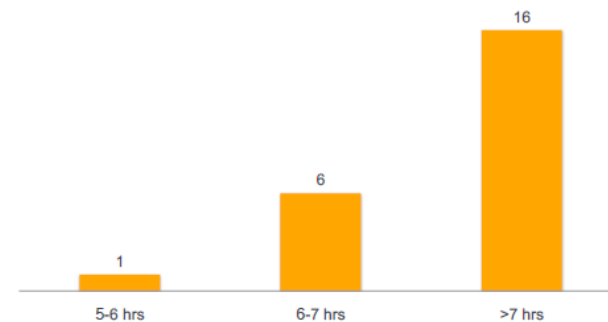
SAFTE Score	100	90	80	70	65	60	55	50	45
Fatigue Risk	Low	Elevated	High	Very High	Extreme				

0.08% BAC

Average Sleep Duration (hours) **7.1**

Average SAFTE Alertness Score (during waking hours) **90**

### Average Sleep Duration by Worker



\* George House – baseline data

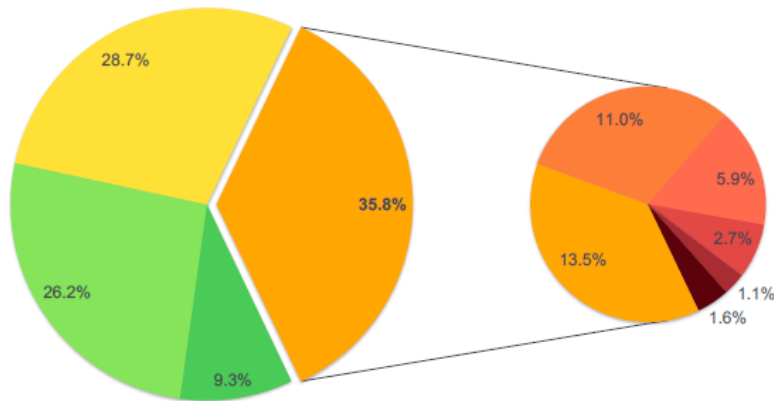
# Initial Results

## Night

- However, it clearly demonstrated that groups working at night were at a significant risk of fatigue\*, which correlated with our low level accident data.

### % of Nighttime Working Hours by Fatigue Level

2,162 working hours with hourly fatigue data between March 21 and May 3, 2017



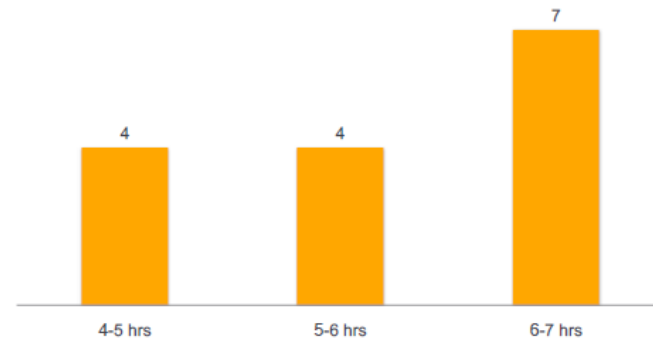
Overall workers are spending **35.8%** of on-duty hours fatigue-impaired.

	0.08% BAC									
SAFTE Score	100	90	80	70	65	60	55	50	45	
Fatigue Risk	Low		Elevated		High		Very High		Extreme	

Average Sleep Duration (hours) **5.8**

Average SAFTE Alertness Score (during waking hours) **80**

### Average Sleep Duration by Worker



\* Cadder Yard – mostly night shifts



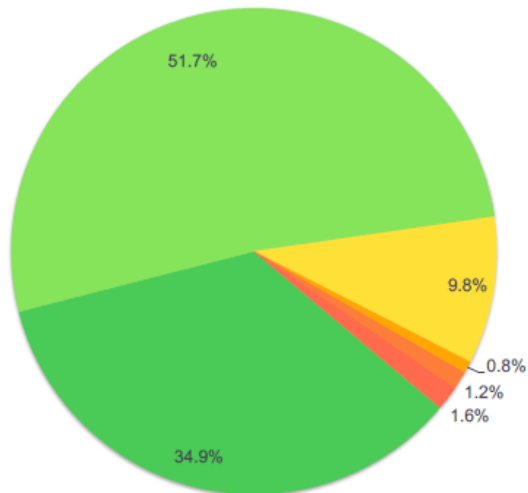
# Initial Results

## Day & Night

- To show balance, this site has a mix of both day and night shift workers:

### % of Daytime Working Hours by Fatigue Level

3,367 working hours with hourly fatigue data between March 20 and May 3, 2017



Overall workers are spending **4%** of on-duty hours fatigue-impaired.

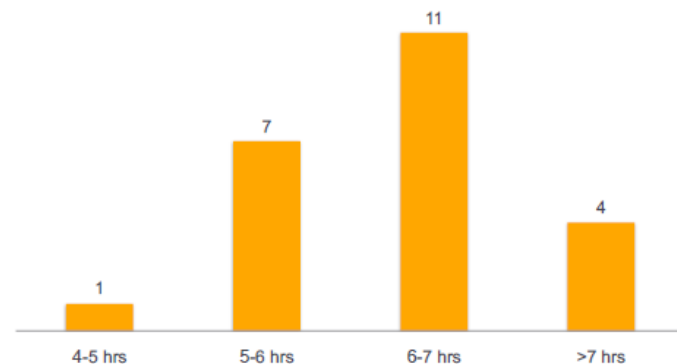
SAFTE Score	100	90	80	70	65	60	55	50	45
Fatigue Risk	Low		Elevated		High		Very High		Extreme

0.08% BAC

Average Sleep Duration **6.8**  
(hours)

Average SAFTE Alertness Score **85**  
(during waking hours)

### Average Sleep Duration by Worker



\* Millerhill – mix of day and night shift workers

# Fatigue Strategy

## 1.0 Fatigue Intervention Strategy

- **Eliminate** the most extreme occurrences of fatigue with daily predictive monitoring.
- Establish Cease Work Thresholds for day and night shifts based on risk tolerance and impact to operational continuity



- Develop a **Fatigue Intervention Plan** with intervention tactics tied to specific SAFTE Alertness Score thresholds
- Provide training and change management support to supervisors and workers, capture and evaluate feedback.

# Fatigue Strategy

## Example Intervention Points

60-51 (Very high fatigue)	Medium	Provide opportunity for on-shift nap	<ul style="list-style-type: none"> <li>PIC checks sleep obtained in last 24 hours</li> <li>PIC checks in with employee: 1. How did you sleep last night? 2. How alert are you feeling?</li> <li>PIC makes decision to provide provide nap opportunity and encourages intake of caffeine pre-nap</li> <li>PIC schedules supervision / monitoring for remainder of the employee's shift</li> </ul>
	High	Remove employee from duties	<ul style="list-style-type: none"> <li>PIC checks sleep obtained in last 24 hours</li> <li>PIC checks in with employee: 1. How did you sleep last night? 2. How alert are you feeling?</li> <li>PIC makes decision to remove employee from work site and send home safely</li> <li>PIC reports action (internally, if required)</li> </ul>
50 & Below (Extremely high fatigue)	High	Remove employee from duties	<ul style="list-style-type: none"> <li>PIC checks sleep obtained in last 24 hours</li> <li>PIC checks in with employee: 1. How did you sleep last night? 2. How alert are you feeling?</li> <li>PIC makes decision to remove employee from work site and send home safely</li> <li>PIC reports action (internally, if required)</li> </ul>

# Fatigue Strategy

## 2.0 Fatigue Reduction Strategy

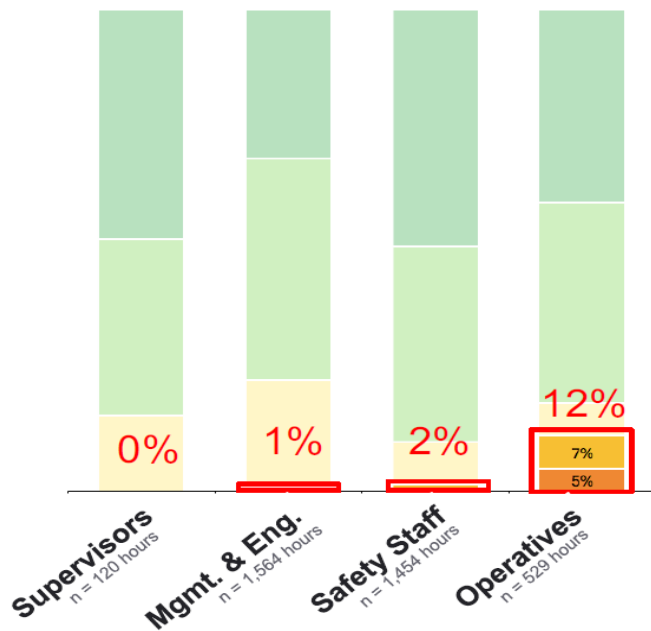
- **Improve** the fatigue risk profile by supporting workers in getting better sleep.
- Occupational Health Staff to use the Analyse dashboard to identify those who are chronically fatigued to be screened for medical sleep disorders
- Provide individualised guidance and fatigue management training for workers
- Enable the Readiband app so that workers can monitor their own sleep and fatigue status and improve sleep behaviours

# Full implementation

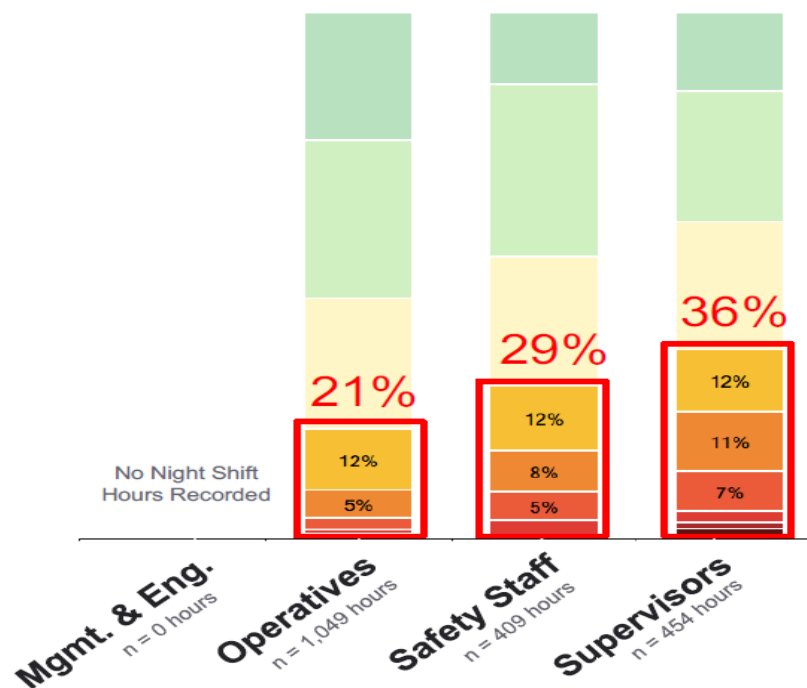
## Comparison of Fatigue risk by role



% of Day Shift Hours by Fatigue Level and Role



% of Night Shift Hours by Fatigue Level and Role



## Fatigue Strategy

What have we done?

- Updated our business and project level fatigue plans to include the use of the Readibands for all safety critical staff working nights.
- Developed an intervention strategy based on levels of fatigue being shown by the bands.
- Utilised the Readiband data to review shift patterns, travel times and to develop a programme of education and medical support.

# Fatigue Strategy

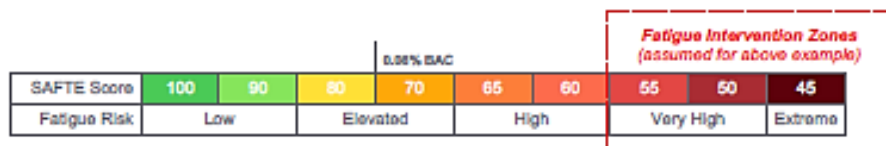
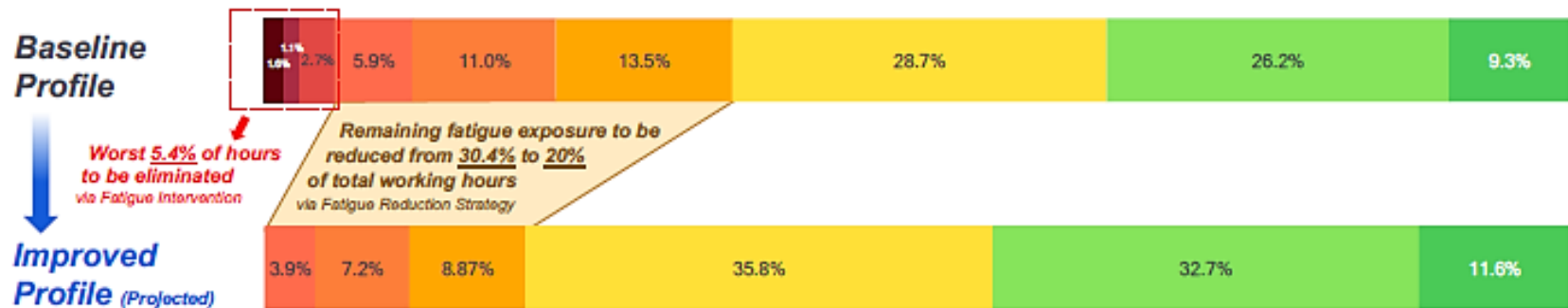
What have we done?

- Centralised all Permanent and agency resourcing to ensure travel times are monitored at the point of allocating resource to projects.
- Our high level strategy is to have no safety critical resource working in a fatigued state by the end of 2018, and to be able to demonstrate that this has been achieved by use of the Readibands.

# Fatigue Strategy

## Fatigue Risk Profile Improvement

**% of Nighttime Working Hours by Fatigue Level**



<b>KPI Summary</b>	<b>Baseline</b>	<b>Target</b>
% of working hours below <b>Fatigue Intervention Threshold</b> (SAFTE < 65)	5.4%	0%
% of working hours below <b>Fatigue Risk Threshold</b> (SAFTE < 70)	35.8%	20%

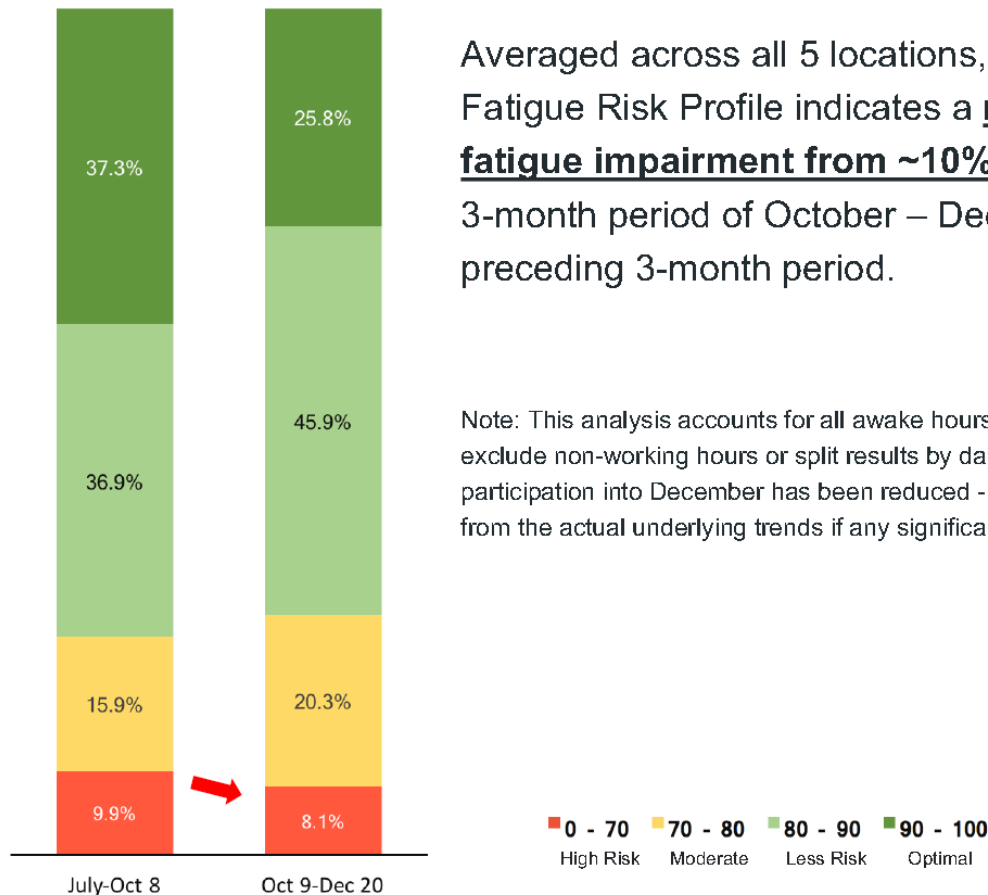


# Fatigue Strategy

What improvements have we seen to date?

## Simplified Fatigue Risk Profile: All-Site Average

% of All Awake Hours by Fatigue Level  
(SAFTE Alertness Score)



Averaged across all 5 locations, Morgan Sindall’s Simplified Fatigue Risk Profile indicates a **reduction in exposure to fatigue impairment from ~10% to ~8%** of waking hours in the 3-month period of October – December, as compared to the preceding 3-month period.

Note: This analysis accounts for all awake hours and does not use time & attendance data to exclude non-working hours or split results by day and night shift. Additionally, it’s been noted that participation into December has been reduced - As a result, these results may portray differences from the actual underlying trends if any significant variation exists on account of those factors.

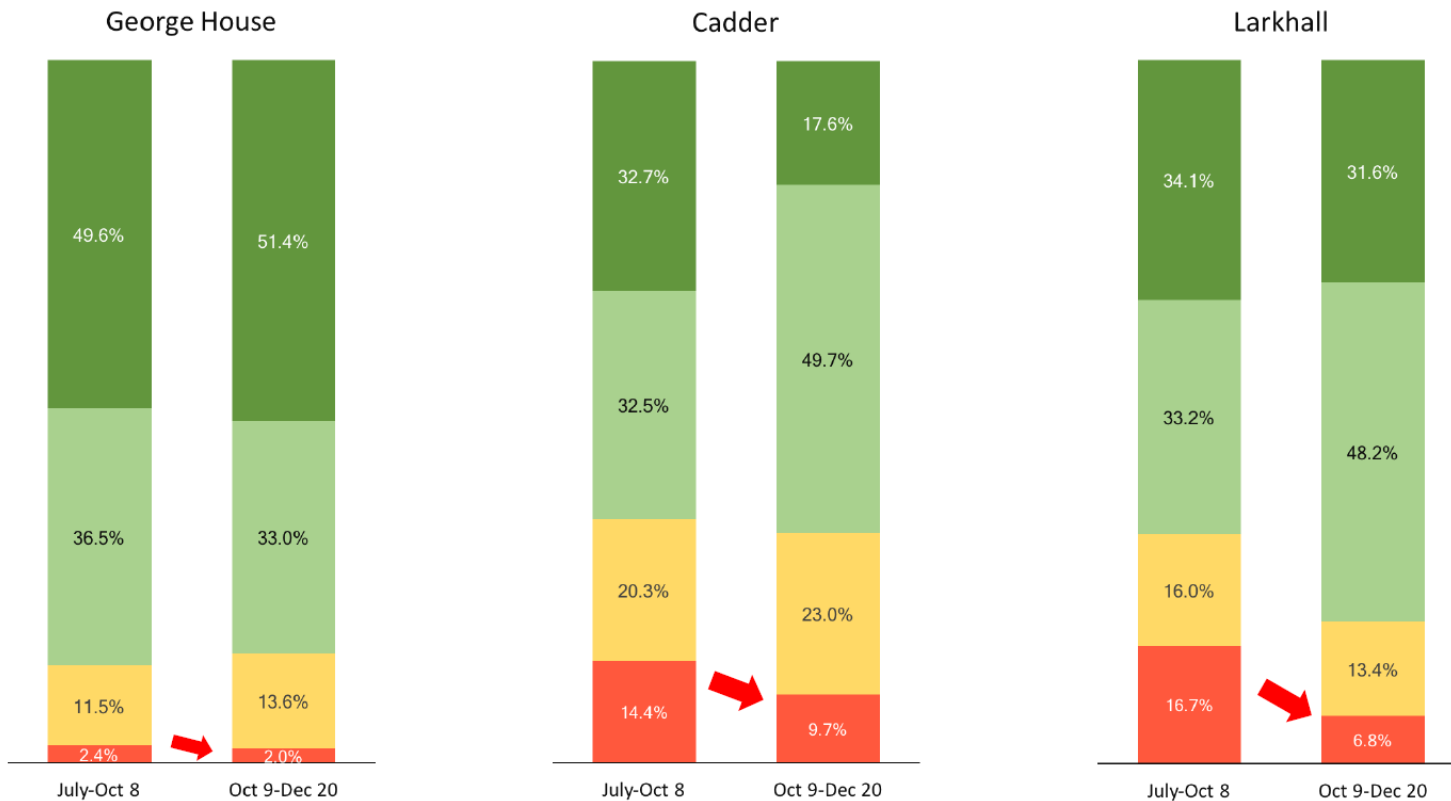
# Fatigue Strategy

What improvements have we seen to date?

## Simplified Fatigue Risk Profile: Sites with Improvement



% of All Awake Hours by Fatigue Level  
(SAFTE Alertness Score)



**Thank You**

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