

# Guidelines for developing and implementing a fatigue management policy in forestry



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## Purpose

The purpose of this guidance material is to assist Forestry industry participants to identify assess and manage the risks associated with Fatigue. This document provides a structured approach to the development of a Fatigue Risk management system including a fatigue policy, risk assessment tools and risk-based control options to manage fatigue. A series of case studies are used to illustrate how Fatigue Risk Management methods explained in this document may be applied in a Forestry context. The examples are generic in nature and not intended as a template for businesses to adopt.

This Guidance material should be read in conjunction with Safe Work Australia's guide for managing the risk of fatigue at work and fatigue management, which provides practical guidance for business and employers (and other (PCBUs) and other duty holders on how to manage fatigue to ensure it does not contribute to health and safety risks in the workplace.

This guidance material is not designed to replace requirements related to fatigue under other laws, for example heavy vehicle driver fatigue laws or rail safety requirements.

More information is available in the National Transport Commission's guidelines for managing heavy vehicle driver fatigue and the National Rail Safety Regulator's guidance on fatigue risk management program.

Guidance on heavy vehicle driver fatigue is available on the NHVR website.

## What is fatigue?

Fatigue is a state of tiredness or exhaustion that results in a degree of impairment. This impairment may be physical and/or mental and can result in an increased risk of workplace errors or accidents. All workplaces are affected by fatigue, but those employing shift work are more likely to have a high fatigue risk.

### Causes of fatigue

Fatigue can be caused by a number of factors, including inadequate sleep and circadian timing. Specifically, inadequate or poor-quality sleep can result in both cumulative and acute fatigue (i.e. having one bad night of sleep may result in acute fatigue the next day, but regularly having inadequate sleep may result in chronically heightened levels of fatigue). Human circadian rhythms are biological processes including the sleep/wake cycle. These rhythms operate on a 24-hour cycle, with 'low' periods occurring overnight (particularly between 2-5am). During these periods, the drive for sleep is typically highest, and fatigue is more likely. Additionally, there may be both work-related and personal causes of fatigue. For example, the following work-related factors may result in an increased fatigue risk (though this is not an exhaustive list);

- Night work
- Extended shifts
- Consecutive shifts
- Work with high cognitive or physical demands
- Work that is monotonous or repetitive
- Long commuting times
- Travel
- Shifts that begin early in the morning (i.e. prior to 0700h)
- Inadequate breaks between shifts
- Inadequate breaks during shifts

There are also a number of personal factors that may result in heightened fatigue risk. These may include;

- Non-work commitments (i.e., family responsibilities, sporting teams, secondary employment)
- Physical and/or mental health
- Sleep disorders
- Not prioritising sleep

## Symptoms of fatigue

Fatigue can be identified by a number of symptoms, both mental and physical. Mental signs of fatigue can include irritability, increased risk-taking, poor decision making, attentional problems and poor concentration, among others. Physically, fatigue can manifest in poor hand eye coordination, headaches, slowed reaction times, tired or sore eyes, microsleeps, and a number of other outcomes. These symptoms are linked with an increased risk of errors or accidents in the workplace. Fatigue results in performance impairment similarly to being under the influence of alcohol. Research has indicated that being awake for 17 hours results in performance at a similar level to having a blood alcohol level of .05%BAC (Dawson and Reid, 1997).

## How does a fatigue management policy work?

Fatigue management policies are developed to minimise the risk of fatigue related errors or accidents in the workplace. This is done in several ways, which will be explained in detail within this document.

Individual businesses` Fatigue Management Policy will consist of a set of rules that define 'standard hours' as the base level of the fatigue management framework. These rules will effectively define maximum shift times, minimum break times along with additional limits to

aggregate working hours, night hours and time between 'reset' breaks of 32h or more. These limits are also generally known as hours of work guidelines. Most shifts that are worked within an organisation typically adhere to these guidelines.

Developing standard hours of work guidelines (i.e. what are the maximum hours of work that are permitted under the Fatigue policy).

- 1) This process begins with an assessment of the business to determine the Fatigue risk that different roles within the business may be exposed to during normal (reasonably foreseeable) operations. A risk assessment is typically performed to establish a base line which consists of the following parts;
  - a. How likely is it that workers could experience fatigue? In the baseline assessment (level 1 risk assessment) the main factor impacting the likelihood of worker fatigue, is the roster or working hours:
    - i. Sleep opportunity provided by the roster is identified (either by a biomathematical modelling tool and/or feature analysis of the roster)
  - b. What are the consequences of a fatigue related error or accident? (i.e. driving a car while fatigued can result in serious injury, damage to property, or loss of life, whereas fatigue in an office environment would have less severe consequences).
  - c. Information about the likelihood of fatigue and the potential consequences of fatigue are combined to determine risk level (see Table 10).
  - d. Risk level can then be used to identify which control measures are necessary, and they combine to form the standard fatigue management rule set.
  - e. In order to cross validate the level one risk assessment, consultation with staff and workers should take place. Workers should be confident that the proposed roster would allow sufficient opportunity to gain adequate sleep to work safely. Typically, this is a minimum of 6 hours per 24hours. Where employees believe the proposed roster may not offer sufficient sleep opportunity this level 2 and 3 risk assessment.

Working time arrangements that sit within these constraints will require standardised controls with respect to;

- a 'shared-responsibility' policy framework,
- training and education,
- risk assessment and mitigation,
- audit/review.

Where an organisation wants to implement a working time arrangement that is non-compliant with their standard fatigue management rule set (e.g. if a proposed roster includes elements that are outside of the work hours guidelines hours) we have outlined a standardised process and set of tools that can be used. These processes and tools can be

used to estimate the increased level of risk associated with the shifts that do not comply with the businesses standard fatigue management rule set This level of risk can then be used to identify the additional controls required to ensure the risk remains as low as possible.

### Exceeding the standard hours rule set

- 1) The guidance outlined in the Standard hour's ruleset is generally only exceeded after a fatigue risk assessment is conducted and when appropriate control measures are used.
  - a. A risk assessment is typically performed. This process is quite similar to that outlined above but includes additional assessments of fatigue likelihood.
  - b. The Risk assessment consists of the following parts;
    - i. How likely is it that the individual is experiencing fatigue? The following factors are used to estimate the likelihood of fatigue.
    - ii. Sleep opportunity provided by the roster is identified (either by a biomathematical modelling tool and/or feature analysis of the roster)
    - iii. How much sleep the individual has actually had (i.e. prior sleep wake information).
    - iv. Are they experiencing the symptoms of fatigue?
    - v. What are the consequences of a fatigue related error or accident? (i.e. driving a car while fatigued can result in serious injury, damage to property, or loss of life, whereas fatigue in an office environment would have less severe consequences).
- 2) Information about the likelihood of fatigue and the potential consequences of fatigue are combined to determine risk level (see Table 103).
- 3) Risk level can then be used to identify which control measures are necessary.

A fatigue management policy generally sits within a Safety Management System context, based on the ISO45001, and within that, the ISO31000 risk management system. It is important that fatigue management policies under this framework utilise employee consultation. Refer to figure 1 below which summarises the policy development steps.

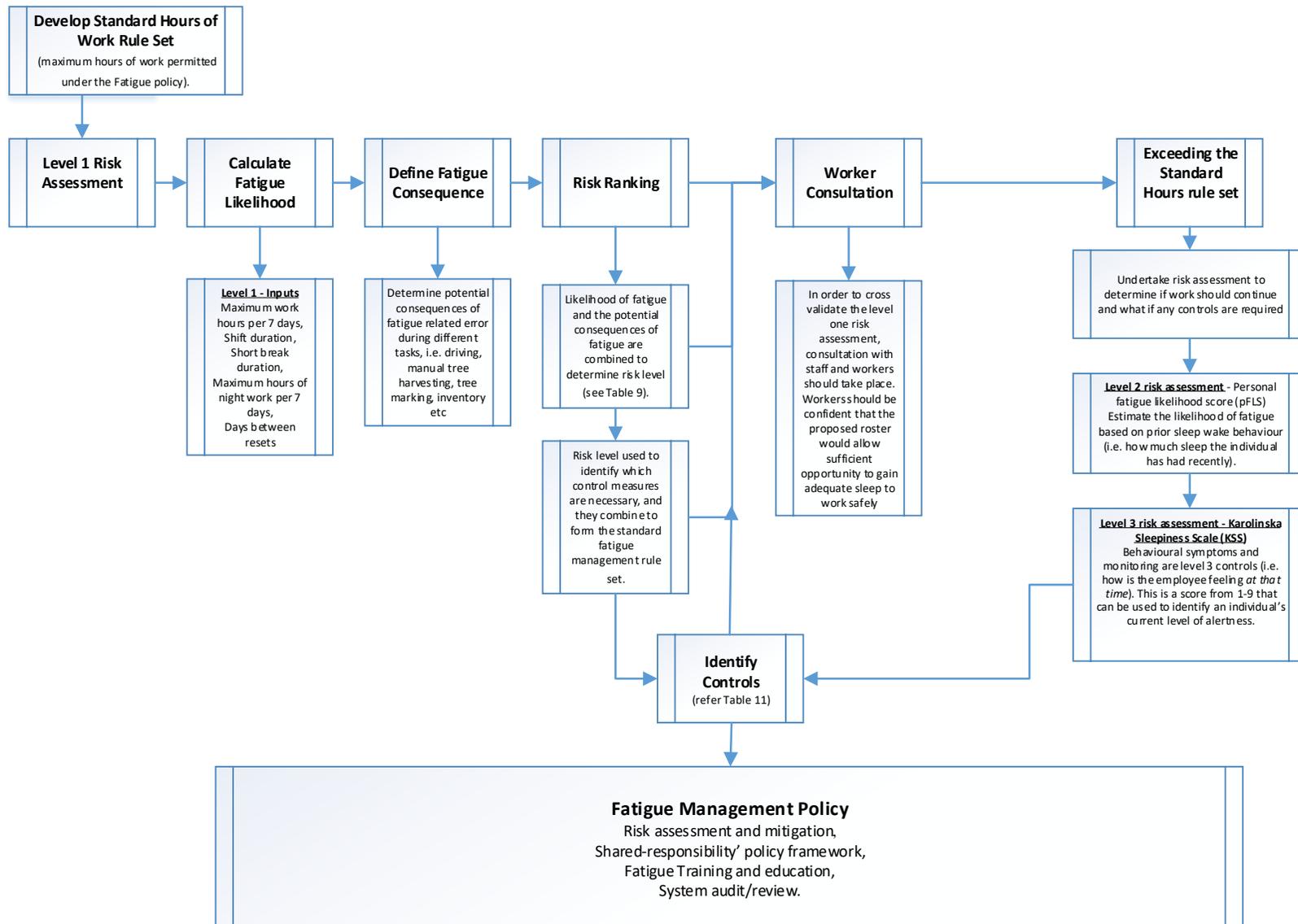


FIGURE 1 - STANDARD HOURS RULE SET FLOWCHART

## Assessing fatigue likelihood, consequence and risk

Where the proposed working time arrangement (WTA) does not comply with the standard hours model, it is necessary to quantify the additional risk and determine the additional controls required. For example, an assessment of fatigue likelihood, consequence, and risk may be undertaken if a proposed roster includes more consecutive shifts than are permitted under the guidelines, or if extended hours are required in an emergency situation.

Risk and relevant controls are determined by combining

- (a) A semi-quantitative assessment of *fatigue likelihood*, and;
- (b) Determining the potential consequences of a fatigue-related error or accident while undertaking the work task.

*Fatigue likelihood* is estimated using a combination of three factors, each operating at different proximate levels of the fatigue accident trajectory

- (Level 1) The sleep opportunity assessed using feature analysis of the roster and/or FAID (i.e. how much sleep it was possible for the individual to have?),
- (Level 2) Actual sleep reported using the personal fatigue likelihood scale [pFLS] (i.e. how much sleep did the individual actually have?), and;
- (Level 3) Current psychological state of fatigue using the Karolinska Sleepiness Scale (KSS) (i.e. how fatigued is the individual actually feeling?)

Each of these leading indicators can be used to produce a score. These scores are combined and converted to an ISO31000 fatigue likelihood estimate (Table 2). This score can then be used in the ISO31000 risk matrix to determine risk level (Table 3) (i.e. the fatigue likelihood score is combined with a measure of the severity of consequences should a fatigue related error or accident occur to produce the relevant level of risk). The control measures that are required based on this level of risk are then identified (Table 4). The full procedure for this kind of fatigue risk assessment is presented below.

For example, ...

*An employee has already worked a 12h day shift, commencing at 0700h, but an emergency arises so she is required to stay at work for an additional 4h. It is assessed that the risk of ceasing work is greater than that of continuing to work. As a 16h shift exceeds the hours of work guidelines, it is necessary to perform a risk assessment. An assessment determines that the employee had been on leave for the week prior to this shift, and as such has had adequate time for prior sleep. The employee states that she had eight hours of sleep both last night and the preceding night but is experiencing some signs of fatigue (slightly slowed reaction times, yawning). Based on the scale that is used, she has identified herself as having 'some signs of sleepiness'. This information is put into a fatigue calculator app, which*

identifies the employee as having a fatigue likelihood score of 3. As her job involves driving, which has been identified as having potentially catastrophic consequences, her fatigue likelihood score puts her in the high-risk category. As such, the control measures that are used for high risk conditions are employed. In her workgroup, these controls include longer breaks, additional supervision and the provision of a taxi voucher for the commute home. Additionally, she requires 1-up manager sign off to continue working.

## Estimating fatigue likelihood

### Level 1 risk assessment – roster assessment

The purpose of a level 1 risk assessment is to estimate the likelihood of fatigue based on sleep opportunity (roster). Each of the 5 roster features/dimensions (column 1) on the table below is assigned a score (0-8) according to what the specific roster requires.

For example, where weekly hours exceed 55h/7days the likelihood score for this dimension will be 8. The score for each of the 5 dimensions is summed to give a score in the range 0-40. Not surprisingly, the higher the score, the lower the sleep opportunity and the higher the likelihood of fatigue.

Table 1. Roster dimensions

Roster Dimension	Score				
	0	1	2	4	8
Maximum work hours per 7 days	≤36h	36-43h	44-47h	48-54h	55h+
Shift duration	≤8h	8-10h	10-12h	12-14h	≥14h
Short break duration	≥16h	16-13h	12-10h	10-8h	≤8h
Maximum hours of night work per 7 days	0h	1-8h	8-16h	16-24h	≥24h
Days between resets	<6	6	7-10	11-12	12+

For shift work, the likelihood score typically ranges between 5-30.

Table 2. Dimensions of an example roster

Roster Dimension	Score				
	0	1	2	4	8
Maximum work hours per 7 days	≤36h	36-43h	44-47h	48-54h	55h+
Shift duration	≤8h	8-10h	10-12h	12-14h	≥14h
Short break duration	≥16h	16-13h	12-10h	10-8h	≤8h
Maximum hours of night work per 7 days	0h	1-8h	8-16h	16-24h	≥24h
Days between resets	<6	6	7-10	11-12	12+

The example above would result in a total score of **8**.

There can be a similar process for using the FAID software to determine the likelihood of fatigue, but it is beyond the scope of this document.

#### Level 2 risk assessment - personal fatigue likelihood score (pFLS)

The purpose of a level 2 risk assessment is to estimate the likelihood of fatigue based on prior sleep wake behaviour (i.e. how much sleep the individual has had recently). This can be done by the employee or supervisor either as a mental arithmetic problem or using one of the many 'apps' available to do the calculation automatically.

The personal fatigue likelihood score is based on quantifying prior sleep and wake and where the amount of sleep prior to working is below 5 in the prior 24h or 12 in the prior 48 h or wake exceeds sleep in the 48 prior to commencing work. The score is calculated according to the following rule

(X score) For every hour of sleep less than 5h in 24 add 4 points

(Y score) For every hour of sleep less than 12h in 48 add 2 points

(Z score) For every hour of wake greater than the hours of sleep in the last 48h add 1 point

The pFLS score typically ranges between 0 (low) -15 (extreme). The score after the end of the first night of night shift is typically 12.

### Level 3 risk assessment - Karolinska Sleepiness Scale (KSS)

Behavioural symptoms and monitoring are level 3 controls (i.e. how is the employee feeling *at that time*). This is a score from 1-9 that can be used to identify an individual's current level of alertness.

1. Extremely alert
2. Very alert
3. Alert
4. Rather alert
5. Neither alert nor sleepy
6. Some signs of sleepiness
7. Sleepy, but no effort to keep awake
8. Sleepy, some effort to keep awake
9. Very sleepy, great effort to keep awake, fighting sleep

### Converting level 1, 2 and 3 scores to ISO31000 fatigue likelihood

The following table uses the scores from the previous three levels (roster assessment, pFLS & KSS) to calculate a likelihood score (column 1). One score is selected in each column based on the findings from each level.

In general, where there is a conflict, primacy is assigned to L3 over L2 over L1 due to the proximity of the measure to an error. That is, a reduced sleep opportunity has lower predictive utility (with respect to an error) than reduced sleep which in turn has a lower predictive utility than subjective state. Practically, this means that if, for example, L1 and L2 analyses indicated an ISO31000 score of 2, but the L3 score indicated an ISO31000 score of 3, 3 would be used.

Table 3: Mapping fatigue likelihood score on to ISO31000

<b>Likelihood (ISO31000)</b>	<b>Level 1 (Roster assessment)</b>	<b>Level 1 (FAID_95%)</b>	<b>Level 2 (pFLS)</b>	<b>Level 3 (KSS)</b>
1	0-5	<40	0	1-2
2	6-11	40-60	1-4	3-4
3	12-20	60-79	4-8	5-6
4	21-25	80-100	9-12	7-8
5	25+	100+	12+	9

## Frequent reports of high level of fatigue likelihood.

Where an employee self-reports a level of fatigue that is controllable, the supervisor should thank the employee verbally for identifying the hazard and then work collaboratively with the employee to quantify the risk, identify and implement the appropriate controls and (re)commence work.

Where the employee self-reports a level of fatigue that requires them to cease work, supervisors should respond using a 'just culture' framework. Initially (first to third report in 90-day period), there is no need to determine the cause for why the employee is fatigued in order to manage the risks. In this case, the supervisor should simply thank the employee for identifying the hazard, enquire as to whether it is likely to re-occur in the near future and ensure the employee can return home safely.

If it is likely to re-occur again in the near future the supervisor should refer the employee to a suitably qualified individual other than the direct supervisor to undertake a root cause analysis (RCA). Based on the RCA appropriate measures should be taken to assist the employee. An absence should be treated as a 'sick leave' event. If the employee considers it unlikely to re-occur, then there is no need to undertake a root cause analysis (RCA).

Where an employee self-reports fatigue at a level that requires them to cease work more than three times in a 90-day period, the organisation should undertake a RCA using a suitably qualified person(s) other than the direct supervisor. Based on the outcomes of the RCA, appropriate measures should be taken to assist the employee to reduce the likelihood of reoccurrence. If excessive events (>3/90d) continue to occur, the employer should manage repeated fatigue events in the same way as repeated un-certificated absenteeism.

## Risk assessment

ISO31000 fatigue likelihood scores are then used in conjunction with consequence ratings to identify the level of risk of a particular shift or roster. These ratings are typically assessed by workplace consultation and refer to how severe the potential consequences of a fatigue related error or accident would be. For example, driving is generally classified as a very high-risk activity, whereas office-based tasks are often categorised as low risk. This report includes an initial set of analyses based on typical work tasks that are common in the industry, seen in the Fatigue Consequence Rating tables below. It is important to note that these are generic analyses – specific sites may need to address their specific circumstances, and consequences may be altered.

## Industry generic fatigue consequence ratings

Table 4. Generic Forestry tasks

Role	Sub classification	Role activities	Fatigue consequence rating (1-5)
Office worker	Admin	Office based administration	1
Silviculture worker	Manual tasks	Tree marking	3
LV driver	Crew	Driving to and from operational sites	5
HV driver	Service /Fuel Truck/Float/Bulk water carrier	Drive HV to and from operational sites	5
Supervisor/Manager	Management	Driving LV around/to and from site, inspections, planning	5
Maintenance Worker	Mechanic	Machine & vehicle Servicing, maintenance & repairs-workshop	3
		Machine & vehicle Servicing, maintenance & repairs-Forest, driving	5

Table 5. Silviculture

Role	Sub classification	Role activities	Fatigue consequence rating (1-5)
Silviculture worker	Plant operator	Tele-handler, tractor, skidder etc	3
Silviculture worker	Manual tasks	Pruning, manual comp control etc	4
Silviculture worker	Manual tasks	Nursery work	2
Silviculture worker	Manual tasks	Tree marking	3
Fire fighter	Tactical fire fighting	Pump operation, fire suppression, hose lay etc	3
Fire fighter	HV/Plant operating	Fire appliance (non-public roads), dozer	3
Excavator/Plant operator	Plant operator	Site prep, flat to gradual slope.	3
Excavator/Plant operator	Plant operator	Site prep, raking steep slope.	4
Excavator/Plant operator	Servicing/maintaining	Equipment servicing out of machine	3

Table 6. Log Harvesting

Role	Sub classification	Role activities	Fatigue consequence rating (1-5)
Harvester operator	Plant operator	Mechanically fall and process trees flat to gradual slope. (single 12)	3
Harvester operator	Plant operator	Mechanically fall and process trees steep slope.	5
Harvester operator	Servicing/maintaining	Equipment servicing out of machine	4
Forwarder operator	Plant operator	Extract logs from flat to gradual slope and stack on break	3
Forwarder operator	Plant operator	Extract logs from steep slope and stack on break.	4
Forwarder/Excavator /Plant operator	Plant operator	Continual loading of trucks.	3

Table 7. Log Harvesting

Role	Sub classification	Role activities	Fatigue consequence rating (1-5)
Manual tree faller	Manual tasks	Tree falling with chainsaw flat to gradual slope.	4
Manual tree faller	Manual tasks	Tree falling with chainsaw steep slope.	5
Log & forest quality checks	Manual tasks	Walking in forest log quality checks and forest damage reports.	2

Table 8. Log Chipping/Processing

Role	Sub classification	Role activities	Fatigue consequence rating (1-5)
Machine Operator	Machine Operator	Chipper, Excavator, Skidder, Loader, Forwarder, Feller Buncher etc	3
Machine Operator	Manual Tasks	inspections, maintenance etc	3

Based on the ISO31000 score from Table 4 and an additional assessment of the consequence of a fatigue-related error while working, we can estimate the level of risk. Risk is determined to be either low, moderate, high or extreme based on the likelihood of fatigue and the severity of the potential consequences.

Table 9: Risk likelihood

Likelihood of fatigue (ISO31000)	Severity of consequence				
	1	2	3	4	5
1	Low	Low	Mod	Mod	Mod
2	Low	Mod	Mod	Mod	High
3	Mod	Mod	Mod	High	High
4	Mod	Mod	High	High	Extreme
5	Mod	High	High	Extreme	Extreme

### Control measures

The extent of control measures required are determined using Tables 10 and 11. These control measures are outlined in generic terms in Table 11. In general, these controls would be operationalised for individual work groups as necessary. Table 11 indicates typical controls proposed for Forestry.

Table 10: Generic control measures

Risk level	Control Measures
Low	Do nothing unless indicated by a higher-level control
Mod	Minor increase in likelihood of fatigue. Notify co-workers and supervisors. Self-management controls usually sufficient. Typical controls include; self-monitoring, caffeine, task rotation, self-paced workload, self-managed breaks
High	Moderate increase in likelihood of fatigue. Notify co-workers and supervisors. Team and process management controls usually sufficient. Increased supervision, task re-assignment, where appropriate re-proceduralisation of tasks to reduce likelihood/consequence of error
Extreme	Significant increase in likelihood of fatigue. Notify co-workers and supervisors. Document a SMS incident report. Do not continue in a safety critical task without 1-up approval and documentation based on pre-existing risk assessment. Controls unlikely to be sufficient. Typically permitted only used where risk of continuing to work is less than risk associated with stopping (i.e. exceptional circumstances).

Table 11. Indicative risk controls for Low, Moderate, High and Extreme risk categories for each of the four elements of the FRMS.

		Low	Moderate	High	Extreme
<b>Policy Governance</b>		Basic policy framework	Explicit shared responsibility framework Employee sign off on training	To continue working- 1-up sign off Employee sign-off as FFW	To continue working- 2-up sign off to work Employee sign off as FFW
<b>Training &amp; Education</b>		Induction training about non-work causes of fatigue and reporting when not FFW Competency based training	TLIF PFMS training without assessment Basic awareness of PSW rules around FFW Competency based training Nationally accredited supervisor training	TLIF-PFMS with assessment PSW rules competence KSS competence Competency based training Nationally accredited supervisor training	Fatigue-proofing training Authority gradient challenge training for employee/Supervisor Competency based training Nationally accredited supervisor training
<b>Risk Mitigation</b>	<b>L1</b>	Ensure compliance with rules-of-rostering	Active discussions on non-work factors that might impact on level of sleep opportunity	Active discussion of secondary employment Active discussions of commute times	Seek expert opinion(s) as to whether rosters are scientifically defensible
	<b>L2</b>	Exceptional PSW reporting	Peer support Active interrogation of additional hours Supervisor trained in use of fatigue calculator	Supervisory support Active interrogation at start and during shift Employee trained in use of L2 policy	Detailed and documented discussion of all individual FFW before continuing to work
	<b>L3</b>	Exceptional KSS reporting	Peer decision support Active interrogation before additional hours	Supervisor decision support Active interrogation at start and during shifts	2-up decision support Frequent monitoring during work period
<b>Monitor/ Review</b>		Documented- L1 formal Annually, actual hours of work formally checked quarterly L2 informal L3 informal	Review to be performed by a competent person (internal) Documented L1 formal quarterly L2 formal L3 informal	Review to be performed by a competent person (external independent review) Documented L1 quarterly L2 formal L3 formal	Review to be performed by a competent person (external independent review) Documented- Pre-incident modelling Post-incident review Corrective action review

## Journey management planning

Driving is undertaken frequently by Forestry employees, both in the context of commuting and during work hours. This activity is typically identified as having a consequence rating of 5 (the highest possible score). Journey management planning is often used by workplaces as a control measure for both commuting and travel during work hours. A journey management plan is typically used where the journey is greater than 45 minutes, or 100km, and where the likelihood of fatigue is moderate, high, or extreme. Journey management plans should be developed in advance of the journey and should be approved by an appropriately qualified specialist and manager. If ad hoc journey management plans are required, they should be approved by a line manager prior to commencing travel. When driving time is less than 45 minutes, a journey management plan is not typically required. However, safe driving behaviours should be included in fatigue training.

At the moderate risk level, driving time should be limited to 90 minutes. At the high-risk level, 45 minutes should be the upper limit. Driving should not be permitted under extreme risk conditions, unless the risk associated with driving is less than the risk of driving while fatigued (i.e., an emergency). Caffeine should also be used strategically.

In a situation with multiple drivers, an assessment of the fatigue levels of each potential driver should be undertaken and used to determine individual roles. For example, in a situation with three drivers, the individual with the lowest fatigue should drive. The individual with the second lowest level of fatigue should ride in the front passenger seat to assess the driver for signs of fatigue. As part of fatigue training and education, drivers should be taught to be aware of the signs and symptoms of fatigue.

In a single driver scenario, these same limits on driving time typically apply, with the additional requirement for breaks to be documented. This may take the form of receipts from roadhouses/petrol stations, or photographic evidence. Breaks should be at least 15 minutes in duration.

Table 12. Driver controls

	<b>Risk level</b>	<b>Length of drive</b>	<b>Controls</b>
<i>Get on with it</i>	Low	≤ 90 minutes	Typically, no additional controls, unless there are level 2 or level 3 indicators of fatigue from non-work causes
<i>Look after yourself</i>	Moderate	≤ 90 minutes	Limit driving time, strategic use of caffeine, self-management
<i>Look after each other</i>	High	≤ 45 minutes	Breaks during drive, documentation of breaks, team management, supervisor approval
<i>Look out</i>	Extreme		Only to be undertaken in emergency situations

Appendix 5 is an example journey management plan, taken from Pilbara Ports Authority. This document would be modified for use in other workplaces.

## Application – Putting it all together

The following case study is an example of possible hours of work guidelines (Table 13). This table provides limits that are typically adhered to under normal operations. This rule set is based on a hypothetical forest management company undertaking work through internal workers and contractors. These rules may be exceeded under exceptional circumstances (less than 5% of shifts), if appropriate control measures are implemented, and if the risk of not continuing work is greater than the risk of continuing.

Table 13. Example hours of work guidelines

Job role	Hours of work	High consequence tasks	ISO31000 likelihood score	Consequence rating	Risk level
<b>Company internal staff</b>					
Office staff/ management	9 hour shift * 5 days	* Refer fire below	1	1 (no driving)	Low
Foresters/supervisors	9 hour shift * 5 days	*includes driving	1	5 (driving)	Moderate
Fire (emergency first shift)	Normal 9 hour day shift, plus possible 12 hour night shift (same day) commencing from 8pm	*includes driving	5	5 (driving)	Extreme
<b>Contractors</b>					
Silviculture workers	9 hour shift * 5 days	*includes driving	1	5 (driving)	Moderate
Harvesting operators	13 hour shifts*5 days	*includes driving	3	5 (driving)	High
Maintenance workers field based	13 hour shifts*5 days	*includes driving, and maintenance	3	5 (driving)	High

## Case Study

Business 1 is a forestry management company with a mixture of job roles and hours, that are performed by in house workers and by contractors. Shifts and tasks for each workgroup are identified. The workgroups identified are; office staff/management, foresters/supervisors, fire (emergency first shift), silviculture workers, harvesting operators, and field-based maintenance workers. For each of these roles, a fatigue consequence assessment is performed. Consequence ratings are determined based on the severity of an accident or error occurring while performing these tasks. In order to identify the potential level of fatigue experienced by each of these workgroups, a fatigue likelihood assessment is performed. This assessment produces an ISO31000 score for each workgroup, higher scores being indicative of a higher fatigue risk. ISO31000 fatigue likelihood scores are combined with fatigue consequence ratings, to determine the risk level. Within this business, the following risk levels are identified:

<b>Role</b>	<b>Risk level</b>
Office staff/Management	Low
Foresters/Supervisors	Moderate
Fire (emergency first shift)	Extreme
Silviculture workers	Moderate
Harvesting operators	High
Field based maintenance workers	High

For office staff and managers, who have been identified as low risk, basic controls are generally required. Under the policy and governance level, a basic policy framework is required. Training and education requirements for low risk groups includes induction training about non-work causes of fatigue, and reporting when not fit for work. Competency based training would typically be employed. For risk assessment and mitigation, rosters would generally need to comply with hours of work guidelines and have exceptional prior sleep wake and sleepiness reporting. Compliance is to be documented formally quarterly for level 1 measures, with informal audits performed quarterly on level 2 and 3 measures.

For workgroups with a moderate risk profile (foresters/supervisors and silviculture workers), the same controls are required as for low risk workgroups. Additional policy and governance controls may include an explicit shared responsibility framework, and employee sign off on training. Additional training may also include competency units endorsed by the Australian government, though these are typically not assessed. Risk mitigation strategies may also include active discussions of non-work factors that may affect fatigue, peer support, supervisor use of fatigue calculator tools, and active interrogation of fatigue levels prior to additional hours being worked. Further, formal level 2 reviews may be required at this risk level, compared with information reviews required at level 1.

For the high-risk workgroups (harvesting operators and field-based maintenance workers), the controls required at the moderate level are also typically utilised. Additionally, under high risk conditions, “1-up” approval is generally required for work, and employees would be required to sign off as being fit for work prior to commencing a shift. Additional training is also typically required at the high-risk level, with assessed TLIF-PFMS training and nationally accredited supervisor training. Risk mitigation controls may also include active discussions of secondary employment and commute times (level 1), supervisory support and active interrogation of fatigue likelihood prior to and during shifts (level 2), and supervisor support for decision making (level 3). Formal documentation of audit and compliance is typically required at each level.

Emergency fire shifts are categorised as being extreme risk. In this category, all of the requirements for low, moderate, and high-risk levels must typically be met. Additionally, to continue working, employees must generally have “2-up” approval. Training that addresses fatigue-proofing and the authority gradient is typically required. Risk assessments of workgroups that are engaged with extreme risk typically would require an expert opinion as to whether the roster is scientifically defensible. Prior to working under extreme risk conditions, workers would typically be required to have a detailed and documented discussion of fitness for work, in addition to 2-up decision making support and frequent monitoring during the work period. Under extreme risk conditions, pre-incident modelling is typically required, as is post-incident review and corrective action review.

Additionally, for all workgroups under low, moderate, high, and extreme, additional control measures may be developed. These may include work-based controls such as task rotation, additional breaks, self-assessments, journey management planning, napping, and a variety of other strategies. Journey management plans may be required if driving times exceed 45 minutes for at the high-risk level, or 90 minutes at the moderate risk level. Driving should not be undertaken at the extreme risk level, unless the risk of not driving is greater than the risk of driving while fatigued.

Contracted staff may be required to adhere to fatigue risk management policies that have been developed externally to this organisation. If this is the case, this organisation would typically audit the relevant policy to ensure that fatigue risk is also being effectively managed in contractors.

For detailed information about this and two other case studies, please see Appendix 6.

## Glossary of controls

To use the indicative risk controls table, identify the appropriate level of risk. Low, moderate and high are generally appropriate for most day-to-day operations in most organisations. Extreme risk is generally applied to emergency or extraordinary situations. It is important to note that each of these levels is cumulative – the controls build on one another. For example, if the risk category was determined to be high, the control measures from low, medium and high must all be applied.

### **1. Policy and Governance**

#### **a. Low**

Basic policy framework

A basic policy framework is typically developed to address fatigue in the workplace. This generally includes overarching information regarding roles and responsibilities, roster specifications, fitness for duty, risk assessments, training, review and record keeping/documentation. This may also include specific information about fatigue identification, self-assessments, supervisor assessments, fatigue controls and other management needs.

#### **b. Moderate**

Explicit shared responsibility framework

Employee sign off on training

The shared responsibility framework generally includes specific identification and education around the roles and responsibilities of the employee and of the employer. Employee responsibilities typically include presenting to work fit for duty and taking all reasonable steps to mitigate their own fatigue risk (i.e. controlling non-work factors that may impact fatigue, using self-assessment tools as required, reporting fatigue to management, attending required training, etc.). Employer responsibilities generally include providing a workplace that manages all safety risks and hazards appropriately, developing appropriate workplace fatigue policies and guidelines, providing appropriate training to employees, monitoring and reviewing fatigue management procedures, duty of care requirements, complying with legislation and relevant guidelines).

Employees may also be required to sign off on relevant training – they may attend specified fatigue management training sessions (either online or in person) which specifically include both practical fatigue management strategies and information regarding their roles and responsibilities, in addition to the use of any relevant tools (e.g. self-assessment forms, etc.). This is done to ensure employees have the relevant knowledge to utilise the fatigue management systems that are in place.

**c. High**

To continue working-  
1-up sign off  
Employee sign-off as FFW

In order for an employee to continue working under high risk conditions, they typically are required to obtain approval from their manager (i.e. their “1-up”). If the employee obtains this approval, they then generally will also sign off as being fit for work. This may include completing a fatigue assessment tool. This is required as individuals typically find it difficult to accurately gauge their own level of impairment and engaging a supervisor for sign off will ensure the task is performed safely.

**d. Extreme**

To continue working-  
2-up sign off to work  
Employee sign off as FFW

Under extreme risk conditions, employees are usually required to obtain sign off from a “2-up” manager/supervisor. This refers to an individual who is two supervisory levels above themselves (i.e. their manager’s manager). If the employee obtains this approval, they will generally also sign off as being fit for work. This may include completing a fatigue assessment tool. This is required as individuals typically find it difficult to accurately gauge their own level of impairment and engaging a supervisor for sign off will ensure the task is performed safely. Additionally, having the “2-up” supervisor sign off is typically required as this individual will have a broader sense of the organisational requirements and can ensure safety more generally.

**2. Training and Education**

**a. Low**

Induction training about non-work causes of fatigue and reporting when not FFW  
Competency based training

Under low risk conditions, the training and education that would typically be provided to employees in relation to fatigue can be general in nature, giving information about personal fatigue management. Specifically, this may include information about non-work causes of fatigue (i.e. sleep disorders, poor sleeping conditions, medications that may interfere with sleep, prioritising sleep, etc.). Additionally, information may be provided about appropriate reporting channels and processes for individuals who are experiencing fatigue at work. This training is typically competency based and, as such, requires employees to display their understanding of the relevant content. This training is provided to ensure that all employees have the relevant education to make informed decisions about their own fatigue and workplace safety.

**b. Moderate**

- TLIF PFMS training without assessment
- Basic awareness of PSW rules around FFW
- Competency based training
- Nationally accredited supervisor training

TLIF PFMS training includes specific units of competency endorsed by the Australian government. These fatigue management units are usually completed by employees who operate under moderate risk conditions, though they do not need to be formally assessed. Employees are also generally given training regarding the prior sleep wake model of fatigue, and how this relates to their fitness for work. This training is typically competency based and, as such, requires employees to display their understanding of the relevant content. This training is provided to ensure that all employees have the relevant education to make informed decisions about their own fatigue and workplace safety. Additionally, supervisors typically participate in nationally accredited supervisor training when this level of risk is identified. Supervisors complete this training to have a comprehensive understanding of how to best manage the fatigue of their employees, and to help develop a mature workplace fatigue reporting culture.

**c. High**

- TLIF-PFMS with assessment
- PSW rules competence
- KSS competence
- Competency based training
- Nationally accredited supervisor training

TLIF PFMS training includes specific units of competency endorsed by the Australian government. These fatigue management units are typically completed by employees who operate under high risk conditions and are formally assessed. Employees are also generally trained to be competent in use of the prior sleep wake model, and in use of the Karolinska Sleepiness Scale (a measure of alertness/sleepiness). This training is typically competency based and, as such, requires employees to display their understanding of the relevant content. This training is provided to ensure that all employees have the relevant education to make informed decisions about their own fatigue and workplace safety. Additionally, supervisors typically participate in nationally accredited supervisor training when this level of risk is identified. Supervisors complete this training to have a comprehensive understanding of how to best manage the fatigue of their employees, and to help develop a mature workplace fatigue reporting culture.

**d. Extreme**

- Fatigue-proofing training
- Authority gradient challenge training for employee/supervisor
- Competency based training
- Nationally accredited supervisor training

Under extreme risk conditions, fatigue-proofing training is usually provided to all employees. This includes adaptive and protective risk reduction strategies (i.e. changing work strategies when fatigued, using additional control measures, double checking, etc.). These strategies are often already informally used in workplaces to ensure that fatigue does not lead to an incident or accident, but formal training can be helpful in solidifying their use and reducing risk. Training regarding authority gradients is usually provided for both employees and supervisors in the extreme risk context. This includes information on the fatigue reporting process, barriers to reporting, and strategies for encouraging a mature fatigue and safety culture in the workplace. This kind of training is generally employed to ensure that employees are comfortable reporting fatigue to their relevant managers or supervisors, as a lack of reporting can be an additional risk factor. Training is typically competency based and, as such, requires employees and supervisors to display their understanding of the relevant content. Additionally, supervisors typically participate in nationally accredited supervisor training when this level of risk is identified. Supervisors complete this training to have a comprehensive understanding of how to best manage the fatigue of their employees, and to help develop a mature workplace fatigue reporting culture.

### **3. Risk Mitigation**

#### **Level 1**

##### **a. Low**

Ensure compliance with rules-of-rostering

Ensuring compliance with hours of work and rostering rules is generally used in the low risk context. This may include factors such as shift length, breaks between shifts, breaks within shifts, night shift regulations, on-call regulations, etc. do not exceed the relevant limits set by the organisation. This is to ensure employees are not unduly fatigued by their work hours, in order to further minimise risk.

##### **b. Moderate**

Active discussions on non-work factors that might impact on level of sleep opportunity

Non-work factors are typically actively discussed and considered when accounting for possible sleep opportunities between shifts. This may include factors such as sleep disorders, poor sleeping conditions, medications that may interfere with sleep, parental and family responsibilities. This is done to ensure that these factors are taken into account when assessing fatigue risk, to ensure that managers and employees have the same level of awareness about potential fatigue risk.

##### **c. High**

Active discussion of secondary employment

Active discussions of commute times

Active discussion and consideration typically occur with regards to whether an employee takes part in any non-work employment or activities that may impact their fatigue.

This may include activities such as second jobs, volunteering, or being part of organisations that have specific requirements (e.g. army reserve). Additionally, commute times must be considered when discussing and developing risk frameworks and rosters. This may include journey management for specific commute lengths and shift types. These factors are considered in order to ensure that fatigue risk is correctly identified and can be managed appropriately.

**d. Extreme**

Seek expert opinion(s) as to whether rosters are scientifically defensible

When the risk category is identified as being extreme, experts are generally engaged to determine whether a specific roster is scientifically defensible. This may include use of biomathematical modelling tools, in addition to an assessment based on current scientific understanding. This is done in the extreme risk context to ensure that all relevant information has been taken into consideration, and to minimise the risk of an adverse event.

**Level 2**

**a. Low**

Exceptional PSW reporting

Under low risk conditions, prior sleep wake reporting would generally be used. This includes specific information about prior sleep, prior wake, and associated fatigue risk and results in a personal fatigue likelihood score. This score can then be used as a Level 2 marker of fatigue. This is generally calculated in the context of Level 1 and Level 3 controls and provides an understanding of the likelihood that the individual is experiencing fatigue. This can then be used to determine what controls are implemented to ensure safety for that individual and their workplace.

**b. Moderate**

Peer support

Active interrogation of additional hours

Supervisor trained in use of fatigue calculator

Under moderate risk conditions, peer support is typically used to address fatigue. This may include employees reporting fatigue to their team and taking steps to address risk, in addition to employees being aware of the potential signs of fatigue in their colleagues. In the workplace this generally includes having co-workers double check critical tasks if required. This acts as a control against the occurrence of a fatigue-related accident or incident. Actual hours, rather than planned hours, are generally interrogated, to ensure that guidelines are being followed and appropriate control measures are being used, to ensure that additional fatigue has not built up without being addressed. Supervisors are also generally trained in the use of fatigue calculators (i.e. biomathematical modelling tools that can identify high risk times for fatigue). Fatigue calculators can be used while rosters are being developed, or post-development, to assist in managing relevant risk control measures.

**c. High**

- Supervisory support
- Active interrogation at start and during shift
- Employee trained in use of L2 policy

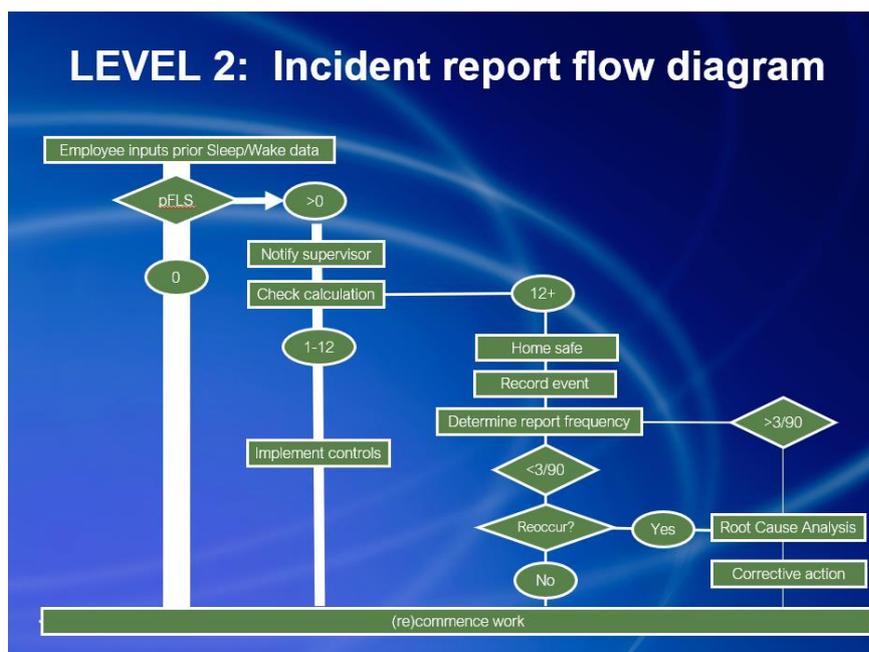
Under high risk conditions, supervisors typically provide support to their employees regarding fatigue management. This typically involves a supervisor being contacted for assistance with decision making or safety critical tasks and is done to ensure that work is performed safely. Active interrogation of fatigue and risk prior to and during shifts is also generally used in the high-risk context. This may include self-assessment, supervisor assessments, or fitness for duty testing. This is done as to further ensure that employees are not experiencing fatigue levels that may impact safety. Employees are usually trained in the use of any tools or strategies that assess prior sleep/wake and fatigue risk. This training is necessary to ensure that these tools are used appropriately and are therefore employees can rely on them for accurate risk and fatigue assessment in the workplace.

**d. Extreme**

Detailed and documented discussion of all individual FFW before continuing to work  
Prior to commencing any extreme risk work, there is usually a discussion of each employee’s specific fitness for work, including prior sleep/wake and any other potential risk factors. This is typically thoroughly documented prior to commencing this work. This discussion is used as a way to ensure that individuals are fit for duty and have addressed all necessary fatigue related issues that may be present.

**e. Application of level 2 Risk Assessment**

The flow chart below summarises how the Level 2 Risk assessment information can feed into operational decision making on a given shift.



### **Level 3**

#### **a. Low**

Exceptional KSS reporting

Employees are generally required to utilise the Karolinska Sleepiness Scale to document their perceived level of alertness/sleepiness as required. This is a validated scale, and as such is effective in determining the individual's current level of alertness or sleepiness.

#### **b. Moderate**

Peer decision support

Active interrogation before additional hours

Peers are generally engaged to assist in decision making under moderate risk circumstances. This involves co-workers double checking critical tasks, providing second opinions or other assistance where required. This is done to mitigate the risk of a potential incident or accident. Additionally, active interrogation regarding fatigue risk is generally used if the employee has been asked to complete any overtime or unplanned additional hours/shifts, because this extra work time can result in heightened fatigue.

#### **c. High**

Supervisor decision support

Active interrogation at start and during shifts

Supervisors would typically be engaged for decision making at the high-risk level. This may include assistance with decision making, double checking critical tasks or other assistance as required, to ensure that all work is performed safely. Supervisory assistance is often particularly useful as these individuals are generally aware of broader requirements and relevant procedures. Active interrogation of fatigue and risk prior to and during shifts is generally also used. This may include self-assessment, supervisor assessments, or fitness for duty testing. These measures are taken to ensure that any fatigue is identified and can be managed appropriately.

#### **d. Extreme**

2-up decision support

Frequent monitoring during work period

Decisions under circumstances designated as having extreme risk are generally required to be supported by 2-up managers. This is to ensure that any safety critical decisions are not impacted by the effects of fatigue in those who are directly involved and may be unable to detect some issues due to their own fatigue or broader issues under emergency circumstances. Fatigue must typically be monitored frequently during work periods that are identified as extreme risk. This may include supervisor check-ins, formal self- or supervisor assessment tools and is done to identify any increase in fatigue risk that may have developed during the course of the shift.

#### **4. Monitor/review**

##### **a. Low**

###### **i. L1 Documented formally quarterly**

Level 1 risk assessment is typically documented formally Annually. This includes policy and governance standards and guidelines, in addition to rosters. This is done to ensure all policy documents are up to date and have been altered according to the most recent available data.

###### **ii. L2 Documented informally**

Level 2 risk assessments are usually documented, though this can be done informally. Level 2 risk assessments are designed to account for individual fatigue likelihood and uses the prior sleep wake model and other individual considerations to identify fatigue risk.

###### **iii. L3 Documented informally**

Level 3 risk assessments are usually documented, though this can be done informally. Level 2 refers to current individual fatigue levels and associated risk and can include measures such as the Karolinska Sleepiness Scale to measure levels of alertness/sleepiness. These measures are used to identify fatigue based on how the individual is used at that specific time to identify any potential ill effects of fatigue.

##### **b. Moderate**

When a moderate risk category is identified, reviews are generally required to be completed by a competent person. In this category, this may be an internal individual who has been appropriately trained, to ensure that reviews take all relevant factors into consideration.

###### **i. L1 Documented formally quarterly**

Level 1 risk assessment is typically documented formally each quarter. This includes policy and governance standards and guidelines, in addition to rosters. This is done to ensure all policy documents are up to date and have been altered according to the most recent available data.

###### **ii. L2 Documented formally**

Level 2 risk assessments in the moderate category are generally documented formally. Level 2 risk assessments are usually documented, though this can be done informally. Level 2 risk assessments are designed to account for individual fatigue likelihood and uses the prior sleep wake model and other individual considerations to identify fatigue risk.

###### **iii. L3 Documented informally**

Level 3 risk assessments are usually documented, though this can be done informally. Level 2 refers to current individual fatigue levels and associated risk and can include measures such as the Karolinska Sleepiness Scale to measure levels of alertness/sleepiness. These measures are used to identify fatigue based on how the individual is used at that specific time to identify any potential ill effects of fatigue.

### **c. High**

When a high risk category is identified, reviews are typically completed by a competent person who is external and independent from the workgroup.

#### **i. L1 Documented formally quarterly**

Level 1 risk assessment is typically documented formally each quarter. This includes policy and governance standards and guidelines, in addition to rosters. This is done to ensure all policy documents are up to date and have been altered according to the most recent available data.

#### **ii. L2 Documented formally**

Level 2 risk assessments in the high risk category are generally documented formally. Level 2 risk assessments are usually documented, though this can be done informally. Level 2 risk assessments are designed to account for individual fatigue likelihood and uses the prior sleep wake model and other individual considerations to identify fatigue risk.

#### **iii. L3 Documented formally**

Level 3 risk assessments in the high-risk category are typically documented formally. Level 3 risk assessments are usually documented, though this can be done informally. Level 2 refers to current individual fatigue levels and associated risk and can include measures such as the Karolinska Sleepiness Scale to measure levels of alertness/sleepiness. These measures are used to identify fatigue based on how the individual is used at that specific time to identify any potential ill effects of fatigue.

### **d. Extreme**

Pre-incident modelling

Post-incident review

Corrective action review

When an extreme risk category is identified, reviews are usually completed by a competent person who is external and independent from the workgroup. Fatigue and risk modelling are typically performed proactively, prior to incidents. This may include biomathematical tools, hazard and risk identification, outcome assessment, risk profiles, etc. This is done to identify any specific times of day, roster stage, work type, etc. that may have a higher risk of a fatigue related incident or accident. Post-incident review generally also is required to identify if and how fatigue played a role in the outcome. This review then will normally lead to appropriate changes in policy and procedure in order to avoid another incident. Corrective actions must also be reviewed in order to identify and alter any policies or procedures that may be resulting in avoidable fatigue risk.

# Appendices

## Appendix 1: Implementation Plan

Timeframe	Milestones
0-6 months	<ul style="list-style-type: none"><li>• Policy and governance changes and development (i.e. writing and implementing fatigue management policy)</li><li>• Development of relevant fatigue management tools</li><li>• Fatigue training to be inserted into induction requirements</li></ul>
6-12 months	<ul style="list-style-type: none"><li>• Employee training to be developed and completed</li><li>• Supervisor training to be developed and completed</li><li>• All employees to have completed relevant fatigue training</li></ul>
12-24 months	<ul style="list-style-type: none"><li>• Fatigue culture adopted widely in the workplace (i.e. a workplace culture where fatigue is acknowledged and addressed by all relevant staff)</li><li>• Employee use of fatigue reporting tools</li><li>• Management proactive in their use of fatigue assessment tools and strategies</li></ul>

## Appendix 2: Risk outcomes

	Insignificant	Negligible	Moderate	Extensive	Significant
<b>People</b>	Minor injury or first aid treatment	Injury requiring treatment by medical practitioner and/or lost time from workplace.	Major injury / hospitalization	Single death and/or multiple major injuries	Multiple deaths
<b>Information</b>	Compromise of information otherwise available in the public domain.	Minor compromise of information sensitive to internal or sub-unit interests.	Compromise of information sensitive to the organizations operations.	Compromise of information sensitive to organizational interests.	Compromise of information with significant ongoing impact.
<b>Property</b>	Minor damage or vandalism to asset.	Minor damage or loss of <5% of total assets	Damage or loss of <20% of total assets	Extensive damage or loss <50% of total assets	Destruction or complete loss of >50% of assets
<b>Economic</b>	1% of budget (organizational, division or project budget as relevant)	2-5% of annual budget	5-10 % of annual budget	> 10% of budget	> 30% of project or organizational annual budget
<b>Reputation</b>	Local mention only. Quickly forgotten. Freedom to operate unaffected. Self-improvement review required	Scrutiny by Executive, internal committees or internal audit to prevent escalation. Short term local media concern. Some impact on local level activities	Persistent national concern. Scrutiny required by external agencies. Long term 'brand' impact.	Persistent intense national public, political and media scrutiny. Long term 'brand' impact. Major operations severely restricted.	International concern, Governmental Inquiry or sustained adverse national/international media. 'Brand' significantly affects organizational abilities.
<b>Capability</b>	Minor skills impact. Minimal impact on non-core operations. The impact can be dealt with by routine operations.	Some impact on organizational capability in terms of delays, systems quality but able to be dealt with at operational level	Impact on the organization resulting in reduced performance such that targets are not met. Organizations existence is not threatened but could be subject to significant review.	Breakdown of key activities leading to reduction in performance (e.g. service delays, revenue loss, client dissatisfaction, legislative breaches).	Protracted unavailability of critical skills/people. Critical failure(s) preventing core activities from being performed. Survival of the project/activity/organization is threatened.

### Appendix 3: Risk Matrix

Likelihood	Consequence				
	1 (insignificant)	2 (minor)	3 (moderate)	4 (major)	5 (catastrophic)
<b>A (certain)</b>	High	High	Extreme	Extreme	Extreme
<b>B (likely)</b>	Medium	Medium	High	Extreme	Extreme
<b>C (possible)</b>	Low	Medium	High	Extreme	Extreme
<b>D (unlikely)</b>	Low	Low	Medium	High	Extreme
<b>E (rare)</b>	Low	Low	Medium	High	High

## Appendix 4: Safety Cases

Two examples of the information in a safety case are below, as provided by the National Heavy Vehicle Regulator. These are further examples of guidelines that may be developed within an organisation.

### Safety Case 1

#### Proposed operating limits

Time	Work	Rest
<b>In any period of...</b>	<b>A driver must not work more than a maximum of...</b>	<b>And must have the rest of that period off work with at least a minimum rest break of...</b>
6 ¼ hours	6 hours work time	15 continuous minutes rest time
9 hours	8 1/2 hours work time	30 minutes rest time in blocks of 15 continuous minutes
12 hours	11 hours work time	60 minutes rest time in blocks of 15 continuous minutes
24 hours	14 hours work time	7 continuous hours stationary rest time*
7 days	36 hours long/night work time**	No limit has been set
14 days	144 hours work time	24 continuous hours stationary rest time taken after no more than 84 hours work time and 24 continuous hours stationary rest time and 2 x night rest breaks# and 2 x night rest breaks taken on consecutive days.

\*Stationary rest time is the time a driver spends out of a regulated heavy vehicle or in an approved sleeper berth of a stationary regulated heavy vehicle.

\*\*Long/night work time is any work time in excess of 12 hours in a 24 hour period or any work time between midnight and 6 am (or the equivalent hours in the time zone of the base of a driver).

#Night rest breaks are 7 continuous hours stationary rest time taken between the hours of 10pm on a day and 8am on the next day (using the time zone of the base of the driver) or a 24 continuous hours stationary rest break.

### Safety Case 2

#### Proposed operating limits

Time	Work	Rest
<b>In any period of...</b>	<b>A driver must not work more than a maximum of...</b>	<b>And must have the rest of that period off work with at least a minimum rest break of...</b>
3 hours 15 mins	3 hours of work time	15 continuous minutes rest time
12 hours	11 hours of work time	60 minutes rest time in blocks of 15 continuous minutes
24 hours	11 hours of work time	12 hrs continuous hours continuous stationary rest time*
21 days	154 hours of work time	7 days continuous stationary rest time that includes the periods of 12AM to 6AM on each day using the time zone of the driver's base.

\* Rest time must include the period of 00:00 to 06:00

## Appendix 5: Overview of risks and control measures

The following table presents an overview of possible risks and control measures. This table is based on an example from the National Heavy Vehicle Regulator. Each principle is assessed within the proposed operating limits for risk. In this case, there is a high risk associated with the time spent continuously working, and the reset rest breaks exceed the relevant limits. Column three shows potential countermeasures and controls that may be implemented.

Principle	Risk	Countermeasures/Controls
Time spent continuously working	<b>High</b> (8.33%) (12 hours work opportunity with 60 mins within work rest)	<ul style="list-style-type: none"> <li>• Task Rotation</li> <li>• Rest break every 3 hours</li> <li>• Camp Accommodation</li> <li>• Regular Shifts</li> <li>• Daily Toolbox Safety Meetings</li> <li>• Reduced kilometres travelled</li> <li>• IVMS monitoring</li> <li>• Quality food</li> <li>• Training</li> <li>• Task Rotation</li> </ul>
Frequent breaks from driving	<b>Low</b> 3 hours	
Adequate sleep opportunity	<b>Low</b> 10 hours	<ul style="list-style-type: none"> <li>• Quality camp accommodation</li> <li>• Innerspring mattress</li> <li>• 12 hours rest scheduled in 24 hour period</li> <li>• Quality food</li> <li>• Training</li> </ul>
Adequate night sleep	<b>Low</b> 100%	<ul style="list-style-type: none"> <li>• Drivers' shifts are between 6AM and 6PM.</li> <li>• Drivers rest is in the night rest parameter every night.</li> </ul>
Shift ending between 00:00 and 06:00h	<b>Low</b> 0%	<ul style="list-style-type: none"> <li>• No night work</li> </ul>
Minimise extended shift	<b>Low</b> 12 hours	<ul style="list-style-type: none"> <li>• 12 hours rest opportunity in 24 hour period</li> </ul>
Reset rest breaks	<b>Exceeds limits</b> 14 days	<ul style="list-style-type: none"> <li>• 7 days off in every 21 days</li> <li>• Reduced work times</li> <li>• No night work</li> <li>• IVMS monitoring</li> <li>• Reduced kilometres covered (average: 132 kms per shift)</li> <li>• Driver commute to work policy</li> <li>• Secondary employment policy</li> </ul>

Appendix 6: Case Studies

**Business 1**

A forestry management company with a mixture of job roles and hours, performed in house and by contractors.

Job role	Hours of work	High consequence tasks	ISO31000 likelihood score	Consequence rating	Risk level
<b>Company internal staff</b>					
Office staff/management	9 hour shift * 5 days	* Refer fire below	1	1 (no driving)	Low
Foresters/supervisors	9 hour shift * 5 days	*includes driving	1	5 (driving)	Moderate
Fire (emergency first shift)	Normal 9 hour day shift, plus possible 12 hour night shift (same day) commencing from 8pm	*includes driving	5	5 (driving)	Extreme
<b>Contractors</b>					
Silviculture workers	9 hour shift * 5 days	*includes driving	1	5 (driving)	Moderate
Harvesting operators	13 hour shifts*5 days	*includes driving	3	5 (driving)	High
Maintenance workers field based	13 hour shifts*5 days	*includes driving, and maintenance	3	5 (driving)	High

## Low risk level

- Office staff/management

		Controls required	Application
<b>Policy and Governance</b>		<ul style="list-style-type: none"> <li>• Basic policy framework</li> </ul>	When low risk is identified, a basic policy framework is typically developed to address fatigue in the workplace. This generally includes overarching information regarding roles and responsibilities, roster specifications, fitness for duty, risk assessments, training, review and record keeping/documentation. This may also include specific information about fatigue identification, self-assessments, supervisor assessments, fatigue controls and other management needs.
<b>Training and Education</b>		<ul style="list-style-type: none"> <li>• Induction training about non-work causes of fatigue and reporting when not FFW</li> <li>• Competency based training</li> </ul>	Under low risk conditions, general training and education regarding fatigue would typically be provided, giving information about personal fatigue management. Specifically, this may include information about non-work causes of fatigue (i.e. sleep disorders, poor sleeping conditions, medications that may interfere with sleep, prioritising sleep, etc.). Additionally, information may be provided about appropriate reporting channels and processes for individuals who are experiencing fatigue at work. This training is typically competency based and, as such, requires employees to display their understanding of the relevant content. This training is provided to ensure that all employees have the relevant education to make informed decisions about their own fatigue and workplace safety.
<b>Risk assessment and mitigation</b>	<b>L1</b>	<ul style="list-style-type: none"> <li>• Ensure compliance with rules-of-rostering</li> </ul>	Ensuring compliance with hours of work and rostering rules is generally used in the low risk context. This may include regulations regarding shift length, breaks between shifts, breaks within shifts, night shift regulations, and on-call regulations, and other relevant

			rostering components. This is to ensure employees are not unduly fatigued by their work hours, in order to further minimise risk.
	<b>L2</b>	<ul style="list-style-type: none"> <li>• Exceptional PSW reporting</li> </ul>	Under low risk conditions, prior sleep wake reporting would generally be used. This includes specific information about prior sleep, prior wake, and associated fatigue risk and results in a personal fatigue likelihood score. This score can then be used as a Level 2 marker of fatigue. This is generally calculated in the context of Level 1 and Level 3 controls, and provides an understanding of the likelihood that the individual is experiencing fatigue. This can then be used to determine what controls are implemented to ensure safety for that individual and their workplace.
	<b>L3</b>	<ul style="list-style-type: none"> <li>• Exceptional KSS reporting</li> </ul>	Employees are generally required to utilise the Karolinska Sleepiness Scale to document their perceived level of alertness/sleepiness as required. This is a validated scale, and as such is effective in determining the individual's current level of alertness or sleepiness.
<b>Audit and compliance</b>		<ul style="list-style-type: none"> <li>• Documented- L1 formal quarterly L2 informal L3 informal</li> </ul>	<p>Level 1 risk assessment is typically documented formally each quarter. This includes a review of policy and governance standards and guidelines, in addition to rosters. Additionally, this would include an audit of hours worked. This is done to ensure all policy documents are up to date and have been altered according to the most recent available data.</p> <p>Level 2 risk assessments are usually documented, though this can be done informally. Level 2 risk assessments are designed to account for individual fatigue likelihood and uses the prior sleep wake model and other individual considerations to identify fatigue risk. This typically would involve self-assessments of fatigue (informal), with a requirement to report to supervisors if fatigue ratings are over a certain threshold. The upper limit for many organisations is a score of 12, after which fatigue must be reported. However, this threshold differs depending on organisational needs.</p>

		Level 3 risk assessments are usually documented, though this can be done informally. Level 2 refers to current individual fatigue levels and associated risk and can include measures such as the Karolinska Sleepiness Scale to measure levels of alertness/sleepiness. These measures are used to identify fatigue based on how the individual is used at that specific time to identify any potential ill effects of fatigue.
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**Moderate risk level**

- Foresters/supervisors
- Silviculture workers

	<b>Controls required</b>	<b>Application</b>
<b>Policy and Governance</b>	<ul style="list-style-type: none"> <li>• Basic policy framework</li> <li>• Explicit shared responsibility framework</li> <li>• Employee sign off on training</li> </ul>	<p>Under low and moderate risk levels, a basic policy framework is typically developed to address fatigue in the workplace. This generally includes overarching information regarding roles and responsibilities, roster specifications, fitness for duty, risk assessments, training, review and record keeping/documentation. This may also include specific information about fatigue identification, self-assessments, supervisor assessments, fatigue controls and other management needs.</p> <p>Additionally, the shared responsibility framework generally includes specific identification and education around the roles and responsibilities of the employee and of the employer. Employee responsibilities typically include presenting to work fit for duty, and taking all reasonable steps to mitigate their own fatigue risk (i.e. controlling non-work factors that may impact fatigue, using self-assessment tools as required, reporting fatigue to management, attending required training, etc.). Employer responsibilities generally</p>

		<p>include providing a workplace that manages all safety risks and hazards appropriately, developing appropriate workplace fatigue policies and guidelines, providing appropriate training to employees, monitoring and reviewing fatigue management procedures, duty of care requirements, complying with legislation and relevant guidelines). Employees may also be required to sign off on relevant training – they may attend specified fatigue management training sessions (either online or in person) which specifically include both practical fatigue management strategies and information regarding their roles and responsibilities, in addition to the use of any relevant tools (e.g. self-assessment forms, etc.). This is done to ensure employees have the relevant knowledge to utilise the fatigue management systems that are in place.</p>
<p><b>Training and Education</b></p>	<ul style="list-style-type: none"> <li>• Induction training about non-work causes of fatigue and reporting when not FFW</li> <li>• TLIF PFMS training without assessment</li> <li>• Basic awareness of PSW rules around FFW</li> <li>• Competency based training</li> <li>• Nationally accredited supervisor training</li> </ul>	<p>At the moderate risk level, training and education requirements from both the low and moderate risk levels are typically incorporated. At the low risk level, and therefore also at the moderate level, general training and education regarding fatigue would typically be provided, giving information about personal fatigue management. Specifically, this may include information about non-work causes of fatigue (i.e. sleep disorders, poor sleeping conditions, medications that may interfere with sleep, prioritising sleep, etc.). Additionally, information may be provided about appropriate reporting channels and processes for individuals who are experiencing fatigue at work.</p> <p>In addition to a general induction, staff members at the moderate risk level would typically undertake TLIF PFMS training (non-assessed). TLIF PFMS training includes specific units of competency endorsed by the Australian government. These fatigue management units are usually completed by employees who operate under moderate risk conditions, though they do not need to be formally assessed. Employees are also generally given training regarding the prior sleep wake model of</p>

			<p>fatigue, and how this relates to their fitness for work. This training is typically competency based and, as such, requires employees to display their understanding of the relevant content. This training is provided to ensure that all employees have the relevant education to make informed decisions about their own fatigue and workplace safety.</p> <p>Additionally, supervisors typically participate in nationally accredited supervisor training when this level of risk is identified. Supervisors complete this training to have a comprehensive understanding of how to best manage the fatigue of their employees, and to help develop a mature workplace fatigue reporting culture.</p>
<b>Risk assessment and mitigation</b>	<b>L1</b>	<ul style="list-style-type: none"> <li>• Ensure compliance with rules-of-rostering</li> <li>• Active discussions on non-work factors that might impact on level of sleep opportunity</li> </ul>	<p>Both low and moderate controls are typically used. Ensuring compliance with hours of work and rostering rules is generally used in the low risk context, and as such are also typically used when risk is identified as being moderate. This may include regulations regarding shift length, breaks between shifts, breaks within shifts, night shift regulations, and on-call regulations, and other relevant rostering components. This is to ensure employees are not unduly fatigued by their work hours, in order to further minimise risk.</p> <p>Non-work factors are typically actively discussed and considered when accounting for possible sleep opportunities between shifts. This may include factors such as sleep disorders, poor sleeping conditions, medications that may interfere with sleep, parental and family responsibilities. This is done to ensure that these factors are taken into account when assessing fatigue risk, and to ensure that managers and employees have the same level of awareness about potential fatigue risk.</p>
	<b>L2</b>	<ul style="list-style-type: none"> <li>• Exceptional PSW reporting</li> <li>• Peer support</li> </ul>	<p>Under low and moderate risk conditions, prior sleep wake reporting would generally be used. This includes specific information about prior sleep, prior wake, and associated fatigue risk. This information can be</p>

		<ul style="list-style-type: none"> <li>• Active interrogation of additional hours</li> <li>• Supervisor trained in use of fatigue calculator</li> </ul>	<p>used to generate a personal fatigue likelihood score. This score can then be used as a Level 2 marker of fatigue. This is generally calculated in the context of Level 1 and Level 3 controls, and provides an understanding of the likelihood that the individual is experiencing fatigue. This can then be used to determine which controls are implemented to ensure safety for that individual and their workplace. Under moderate risk conditions, peer support is also typically used to address fatigue. This may include employees reporting fatigue to their team and taking steps to address risk, in addition to employees being aware of the potential signs of fatigue in their colleagues. In the workplace, this generally includes having co-workers double check critical tasks if required. This acts as a control against the occurrence of a fatigue-related accident or incident. Actual hours, rather than planned hours, are generally interrogated, to ensure that guidelines are followed and appropriate control measures are used. Supervisors are also generally trained in the use of fatigue calculators (i.e. biomathematical modelling tools that can identify high risk times for fatigue). Fatigue calculators can be used while rosters are developed, or post-development to assist in managing relevant risk control measures.</p>
	<b>L3</b>	<ul style="list-style-type: none"> <li>• Exceptional KSS reporting</li> <li>• Peer decision support</li> <li>• Active interrogation before additional hours</li> </ul>	<p>Employees are generally required to utilise the Karolinska Sleepiness Scale to document their perceived level of alertness/sleepiness as required. This is a validated scale, and as such is effective in determining the individual's current level of alertness or sleepiness. Peers are generally engaged to assist in decision making under moderate risk circumstances. This involves co-workers double checking critical tasks, providing second opinions or other assistance where required. This is done to mitigate the risk of a potential incident or accident. Additionally, active interrogation regarding fatigue risk is generally used if the employee has been asked to complete overtime</p>

			<p>or unplanned additional hours/shifts, because this extra work time can result in heightened fatigue.</p> <p>These applications would be tailored to the specific workgroup and role. For example, as harvesting operators often work alone, different control measures would be required. This may include phone discussions with peers/supervisors, planning and decision-making protocols/checklists, or other strategies that are developed by the workgroup and organisation to mitigate the risk of fatigue.</p>
<p><b>Audit and compliance</b></p>	<ul style="list-style-type: none"> <li>• Review to be performed by a competent person (internal)</li> <li>• Documented: <ul style="list-style-type: none"> <li>L1 formal quarterly</li> <li>L2 formal</li> <li>L3 informal</li> </ul> </li> </ul>	<p>When a moderate risk category is identified, reviews are generally required to be completed by a competent person. In this category, this may be an internal individual who has been appropriately trained, to ensure that reviews take all relevant factors into consideration.</p> <p>Level 1 risk assessment is typically documented formally each quarter. This includes a review of policy and governance standards and guidelines, in addition to rosters. Additionally, this would include an audit of hours worked. This is done to ensure all policy documents are up to date and have been altered according to the most recent available data.</p> <p>Level 2 risk assessments in the moderate category are generally documented formally. Level 2 risk assessments are designed to account for individual fatigue likelihood and uses the prior sleep wake model and other individual considerations to identify fatigue risk. This generally involves documentation of prior sleep and wake, and may include documented self-assessments, sleep/wake diaries, or fitness for work reporting. Level 3 risk assessments are usually documented, though this can be done informally. Level 2 refers to current individual fatigue levels and associated risk and can include measures such as the Karolinska Sleepiness Scale to measure levels of alertness/sleepiness. These measures are used to identify fatigue based on how the</p>	

		individual is used at that specific time to identify any potential ill effects of fatigue.
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### High risk level

- Harvesting operators
- Maintenance workers field based

	Controls required	Application
<b>Policy and Governance</b>	<ul style="list-style-type: none"> <li>• Basic policy framework</li> <li>• Explicit shared responsibility framework</li> <li>• Employee sign off on training</li> <li>• To continue working-               <ul style="list-style-type: none"> <li>- 1-up sign off</li> <li>- Employee sign-off as FFW</li> </ul> </li> </ul>	<p>Under low, moderate, and high risk levels, a basic policy framework is typically developed to address fatigue in the workplace. This generally includes overarching information regarding roles and responsibilities, roster specifications, fitness for duty, risk assessments, training, review and record keeping/documentation. This may also include specific information about fatigue identification, self-assessments, supervisor assessments, fatigue controls and other management needs.</p> <p>Additionally, the shared responsibility framework generally includes specific identification and education around the roles and responsibilities of the employee and of the employer. Employee responsibilities typically include presenting to work fit for duty, and taking all reasonable steps to mitigate their own fatigue risk (i.e. controlling non-work factors that may impact fatigue, using self-assessment tools as required, reporting fatigue to management, attending required training, etc.). Employer responsibilities generally include providing a workplace that manages all safety risks and hazards appropriately, developing appropriate workplace fatigue policies and guidelines, providing appropriate training to employees,</p>

		<p>monitoring and reviewing fatigue management procedures, duty of care requirements, complying with legislation and relevant guidelines). Employees may also be required to sign off on relevant training – they may attend specified fatigue management training sessions (either online or in person) which specifically include both practical fatigue management strategies and information regarding their roles and responsibilities, in addition to the use of any relevant tools (e.g. self-assessment forms, etc.). This is done to ensure employees have the relevant knowledge to utilise the fatigue management systems that are in place.</p> <p>In order for an employee to continue working under high risk conditions, they typically are required to obtain approval from their manager (i.e. their “1-up”). If the employee obtains this approval, they then generally will also sign off as being fit for work. This may include completing a fatigue assessment tool. This is required as individuals typically find it difficult to accurately gauge their own level of impairment and engaging a supervisor for sign off will ensure the task is performed safely.</p>
<p><b>Training and Education</b></p>	<ul style="list-style-type: none"> <li>• Induction training about non-work causes of fatigue and reporting when not FFW</li> <li>• TLIF-PFMS with assessment</li> <li>• PSW rules competence</li> <li>• KSS competence</li> <li>• Competency based training</li> <li>• Nationally accredited supervisor training</li> </ul>	<p>At the high-risk level, training and education requirements from the low, moderate and high-risk levels are typically incorporated. At the low risk level, and therefore also at the moderate level, general training and education regarding fatigue would typically be provided, giving information about personal fatigue management. Specifically, this may include information about non-work causes of fatigue (i.e. sleep disorders, poor sleeping conditions, medications that may interfere with sleep, prioritising sleep, etc.). Additionally, information may be provided about appropriate reporting channels and processes for individuals who are experiencing fatigue at work.</p> <p>TLIF PFMS training includes specific units of competency endorsed by the Australian government. These fatigue management units are</p>

		<p>typically completed by employees who operate under high risk conditions and are formally assessed. Employees are also generally trained to be competent in use of the prior sleep wake model, and in use of the Karolinska Sleepiness Scale (a measure of alertness/sleepiness). This training is typically competency based and, as such, requires employees to display their understanding of the relevant content. This training is provided to ensure that all employees have the relevant education to make informed decisions about their own fatigue and workplace safety. Additionally, supervisors typically participate in nationally accredited supervisor training when this level of risk is identified. Supervisors complete this training to have a comprehensive understanding of how to best manage the fatigue of their employees, and to help develop a mature workplace fatigue reporting culture.</p>	
<p><b>Risk assessment and mitigation</b></p>	<p><b>L1</b></p>	<ul style="list-style-type: none"> <li>• Ensure compliance with rules-of-rostering</li> <li>• Active discussions on non-work factors that might impact on level of sleep opportunity</li> <li>• Active discussion of secondary employment</li> <li>• Active discussions of commute times</li> </ul>	<p>Low, moderate, and high controls are typically used. Ensuring compliance with hours of work and rostering rules is generally used in the low risk context, and as such are also typically used when risk is identified as being high. Ensuring compliance with hours of work and rostering rules is generally used in the low risk context. This may include regulations regarding shift length, breaks between shifts, breaks within shifts, night shift regulations, and on-call regulations, and other relevant rostering components. This is to ensure employees are not unduly fatigued by their work hours, in order to further minimise risk.</p> <p>Non-work factors are typically actively discussed and considered when accounting for possible sleep opportunities between shifts. This may include factors such as sleep disorders, poor sleeping conditions, medications that may interfere with sleep, parental and family responsibilities. This is done to ensure that these factors are taken into account when assessing fatigue risk, to ensure that managers and</p>

			<p>employees have the same level of awareness about potential fatigue risk.</p> <p>Active discussion and consideration typically occurs with regards to whether an employee takes part in any non-work employment or activities that may impact their fatigue. This may include activities such as second jobs, volunteering, or being part of organisations that have specific requirements (e.g. army reserve). Additionally, commute times must be considered when discussing and developing risk frameworks and rosters. This may include journey management for specific commute lengths and shift types. These factors are considered in order to ensure that fatigue risk is correctly identified and can be managed appropriately.</p>
	<b>L2</b>	<ul style="list-style-type: none"> <li>• Exceptional PSW reporting</li> <li>• Peer support</li> <li>• Active interrogation of additional hours</li> <li>• Supervisor trained in use of fatigue calculator</li> <li>• Supervisory support</li> <li>• Active interrogation at start and during shift</li> <li>• Employee trained in use of L2 policy</li> </ul>	<p>Under all risk conditions, prior sleep wake reporting would generally be used. This includes specific information about prior sleep, prior wake, and associated fatigue risk and results in a personal fatigue likelihood score. This score can then be used as a Level 2 marker of fatigue. This is generally calculated in the context of Level 1 and Level 3 controls and provides an understanding of the likelihood that the individual is experiencing fatigue. This can then be used to determine what controls are implemented to ensure safety for that individual and their workplace.</p> <p>Under risk conditions above 'moderate', peer support is typically used to address fatigue. This may include employees reporting fatigue to their team and taking steps to address risk, in addition to employees being aware of the potential signs of fatigue in their colleagues. In the workplace, this generally includes having co-workers double check critical tasks if required. This acts as a control against the occurrence of a fatigue-related accident or incident. Actual hours, rather than planned hours, are generally interrogated, to ensure that guidelines are being followed and appropriate control measures are being used,</p>

			<p>to ensure that additional fatigue has not built up without being addressed. Supervisors are also generally trained in the use of fatigue calculators (i.e. biomathematical modelling tools that can identify high risk times for fatigue). Fatigue calculators can be used while rosters are being developed, or post-development, to assist in managing relevant risk control measures.</p> <p>Under high risk conditions, supervisors typically provide support to their employees regarding fatigue management. This typically involves a supervisor being contacted for assistance with decision making or safety critical tasks and is done to ensure that work is performed safely. Active interrogation of fatigue and risk prior to and during shifts is also generally used in the high-risk context. This may include self-assessment, supervisor assessments, or fitness for duty testing. This is done as to further ensure that employees are not experiencing fatigue levels that may impact safety. Employees are usually trained in the use of any tools or strategies that assess prior sleep/wake and fatigue risk. This training is necessary to ensure that these tools are used appropriately and are therefore employees can rely on them for accurate risk and fatigue assessment in the workplace.</p>
	<b>L3</b>	<ul style="list-style-type: none"> <li>• Exceptional KSS reporting</li> <li>• Peer decision support</li> <li>• Active interrogation before additional hours</li> <li>• Supervisor decision support</li> <li>• Active interrogation at start and during shifts</li> </ul>	<p>Employees are generally required to utilise the Karolinska Sleepiness Scale to document their perceived level of alertness/sleepiness as required. This is a validated scale, and as such is effective in determining the individual's current level of alertness or sleepiness. Peers are generally engaged to assist in decision making under moderate, and therefore also high-risk circumstances. This involves co-workers double checking critical tasks, providing second opinions or other assistance where required. This is done to mitigate the risk of a potential incident or accident. Additionally, active interrogation regarding fatigue risk is generally used if the employee has been asked</p>

			<p>to complete any overtime or unplanned additional hours/shifts, because this extra work time can result in heightened fatigue. Supervisors would typically be engaged for decision making at the high-risk level. This may include assistance with decision making, double checking critical tasks or other assistance as required, to ensure that all work is performed safely. Supervisory assistance is often particularly useful as these individuals are generally aware of broader requirements and relevant procedures. Active interrogation of fatigue and risk prior to and during shifts is generally also used. This may include self-assessment, supervisor assessments, or fitness for duty testing. These measures are taken to ensure that any fatigue is identified and can be managed appropriately.</p>
<p><b>Audit and compliance</b></p>	<ul style="list-style-type: none"> <li>• Review to be performed by a competent person (external independent review)</li> <li>• Documented: <ul style="list-style-type: none"> <li>L1 quarterly</li> <li>L2 formal</li> <li>L3 formal</li> </ul> </li> </ul>	<p>When a high-risk category is identified, reviews are typically completed by a competent person who is external and independent from the workgroup.</p> <p>Level 1 risk assessment is typically documented formally each quarter. This includes a review of policy and governance standards and guidelines, in addition to rosters. Additionally, this would include an audit of hours worked. This is done to ensure all policy documents are up to date and have been altered according to the most recent available data.</p> <p>Level 2 risk assessments in the high-risk category are generally documented formally. Level 2 risk assessments are designed to account for individual fatigue likelihood and uses the prior sleep wake model and other individual considerations to identify fatigue risk. This generally involves documentation of prior sleep and wake, and may include documented self-assessments, sleep/wake diaries, or fitness for work reporting. Level 3 risk assessments in the high risk category are typically documented formally. Level 3 risk assessments are usually documented, though this can be done informally. Level 2 refers to</p>	

		current individual fatigue levels and associated risk and can include measures such as the Karolinska Sleepiness Scale to measure levels of alertness/sleepiness. These measures are used to identify fatigue based on how the individual is used at that specific time to identify any potential ill effects of fatigue.
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### Extreme risk level

- Fire (emergency first shift)

	Controls required	Application
<b>Policy and Governance</b>	<ul style="list-style-type: none"> <li>• Basic policy framework</li> <li>• Explicit shared responsibility framework</li> <li>• Employee sign off on training</li> <li>• To continue working-               <ul style="list-style-type: none"> <li>- 2-up sign off to work</li> <li>- Employee sign off as FFW</li> </ul> </li> </ul>	<p>Under low, moderate, high, and extreme risk levels, a basic policy framework is typically developed to address fatigue in the workplace. This generally includes overarching information regarding roles and responsibilities, roster specifications, fitness for duty, risk assessments, training, review and record keeping/documentation. This may also include specific information about fatigue identification, self-assessments, supervisor assessments, fatigue controls and other management needs.</p> <p>Additionally, the shared responsibility framework generally includes specific identification and education around the roles and responsibilities of the employee and of the employer. Employee responsibilities typically include presenting to work fit for duty and taking all reasonable steps to mitigate their own fatigue risk (i.e. controlling non-work factors that may impact fatigue, using self-assessment tools as required, reporting fatigue to management, attending required training, etc.). Employer responsibilities generally</p>

		<p>include providing a workplace that manages all safety risks and hazards appropriately, developing appropriate workplace fatigue policies and guidelines, providing appropriate training to employees, monitoring and reviewing fatigue management procedures, duty of care requirements, complying with legislation and relevant guidelines). Employees may also be required to sign off on relevant training – they may attend specified fatigue management training sessions (either online or in person) which specifically include both practical fatigue management strategies and information regarding their roles and responsibilities, in addition to the use of any relevant tools (e.g. self-assessment forms, etc.). This is done to ensure employees have the relevant knowledge to utilise the fatigue management systems that are in place.</p> <p>Under extreme risk conditions, employees are usually required to obtain sign off from a “2-up” manager/supervisor. This refers to an individual who is two supervisory levels above themselves (i.e. their manager’s manager). If the employee obtains this approval, they will generally also sign off as being fit for work. This may include completing a fatigue assessment tool. This is required as individuals typically find it difficult to accurately gauge their own level of impairment and engaging a supervisor for sign off will ensure the task is performed safely. Additionally, having the “2-up” supervisor sign off is typically required as this individual will have a broader sense of the organisational requirements and can ensure safety more generally.</p>
<p><b>Training and Education</b></p>	<ul style="list-style-type: none"> <li>• Induction training about non-work causes of fatigue and reporting when not FFW</li> <li>• TLIF-PFMS with assessment</li> <li>• PSW rules competence</li> <li>• KSS competence</li> </ul>	<p>At the extreme risk level, training and education requirements from the low, moderate, high and extreme risk levels are typically incorporated.</p> <p>At the low risk level, and therefore also at the moderate level, general training and education regarding fatigue would typically be provided, giving information about personal fatigue management. Specifically,</p>

	<ul style="list-style-type: none"> <li>• Competency based training</li> <li>• Nationally accredited supervisor training</li> <li>• Fatigue-proofing training</li> <li>• Authority gradient challenge training for employee/supervisor</li> <li>• Competency based training</li> <li>• Nationally accredited supervisor training</li> </ul>	<p>this may include information about non-work causes of fatigue (i.e. sleep disorders, poor sleeping conditions, medications that may interfere with sleep, prioritising sleep, etc.). Additionally, information may be provided about appropriate reporting channels and processes for individuals who are experiencing fatigue at work.</p> <p>TLIF PFMS training includes specific units of competency endorsed by the Australian government. These fatigue management units are typically completed by employees who operate under high risk conditions and are formally assessed. As such, these units of competency are also typically used when risk is identified as extreme. Employees are also generally trained to be competent in use of the prior sleep wake model, and in use of the Karolinska Sleepiness Scale (a measure of alertness/sleepiness). This training is typically competency based and, as such, requires employees to display their understanding of the relevant content. This training is provided to ensure that all employees have the relevant education to make informed decisions about their own fatigue and workplace safety. Additionally, supervisors typically participate in nationally accredited supervisor training when this level of risk is identified. Supervisors complete this training to have a comprehensive understanding of how to best manage the fatigue of their employees, and to help develop a mature workplace fatigue reporting culture.</p> <p>Under extreme risk conditions, fatigue-proofing training is also usually provided to all employees. This includes adaptive and protective risk reduction strategies (i.e. changing work strategies when fatigued, using additional control measures, double checking, etc.). These strategies are often already informally used in workplaces to ensure that fatigue does not lead to an incident or accident, but formal training can be helpful in solidifying their use and reducing risk.</p> <p>Training regarding authority gradients is usually provided for both</p>
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		<p>employees and supervisors in the extreme risk context. This includes information on the fatigue reporting process, barriers to reporting, and strategies for encouraging a mature fatigue and safety culture in the workplace. This kind of training is generally employed to ensure that employees are comfortable reporting fatigue to their relevant managers or supervisors, as a lack of reporting can be an additional risk factor. Training is typically competency based and, as such, requires employees and supervisors to display their understanding of the relevant content. Additionally, supervisors typically participate in nationally accredited supervisor training when this level of risk is identified. Supervisors complete this training to have a comprehensive understanding of how to best manage the fatigue of their employees, and to help develop a mature workplace fatigue reporting culture.</p>
<p><b>Risk assessment and mitigation</b></p>	<p><b>L1</b></p>	<ul style="list-style-type: none"> <li>• Ensure compliance with rules-of-rostering</li> <li>• Active discussions on non-work factors that might impact on level of sleep opportunity</li> <li>• Active discussion of secondary employment</li> <li>• Active discussions of commute times</li> <li>• Seek expert opinion(s) as to whether rosters are scientifically defensible</li> </ul>
<p>Low, moderate, high, and extreme controls are typically used. Ensuring compliance with hours of work and rostering rules is generally used in the low risk context, and as such are also typically used when risk is identified as being extreme. This may include regulations regarding shift length, breaks between shifts, breaks within shifts, night shift regulations, and on-call regulations, and other relevant rostering components. This is to ensure employees are not unduly fatigued by their work hours, in order to further minimise risk.</p> <p>Non-work factors are typically actively discussed and considered when accounting for possible sleep opportunities between shifts. This may include factors such as sleep disorders, poor sleeping conditions, medications that may interfere with sleep, parental and family responsibilities. This is done to ensure that these factors are considered when assessing fatigue risk, to ensure that managers and employees have the same level of awareness about potential fatigue risk.</p>		

			<p>Active discussion and consideration typically occurs with regards to whether an employee takes part in any non-work employment or activities that may impact their fatigue. This may include activities such as second jobs, volunteering, or being part of organisations that have specific requirements (e.g. army reserve). Additionally, commute times must be considered when discussing and developing risk frameworks and rosters. This may include journey management for specific commute lengths and shift types. These factors are considered in order to ensure that fatigue risk is correctly identified and can be managed appropriately.</p> <p>When the risk category is identified as extreme, experts are generally engaged to determine whether a specific roster is scientifically defensible. This may include use of biomathematical modelling tools, in addition to an assessment based on current scientific understanding. This is done in the extreme risk context to ensure that there all relevant information has been taken into consideration, and to minimise the risk of an adverse event.</p>
	<b>L2</b>	<ul style="list-style-type: none"> <li>• Exceptional PSW reporting</li> <li>• Peer support</li> <li>• Active interrogation of additional hours</li> <li>• Supervisor trained in use of fatigue calculator</li> <li>• Supervisory support</li> <li>• Active interrogation at start and during shift</li> <li>• Employee trained in use of L2 policy</li> <li>• Detailed and documented discussion of all individual</li> </ul>	<p>Under extreme risk conditions, controls from the low, moderate, high and extreme categories are employed.</p> <p>Prior sleep wake reporting would generally be used. This includes specific information about prior sleep, prior wake, and associated fatigue risk and results in a personal fatigue likelihood score. This score can then be used as a Level 2 marker of fatigue. This is generally calculated in the context of Level 1 and Level 3 controls and provides and understanding of the likelihood that the individual is experiencing fatigue. This can then be used to determine what controls are implemented to ensure safety for that individual and their workplace. Peer support is also typically used to address fatigue. This may include employees reporting fatigue to their team and taking steps to address risk, in addition to employees being aware of the potential signs of</p>

		<p>FFW before continuing to work</p>	<p>fatigue in their colleagues. In the workplace, this generally includes having co-workers double check critical tasks if required. This acts as a control against the occurrence of a fatigue-related accident or incident. Actual hours, rather than planned hours, are generally interrogated, to ensure that guidelines are being followed and appropriate control measures are being used, to ensure that additional fatigue has not built up without being addressed. Supervisors are also generally trained in the use of fatigue calculators (i.e. biomathematical modelling tools that can identify high risk times for fatigue). Fatigue calculators can be used while rosters are being developed, or post-development, to assist in managing relevant risk control measures. Under high and extreme risk conditions, supervisors typically provide support to their employees regarding fatigue management. This typically involves a supervisor being contacted for assistance with decision making or safety critical tasks and is done to ensure that work is performed safely. Active interrogation of fatigue and risk prior to and during shifts is also generally used in the high-risk context. This may include self-assessment, supervisor assessments, or fitness for duty testing. This is done as to further ensure that employees are not experiencing fatigue levels that may impact safety. Employees are usually trained in the use of any tools or strategies that assess prior sleep/wake and fatigue risk. This training is necessary to ensure that these tools are used appropriately and are therefore employees can rely on them for accurate risk and fatigue assessment in the workplace.</p> <p>Prior to commencing any extreme risk work, there is usually a discussion of each employee's specific fitness for work, including prior sleep/wake and any other potential risk factors. This is typically thoroughly documented prior to commencing this work. This discussion is used as a way to ensure that individuals are fit for duty</p>
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			and have addressed all necessary fatigue related issues that may be present.
	<b>L3</b>	<ul style="list-style-type: none"> <li>• Exceptional KSS reporting</li> <li>• Peer decision support</li> <li>• Active interrogation before additional hours</li> <li>• Supervisor decision support</li> <li>• Active interrogation at start and during shifts</li> <li>• 2-up decision support</li> <li>• Frequent monitoring during work period</li> </ul>	<p>Employees are generally required to utilise the Karolinska Sleepiness Scale to document their perceived level of alertness/sleepiness as required. This is a validated scale, and as such is effective in determining the individual's current level of alertness or sleepiness. Peers are generally engaged to assist in decision making under moderate risk circumstances. This involves co-workers double checking critical tasks, providing second opinions or other assistance where required. This is done to mitigate the risk of a potential incident or accident. Additionally, active interrogation regarding fatigue risk is generally used if the employee has been asked to complete any overtime or unplanned additional hours/shifts, because this extra work time can result in heightened fatigue.</p> <p>Supervisors would typically be engaged for decision making at the high-risk level. This may include assistance with decision making, double checking critical tasks or other assistance as required, to ensure that all work is performed safely. Supervisory assistance is often particularly useful as these individuals are generally aware of broader requirements and relevant procedures. Active interrogation of fatigue and risk prior to and during shifts is generally also used. This may include self-assessment, supervisor assessments, or fitness for duty testing. These measures are taken to ensure that any fatigue is identified and can be managed appropriately.</p> <p>Decisions under circumstances designated as having extreme risk are generally required to be supported by 2-up managers. This is to ensure that any safety critical decisions are not impacted by the effects of fatigue in those who are directly involved and may be unable to detect some issues due to their own fatigue or broader issues under emergency circumstances. Fatigue must typically be monitored</p>

			frequently during work periods that are identified as extreme risk. This may include supervisor check-ins, formal self- or supervisor assessment tools and is done to identify any increase in fatigue risk that may have developed during the course of the shift.
<b>Audit and compliance</b>	<ul style="list-style-type: none"> <li>• Review to be performed by a competent person (external independent review)</li> <li>• Documented- Pre-incident modelling Post-incident review Corrective action review</li> </ul>		When an extreme risk category is identified, reviews are usually completed by a competent person who is external and independent from the workgroup. Fatigue and risk modelling are typically performed proactively, prior to incidents. This may include biomathematical tools, hazard and risk identification, outcome assessment, risk profiles, etc. This is done to identify any specific times of day, roster stage, work type, etc. that may have a higher risk of a fatigue related incident or accident. Post-incident review generally also is required to identify if and how fatigue played a role in the outcome. This review then will normally lead to appropriate changes in policy and procedure in order to avoid another incident. Corrective actions must also be reviewed in order to identify and alter any policies or procedures that may be resulting in avoidable fatigue risk.

# JOURNEY MANAGEMENT PLAN TEMPLATE



Appendix 7. Example journey management form (Pilbara Ports Authority)

SECTION 1: TRAVEL DETAILS				
Primary Driver Name:	Reason for travel:		Departure Date & Time: / / , :	
Primary Driver Signature:	Journey Description (From/To, Via):		Est Date & Time of Arrival: / / , :	
Passenger Name/s:	Contact at Destination (Name and Ph):		Vehicle Registration:	
SECTION 2: RISK ASSESSMENT STRIKE OUT CONTROLS WHICH ARE NOT APPLICABLE / CIRCLE (□) TO CONFIRM RISK RATING, OR AMEND AS APPROPRIATE				
Hazard	Causes	Impact	Controls	Risk Rating
Loss of control of vehicle	Driver error Interaction with fauna Inclement weather Variable standard of road surfaces	Personal injury and/or damage to vehicle resulting from: Collision with another vehicle, livestock, or wildlife Single vehicle collision	Driver is licensed for the class of vehicle being driven. Driver is well rested and free from the influence of alcohol and drugs (including prescription medication with drowsiness warnings). Driver modifies speed to cater for factors such as weather, traffic, fauna, and road conditions. Journey is scheduled conclude within 14 hours of start of work day. A pre-start inspection of the vehicle is carried out and all safety concerns addressed prior to departure. Vehicle equipped with trauma/first aid kit. Travel commences after dawn and concludes before dusk. <i>Other:</i> <i>Other:</i>	

# JOURNEY MANAGEMENT PLAN TEMPLATE



Hazard	Causes	Impact	Controls	Risk Rating	
Vehicle stranded	Mechanical failure Collision Lack of fuel	Personal illness Personal harm	All controls as stated above (per "Loss of control of vehicle") Minimum 1 litre of water for every 1 hour of journey per person on board. Fleet Care (roadside assist) contact details recorded in the vehicle. Mobile telephone on board (in case mobile reception available). All personnel remain with vehicle. Driver and/or passengers familiar with route, or maps on board. <i>Other:</i> <i>Other:</i>	<div style="display: flex; justify-content: space-between; width: 100%;"> <div style="width: 25%; background-color: #90EE90;"></div> <div style="width: 25%; background-color: #FFFF00;"></div> <div style="width: 25%; background-color: #FFA500;"></div> <div style="width: 25%; background-color: #FF0000;"></div> </div>	
Roads inaccessible	Bushfire, flood, motor vehicle incident, mustering	Modified route required Delayed arrival	Driver modifies speed to cater for factors such as weather, traffic, fauna, and road conditions. Driver follows the direction of emergency services personnel as applicable, tunes in to radio for emergency updates (e.g. ABC Local Radio; Port Hedland:603AM, Marble Bar:105.9FM, Karratha: 702AM) Deviations from planned route (as above) reported to Contact at destination however possible. Shared driving where driver reports experiencing signs of fatigue. <i>Other:</i> <i>Other:</i>	<div style="display: flex; justify-content: space-between; width: 100%;"> <div style="width: 25%; background-color: #90EE90;"></div> <div style="width: 25%; background-color: #FFFF00;"></div> <div style="width: 25%; background-color: #FFA500;"></div> <div style="width: 25%; background-color: #FF0000;"></div> </div>	
<b>SECTION 3: TRAVEL APPROVAL</b>					
Approver Name and Position:			Approver Signature:	Approved Date:	Approved Time: :

**See over for Approver requirements and PPA Risk Matrix**

# JOURNEY MANAGEMENT PLAN TEMPLATE



		CONSEQUENCE				
		INSIGNIFICANT	LOW	MODERATE	HIGH	CATASTROPHIC
Life/Health		First Aid Treatment	Medical treatment or occupational illness (recoverable).	Lost time injury or occupational injury (recoverable); Restricted Work Injury	Fatality or disabling injury or occupational illness (non-recoverable)	Multiple fatalities or disabling permanent injuries
Likelihood	Almost Certain	Moderate	High	High	Extreme	Extreme
	Likely	Moderate	Moderate	High	High	Extreme
	Possible	Low	Moderate	High	High	High
	Unlikely	Low	Low	Moderate	Moderate	High
	Rare	Low	Low	Moderate	Moderate	High

## RISK TOLERANCE LEVELS

GREEN LOW	<i>Driver may approve.</i> Driver must review the JMP and verify that identified controls can be fully implemented, and that all personnel fully understand the task and their role. The journey may proceed with caution, but be prepared to reassess the risk
YELLOW MODERATE	<i>PPA Supervisor input required.</i> Supervisor must review the JMP, and discuss potential additional controls with the Driver. If controls cannot be implemented to reduce the risk rating to green, the Supervisor must sign the JMP as 'Approver'.
ORANGE HIGH	<i>PPA One-up Line Manager* input required.</i> One-up Line Manager must review the JMP, and discuss potential additional controls with the driver or their supervisor. If controls cannot be implemented to reduce the risk rating to yellow or green, the One-up Line Manager must sign the JMP as 'Approver'.

## JOURNEY MANAGEMENT PLAN TEMPLATE



RED <i>EXTREME</i>	<i>Journey must not proceed.</i> Input must be sought from the appropriate Manager for further advice. If controls cannot be implemented to reduce the risk rating to orange, yellow or green, the task must be reconsidered, alternative travel methods employed, or a full Risk Assessment conducted to establish suitable controls
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## Reference

Dawson, D., & Reid, K. (1997). Fatigue, alcohol and performance impairment. *Nature*, 388(6639), 235-235.