Document 1

Risk of transmission of SARS-CoV-2 outdoors, standing at 2-4 metres separation, and shielding by hessian screens

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5 Oct 2021

Motivation: to determine how safe it is for returnees, residing in a managed quarantine facility, to speak to non-quarantining visitor outdoors: adding to our results dated 14 Sep, we modelled separations > 2m and hessian screens.

Assumptions: worst-case wind direction (visitor is downwind of returnee); wind speed 1.8 to 4.0 kph; wind speed uniform with height; both are wearing surgical masks (75% reduction in infectious material on exhalation; 40% reduction on inhalation); exhaled particles 1.5 microns in diameter; returnee exhales viable virus at 16.8 quanta/hour or 28,000 quanta/hour (AIRC 3.0 estimate for standing, speaking, Delta variant, 66th or 99.9th percentile emission rate respectively); effect of vaccination ignored; 5 minutes exposure; air temperature 20 °C; uncovered skin (head and neck) at 36.5 °C, clothing at 30 °C.

Method: CFD simulation of wind flow (steady state, RANS (quick) or LES turbulence (more accurate) model) and AIRC 3.0 methodology for risk estimation.

Results: Increasing separation, without hessian screen, at worst case wind speed 4.0 kph, risk reduces from 0.05% (2 m separation) to 0.02 % (4m separation) (66th percentile emitter). For a 99.9th percentile emitter risk varies from 55 to 22%. (4.0 kph 2 m separation risk was misquoted as 9% in previous results).

Hessian screen partially deflects the flow and reduces risk further. The risk values for 66th percentile are, at 3.9 kph, 0.12% (no screen), 0.11% (screen with 50% open area), and 0.088% (screen with 25% open area); at 1.8 kph, 0.13% (no screen), 0.077% (50% open), and 0.0024% (25% open) (2m separation, RANS model). Variability of the wind will reduce the risk further.

Limitations: Several assumptions have been made, the most important probably being those concerning the viral emission rate. Worst-case conditions will vary with relative height of the two persons. Relative risk is more reliable than absolute.

Increasing separation from 2 to 4 m

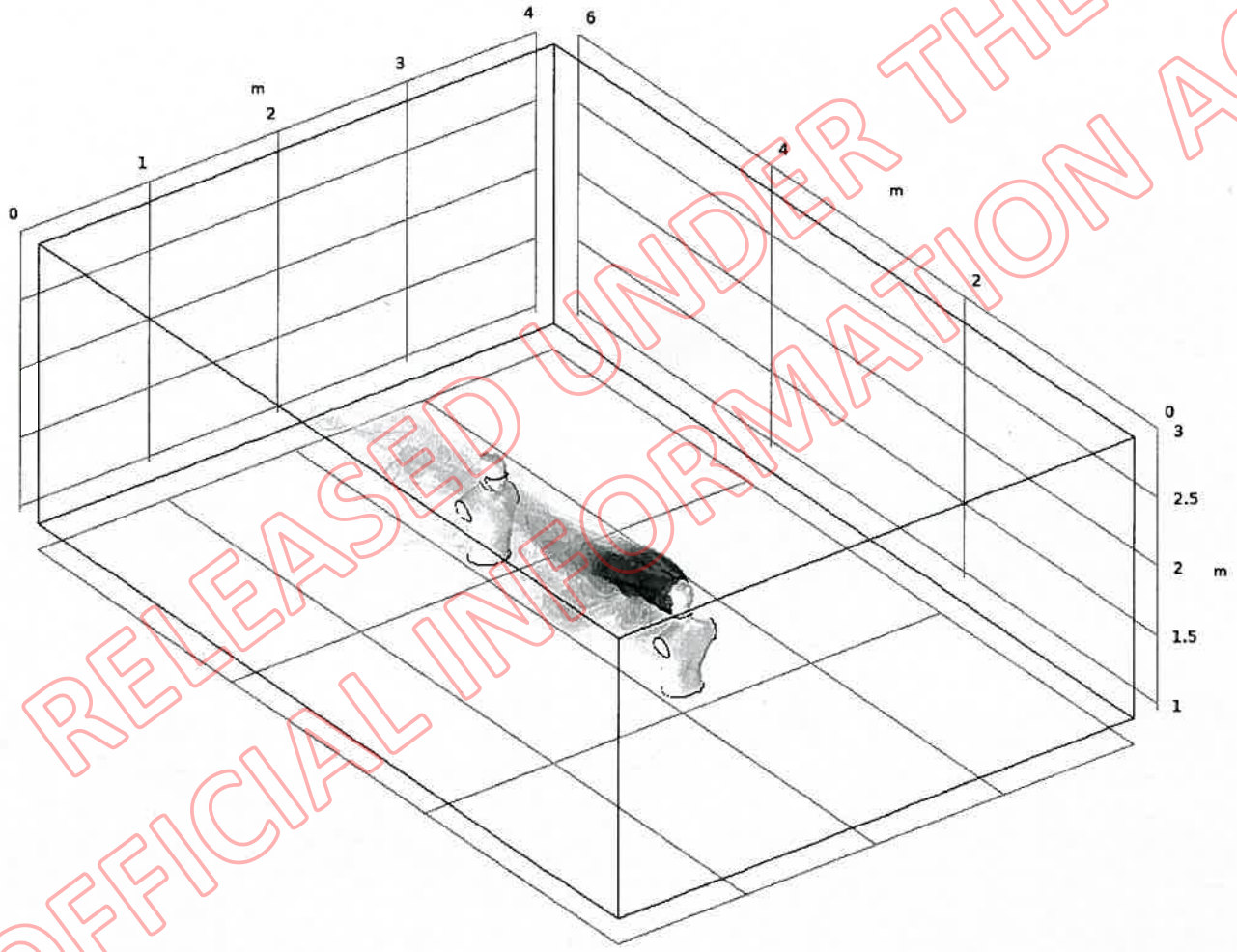
LES turbulence model (more accurate)

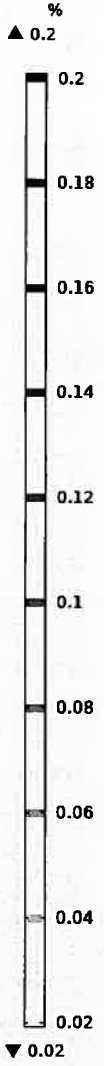
Wind 4.0 kph (worst case with this turbulence model)

16.8 quanta/hour (66th percentile)

2 m separation

Risk of infection 0.05%





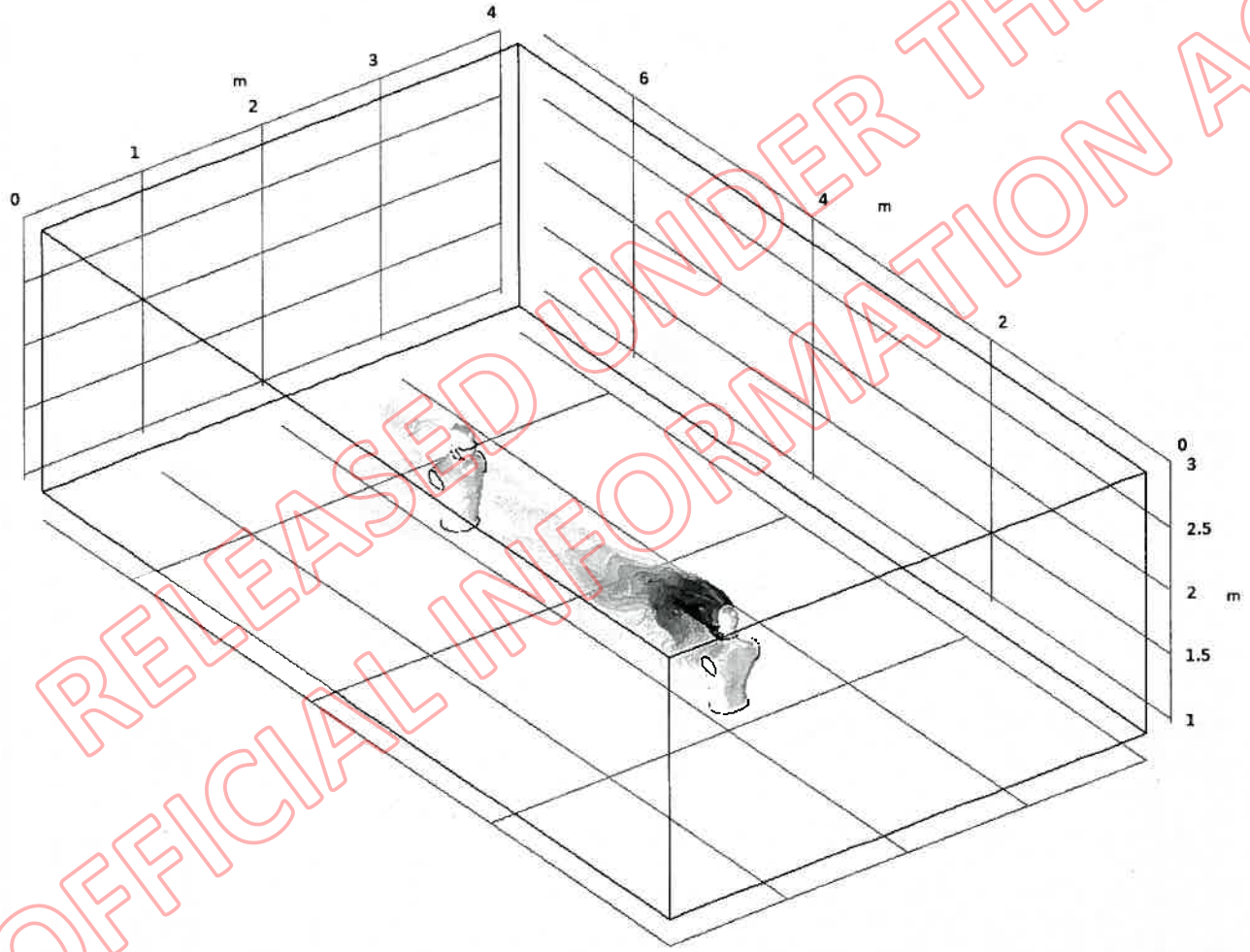
LES turbulence model (more accurate)

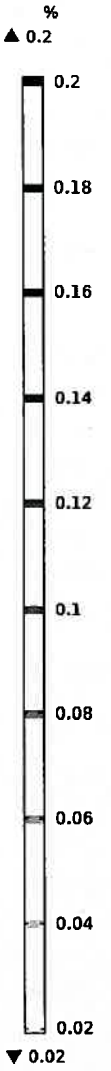
Wind 4.0 kph (worst case with this turbulence model)

16.8 quanta/hour (66th percentile)

3 m separation

Risk of infection 0.03%





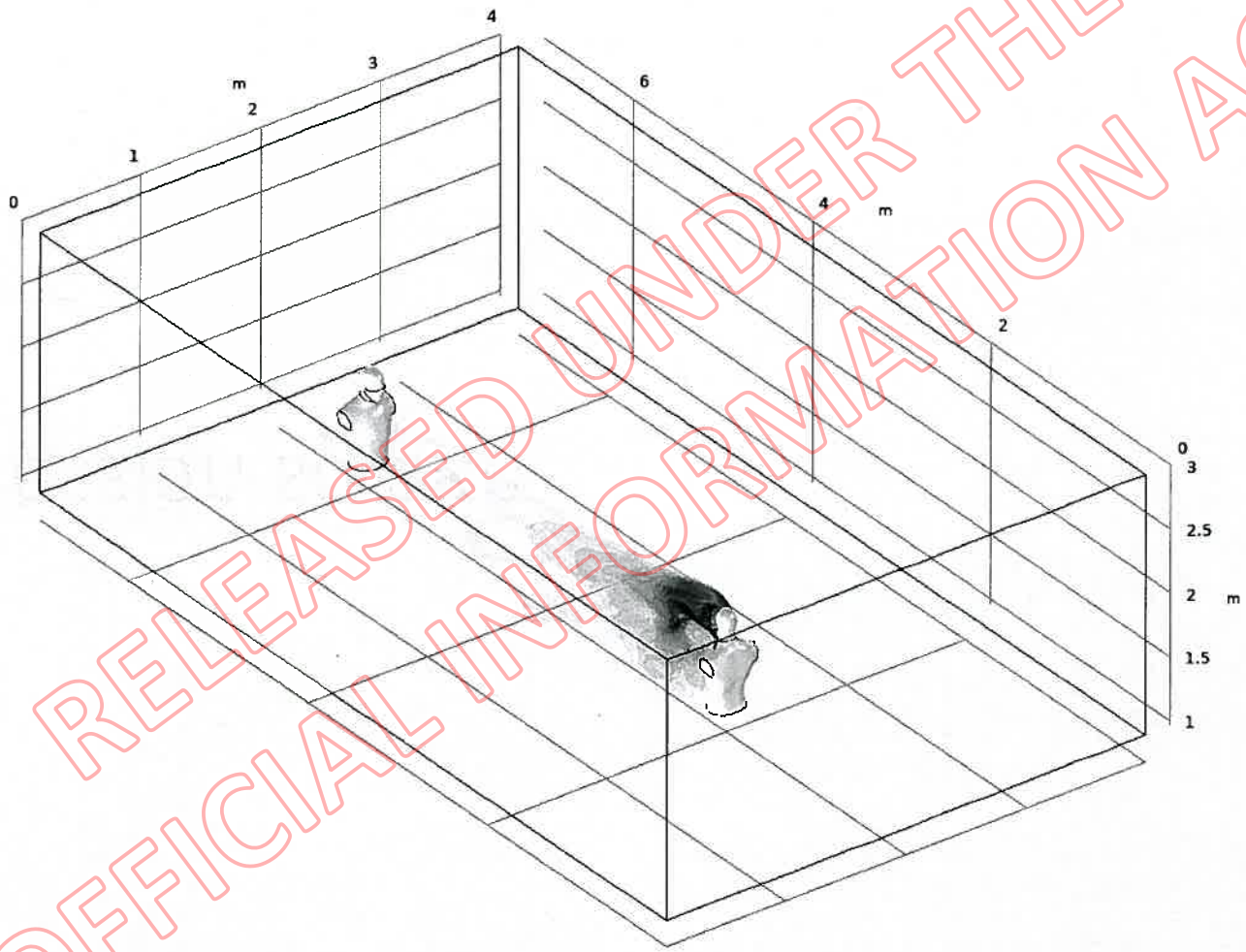
LES turbulence model (more accurate)

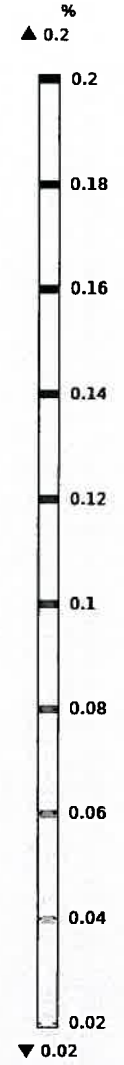
Wind 4.0 kph (worst case with this turbulence model)

16.8 quanta/hour (66th percentile)

4 m separation

Risk of infection 0.02%

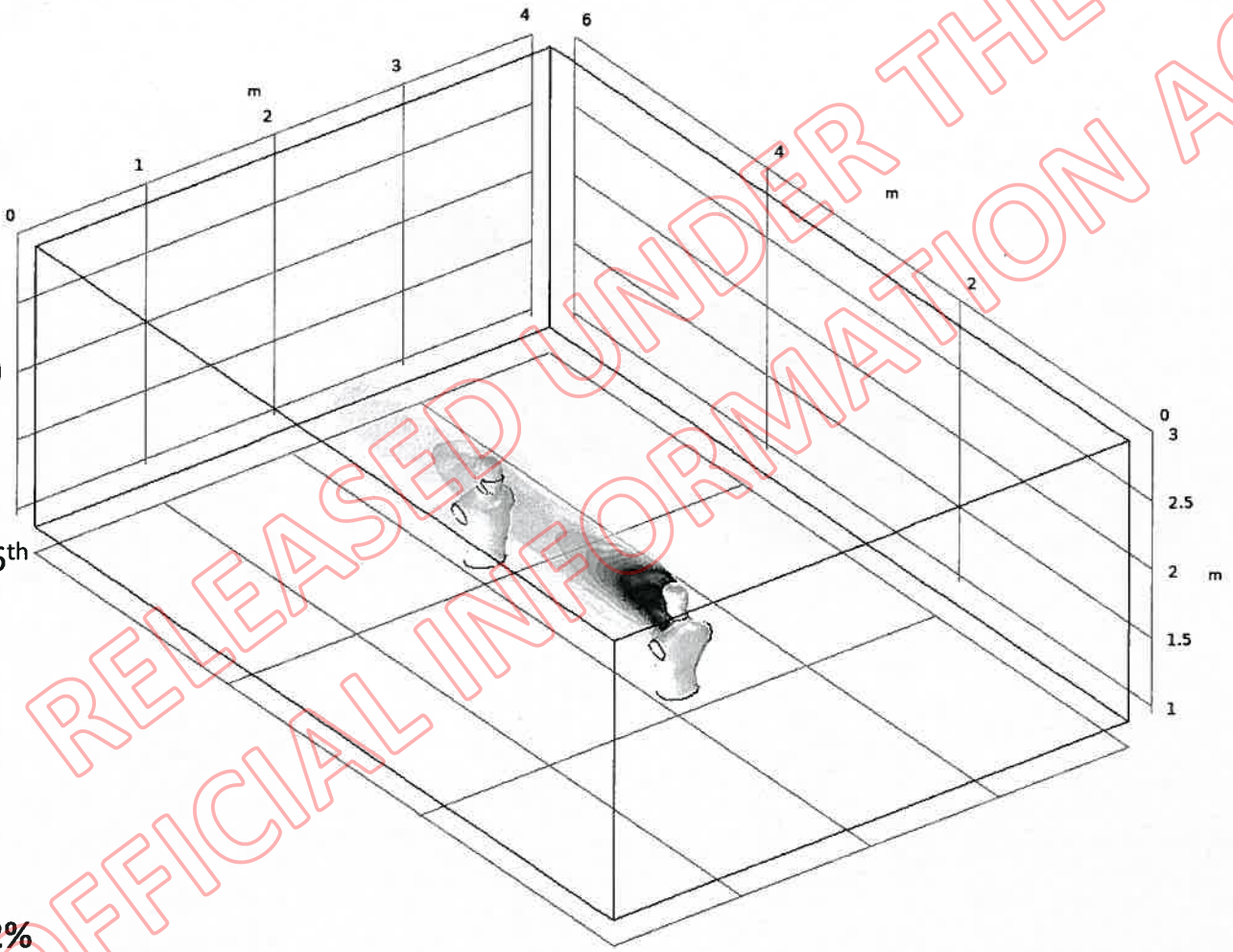


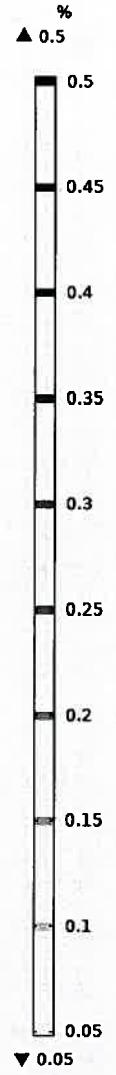


With hessian screen

u_inlet(1)=1 m/s

Isosurface: P_I[%] (%)





RANS turbulence model (less accurate)

3.9 kph wind

16.8 quanta/hour (66th percentile)

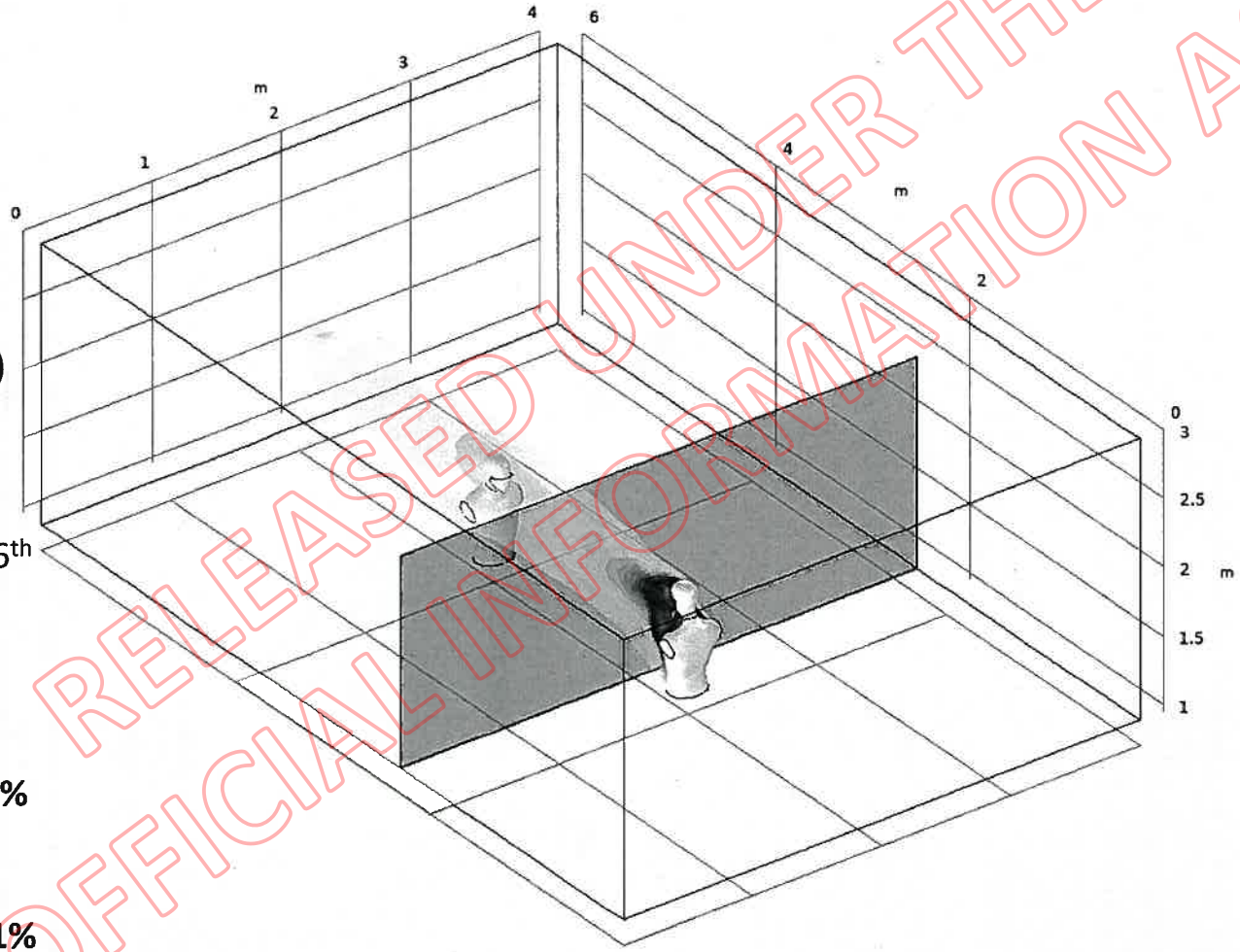
2m separation

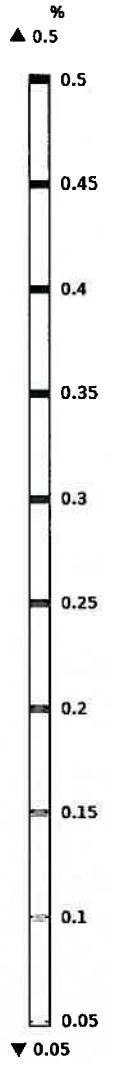
No screen

Risk of infection 0.12%

theta_s=0.5, u_inlet=1 m/s

Isosurface: P_I[%] (%)





RANS turbulence model (less accurate)

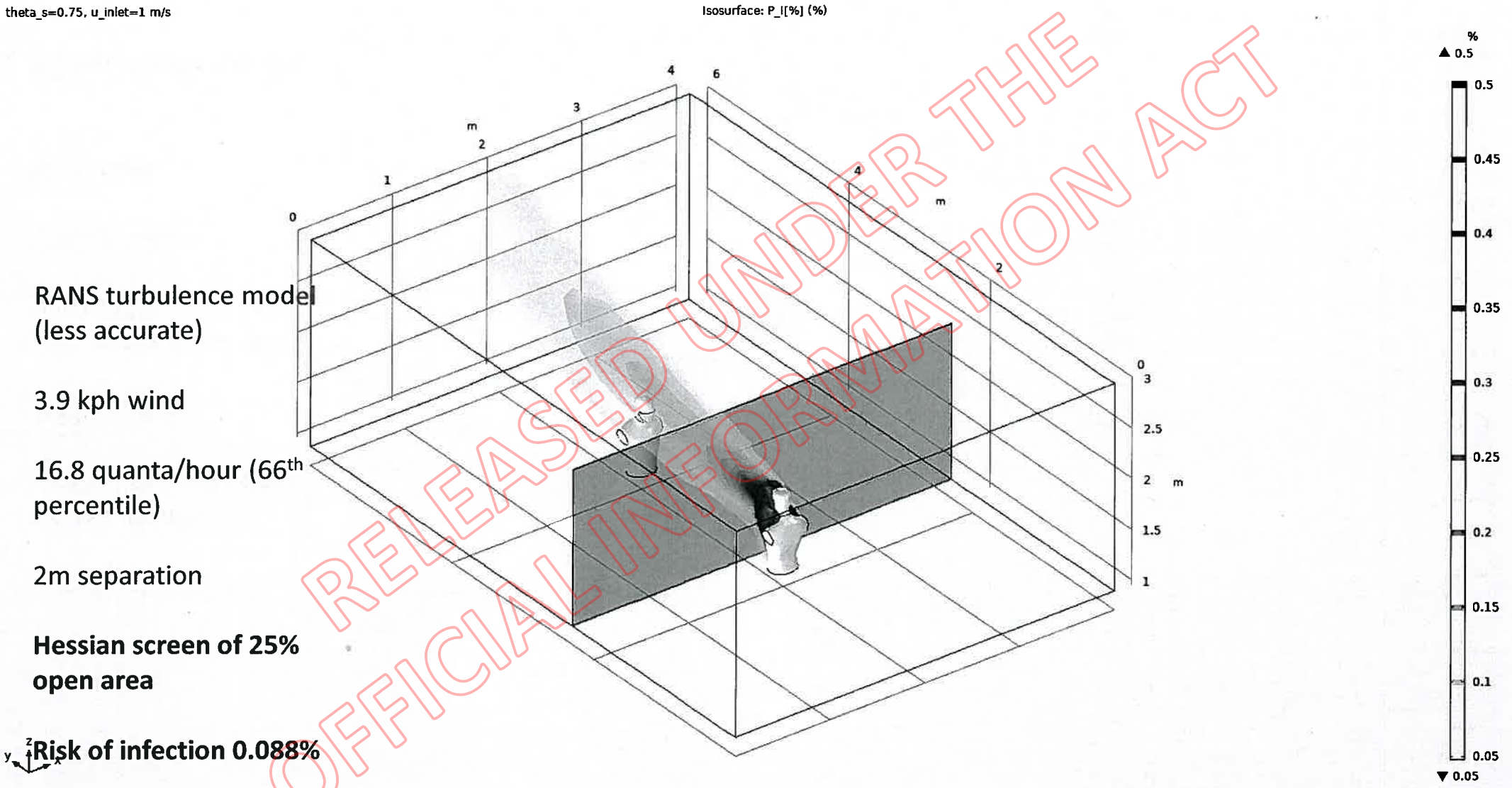
3.9 kph wind

16.8 quanta/hour (66th percentile)

2m separation

Hessian screen of 50% open area

Risk of infection 0.11%



RANS turbulence model (less accurate)

3.9 kph wind

16.8 quanta/hour (66th percentile)

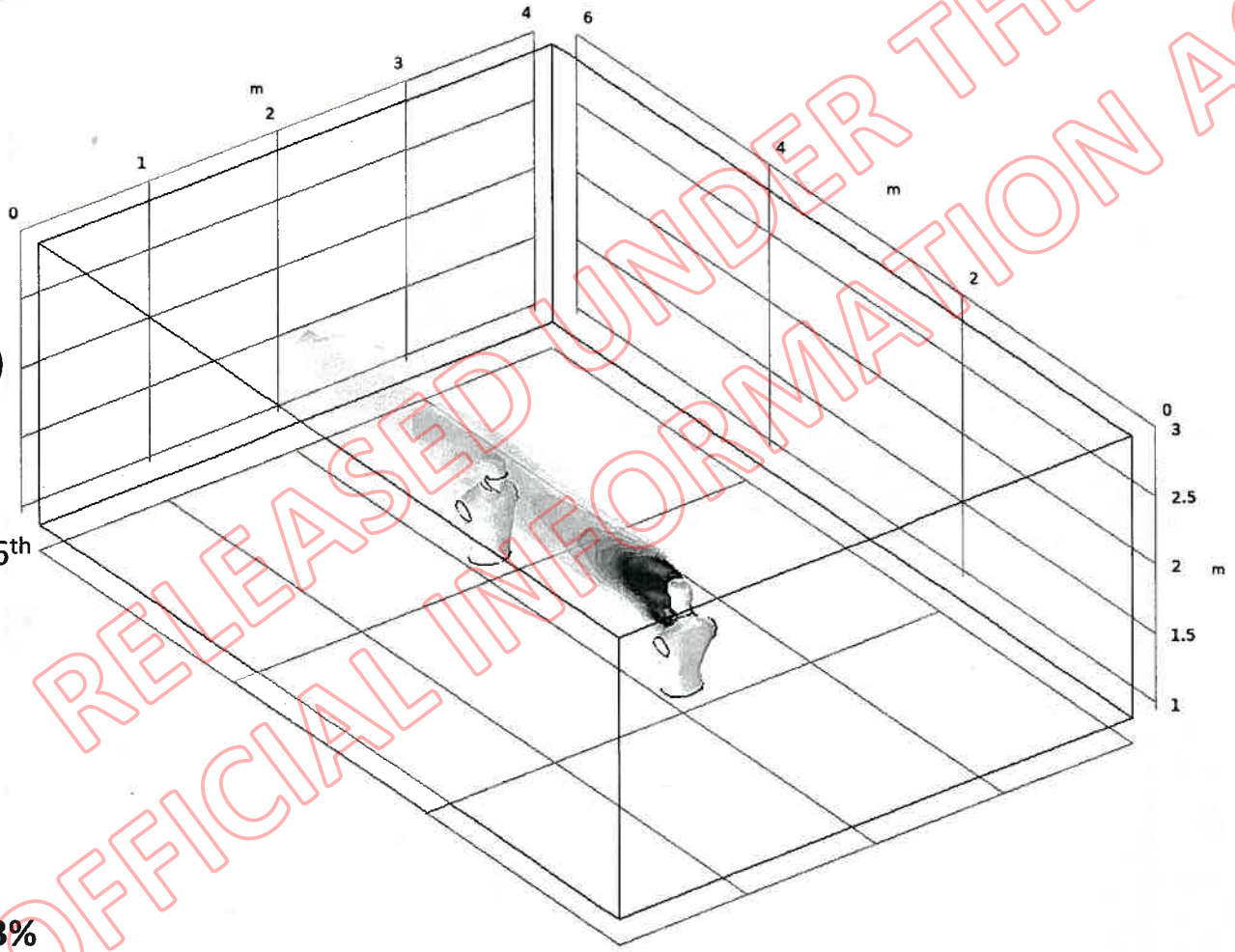
2m separation

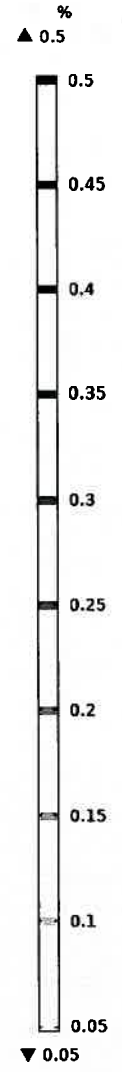
Hessian screen of 25% open area

Risk of infection 0.088%

u_inlet(2)=0.5 m/s

Isosurface: P_i[%] (%)





RANS turbulence model (less accurate)

1.8 kph wind

16.8 quanta/hour (66th percentile)

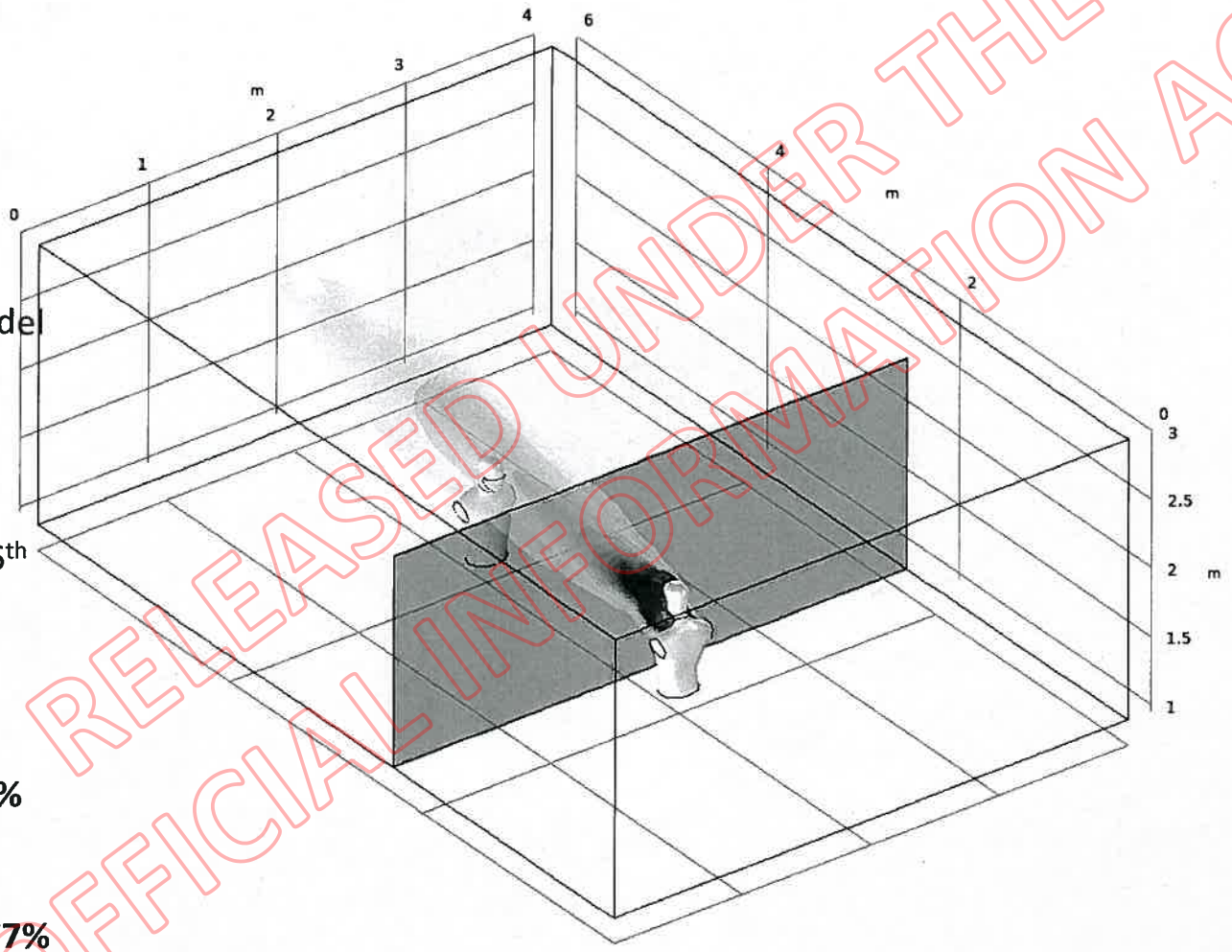
2m separation

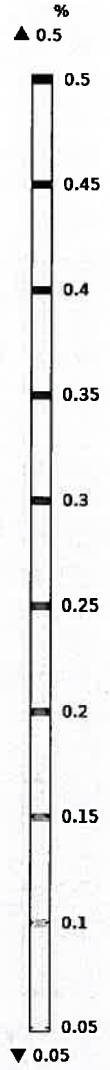
No screen

Risk of infection 0.13%

theta_s=0.5, u_inlet=0.5 m/s

Isosurface: P_i[%] (%)





RANS turbulence model (less accurate)

1.8 kph wind

16.8 quanta/hour (66th percentile)

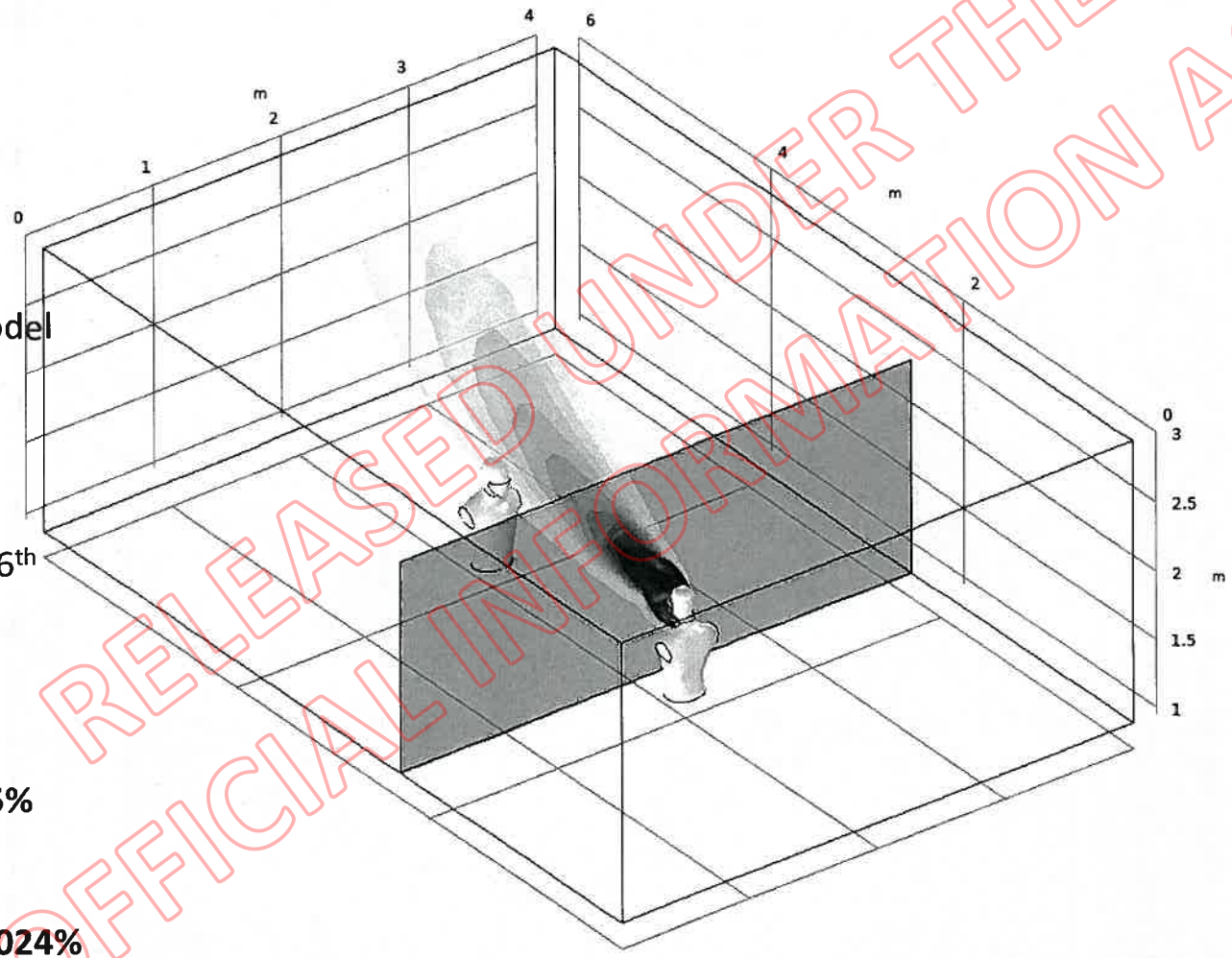
2m separation

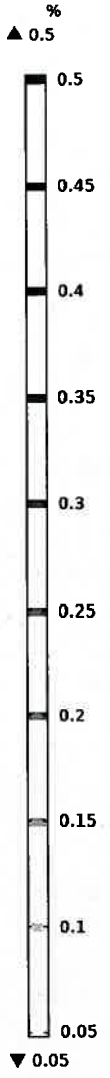
Hessian screen of 50% open area

Risk of infection 0.077%

theta_s=0.75, u_inlet=0.5 m/s

Isosurface: P_I[%] (%)





RANS turbulence model (less accurate)

1.8 kph wind

16.8 quanta/hour (66th percentile)

2m separation

Hessian screen of 25% open area

Risk of infection 0.0024%

Emails

Out of scope

From: s 9(2)(g)(ii) @mbie.govt.nz>
Sent: Tuesday, 12 October 2021 1:11 PM
To: s 9(2)(a)
Cc: s 9(2)(g)(ii) @mbie.govt.nz>
Subject: FW: Response To Crowne Plaza Facility - Risk to the Public Using Walkway in Front of Facility [IN-CONFIDENCE]

Hi s 9(2)(a)

Please find attached the ventilation response we have been working on for you. The attached powerpoint is particularly good from an illustrative perspective.

This information has been reviewed and signed off by our ventilation team and senior management.

Let me know if you need anything else.

s 9(2)(g)(ii)

****
****
Kia ora s 9(2)(a)

Thanks for your email of 13 Sep and apologies for the delay responding. We do not consider a further re-audit and testing investigation necessary in light of the work done and further modelling with the University of Canterbury. This work has been presented to the MIQ TAG and provides a comprehensive summary of risks based on varying conditions. The details of the modelling are summarised below.

Overview

There were two areas of concern raised by Huawei:

1. the Albert St outdoor fresh air area where friends and family are able to gather and talk to a returnees
2. the Albert St accessway in front of the Crowne Plaza which has recently been closed in by City Rail Link

Albert St Fresh air Area

Returnees are permitted to talk to their family members through pre-determined and monitored gaps in the perimeter fence and they adhere to strict Infection Prevention and Control guidelines. The perimeter fence meets the MIQ Perimeter Fencing Standard (height, double layered with a 2m gap) and the returnees wear masks. Returnees are only able to access the fresh air area once they have returned a Day 0/1 negative Covid-19 test and returnees are also not permitted to access the fresh air area if they are symptomatic.

Additionally, University of Canterbury completed some modelling (in conjunction with Health professionals) of an infectious returnee speaking, at 2m separation, with a visitor. The modelling was based on the visitor being exposed for five minutes and the worst-case wind speed and wind direction (i.e. blowing from behind the returnee towards the visitor). The modelling indicated that the risk to the visitor of contracting the virus was on average 0.1%. Please refer to the attached slides detailing the results of the modelling. The 0.1% figure would be further reduced as no-one leaves their room before obtaining a day 1 negative test result.

Albert St Access Way

An audit of the forecourt in front of the Crowne Plaza Managed Isolation Facility, including a check of the distances where returnees disembark the bus when they arrive at the facility, indicates that the minimum distance that a returnee will be from either entrance of the accessway will be in excess of six metres.

The risk to someone using the accessway is considerably less that the risk of 0.1% based on the data modelling at 2m separation. For aerosol from a positive returnee to enter the accessway they would have to be standing up wind of one of the entrances which is not the case given that they disembark from the bus to the side of the accessway. Also, when returnees leave the bus, the bus is between them and the accessway acting as an additional barrier further reducing the risk of transmission.

Summary

Based on the data modelling completed by University of Canterbury in an outdoor space where the virus can disperse and is rapidly inactivated by UV light the likelihood of a person contracting the virus standing 2m from an infected person wearing a mask is considered low at 0.1% (based on a 5 minute exposure duration with a worst-case wind direction).

For distances greater than 2m (i.e. 6m) and for durations shorter than 5 minutes (which is the case when disembarking from a bus and walking directly into the Crowne Plaza facility) the risk to a member of the public is considerably less.

Based on the modelling by University of Canterbury coupled with the added distances and other practices (around disembarking from buses) we do not believe there is a need for a 're-audit' and hopefully this summary provides the assurance that Huawei's staff are after.

Overall, the risk to people using the accessway in front of the Crowne Plaza Managed Isolation Facility would be very low.

s 9(2)(g)(ii)

s 9(2)(g)(ii)
Manager – Supplier Relationships

Managed Isolation and Quarantine
Ministry of Business, Innovation & Employment

s 9(2)(g)(ii) @mbie.govt.nz | Mobile: +64 s 9(2)(g)(ii)
Level 5, Stout St, Wellington 6011 | PO Box 1473, Wellington 6140, New Zealand

MANAGED ISOLATION AND QUARANTINE

s 9(2)(g)(ii)

From: s 9(2)(g)(ii)
Sent: Tuesday, 12 October 2021 11:01 am
To: s 9(2)(g)(ii)
Subject: RE: Response To Crowne Plaza Facility - Risk to the Public Using Walkway in Front of Facility [IN-CONFIDENCE]
Attachments: Returnee speaking with 2-4m separation and screen outside v2a.pptx

Yes we are … see highlighted text (and attached).

s 9(2)(g)(ii)

From: s 9(2)(g)(ii) @mbie.govt.nz>
Sent: Tuesday, 12 October 2021 10:56 AM
To: s 9(2)(g)(ii) @mbie.govt.nz>; s 9(2)(g)(ii) @mbie.govt.nz>
Subject: FW: Response To Crowne Plaza Facility - Risk to the Public Using Walkway in Front of Facility [IN-CONFIDENCE]

Hi both,

Can you answer to s 9(2)(g)(ii) question below?

s 9(2)(g)(ii)

From: s 9(2)(g)(ii) @mbie.govt.nz>
Sent: Tuesday, 12 October 2021 10:53 am
To: s 9(2)(g)(ii) @mbie.govt.nz>
Subject: RE: Response To Crowne Plaza Facility - Risk to the Public Using Walkway in Front of Facility [IN-CONFIDENCE]

hi s 9(2)(g)(ii) thanks for this – are we going to provide the modelling pictures from Canterbury University

s 9(2)(g)(ii)

From: s 9(2)(g)(ii) @mbie.govt.nz>
Sent: Tuesday, 12 October 2021 10:02 AM
To: s 9(2)(g)(ii) @mbie.govt.nz>
Cc: s 9(2)(g)(ii) @mbie.govt.nz>
Subject: Response To Crowne Plaza Facility - Risk to the Public Using Walkway in Front of Facility [IN-CONFIDENCE]

Hi s 9(2)(g)(ii)

Please see below the response for the above (subject line) enquiry.

The response has been reviewed and approved by s 9(2)(g)(ii)

Thanks,
s 9(2)(g)(ii)

s 9(2)(g)(ii) BUSINESS MANAGER

Service Quality & Assurance (SQA) | Managed Isolation and Quarantine (MIQ)
Ministry of Business, Innovation & Employment

s 9(2)(g)(ii) @mbie.govt.nz | Telephone: +64 s 9(2)(g)(ii) | Mobile: +64 s 9(2)(g)(ii)
Level 5, 15 Stout Street, Wellington 6011 | P O Box 1473, Wellington 6140, New Zealand

MANAGED ISOLATION AND QUARANTINE

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

New Zealand Government

NZBN 9429000106078

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****

Kia ora s 9(2)(a)

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Based on the modelling by University of Canterbury coupled with the added distances and other practices (around disembarking from buses) we do not believe there is a need for a 're-audit' and hopefully this summary provides the assurance that Huawei's staff are after.

Overall, the risk to people using the accessway in front of the Crowne Plaza Managed Isolation Facility would be very low.

s 9(2)(g)(ii)

From: s 9(2)(g)(ii)
Sent: Thursday, 16 September 2021 8:58 pm
To: s 9(2)(g)(ii)
Subject: FW: Additional information request - from tenants of Huawei Tower next to the Crowne Plaza [UNCLASSIFIED]

Hi s 9(2)(g)(ii)

Have you had any luck pulling this info together – am getting chases by the hotel owner.

s 9(2)(g)(ii)

From: s 9(2)(g)(ii)
Sent: Monday, 13 September 2021 2:07 PM
To: s 9(2)(g)(ii) @mbie.govt.nz>; MIQ Ventilation < s 9(2)(k) @mbie.govt.nz>
Cc: Shayne Gray <Shayne.Gray@mbie.govt.nz>; Andrew Milne <Andrew.Milne@mbie.govt.nz>
Subject: FW: Additional information request - from tenants of Huawei Tower next to the Crowne Plaza [UNCLASSIFIED]

Hi s 9(2)(g)(ii)

Hoping you might be able to assist please. Even after all the great work last week to clear Crowne Plaza's name the tenants in the Huawei Building next door to the hotel and still asking for more assurances.

I'm not sure that we need to go through the retesting process again (as they have requested) as I understand all their concerns were our concerns too and that we addressed these with the TAG last week. But are there any other documents that we might be able to share with s 9(2)(b)(ii) that would assist them in allaying their tenants fears.

I recall from the media statements that there was modelling done by Canterbury University etc.

s 9(2)(g)(ii)

From: s 9(2)(a)
Sent: Monday, 13 September 2021 12:10 PM
To: s 9(2)(g)(ii) @mbie.govt.nz>
Subject: Additional information request.

Good afternoon s 9(2)(g)(ii)

I hope you managed to get some time away from work over the weekend.

Below is an extract from a letter that the Hotel Owners have received from Huawei, a tenant in the Huawei tower, s 9(2)(a) .

Can I please ask that this be escalated to an appropriate person. If this is not possible could you please let me know.

Many thanks in advance

s 9(2)(a)

4. It is worth mentioning also, that the public perception created and audit results provided to the public by MOH officials and the media on 8 September regarding the investigation results of the MIQ Hotel were incomplete at best, and misleading at worst. Given this omission, it is curious to read the "Update on Crowne Plaza MIF" dated 8 September 2021 which states that the source investigation was "thorough" and that the MIQ Technical Advisory Group (TAG) in fact appeared to acknowledge the risk of exposure to users of the Accessway was indeed possible. These are concerning statements for users of the Throughfare, Accessway and surrounding public areas.

Given these deficiencies, we now respectfully request as a matter of urgency:

a) That you request the MOH to complete, by no later than Friday 17 September, an urgent re-audit and valid testing investigation of the Throughfare, Albert St outdoor exercise area and Accessway, including the recently proposed changes to those areas, also making the subsequent report and findings available to Huawei in full (specific consideration should be made to the Accessway which will effectively act as a wind tunnel once the roof has been added, thus creating a containment area that is likely to concentrate any aerosol for the duration of its length along the Accessway, and the open ends of the exercise area where friends and family of returnees have been permitted to gather); and

b) That you request the MOH provide the full MIQ Technical Advisory Group (TAG) assessment methodology, report document and scientific basis for their findings to Huawei by Wednesday 15 September please

s 9(2)(a)
Area General Manager
New Zealand

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AN IHG HOTEL
AUCKLAND

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