

## 2.3 Predicted operational noise levels

Table 9 to Table 14 present the predicted noise levels at each of the assessment locations during each of the reasonable worst case operational scenarios and determine compliance with the noise limits presented in Section 1.2.

It should be noted that in accordance with the EPA INP:

*"A development will be deemed to be in non-compliance with a noise consent or licence condition if the monitored noise level is more than 2 dB above the statutory noise limit specified in the consent or licence condition."*

### 2.3.1 Reasonable worst case intrusiveness scenario (15 minute period)

The following are the modelled results for the reasonable worst case intrusiveness scenario (15 minute period). The modelling scenarios are presented in Section 2.2.4, and it is expected that this scenario could occur during the day, evening or night-time assessment periods.

Table 9 Reasonable worst case intrusiveness scenario (15 minute period) - Scenario 1 - Three trucks filling during 15 minute period

Period	Day/Evening/Night								
	Neutral			3 m/s source to receiver wind			Temperature inversion (F-Class, 3°C/100 m)		
Assessed meteorological condition									
Receiver	Predicted noise level, $L_{Aeq}(15\text{ min})$ , dB(A)	Criteria dB(A)	Compliance with noise criteria, dB(A)	Predicted noise level, $L_{Aeq}(15\text{ min})$ , dB(A)	Criteria dB(A)	Compliance with noise criteria, dB(A)	Predicted noise level, $L_{Aeq}(15\text{ min})$ , dB(A)	Criteria dB(A)	Compliance with noise criteria, dB(A)
R1	26	35	Yes	31	35	Yes	30	35	Yes
R2	36	35	Yes	41	35	No (+6)	40	35	No (+5)
R3	28	35	Yes	32	35	Yes	32	35	Yes
R4	36	35	Yes	41	35	No (+6)	40	35	No (+5)
R5	20	35	Yes	26	35	Yes	25	35	Yes
R7	27	35	Yes	32	35	Yes	31	35	Yes
R8	27	35	Yes	31	35	Yes	31	35	Yes
R9 <sup>1</sup>	33	45	Yes	38	N/A	N/A	37	N/A	N/A
R10	18	35	Yes	24	35	Yes	24	35	Yes

Notes:

- The approval condition states a noise level criteria of 35 dB(A), to which the following note applies, "Noise limits for Mayfield East Public School is an internal noise level for the noisiest 1-hour period when in use". As such a 10 dB reduction has been assumed between external and internal noise levels based upon a window being open for adequate natural ventilation for the purposes of assessing an external noise level. Additionally, "N/A" is noted for the evening and a night period as the school is not in use during these times.

Table 10 Reasonable worst case intrusiveness scenario (15 minute period) - Scenario 2 - One trucks filling during 15 minute period, two trucks arrive and two leave the facility

Period	Day/Evening/Night								
	Neutral			3 m/s source to receiver wind			Temperature inversion (F-Class, 3°C/100 m)		
Assessed meteorological condition									
Receiver	Predicted noise level, $L_{Aeq}$ (15 min), dB(A)	Criteria dB(A)	Compliance with noise criteria, dB(A)	Predicted noise level, $L_{Aeq}$ (15 min), dB(A)	Criteria dB(A)	Compliance with noise criteria, dB(A)	Predicted noise level, $L_{Aeq}$ (15 min), dB(A)	Criteria dB(A)	Compliance with noise criteria, dB(A)
R1	28	35	Yes	32	35	Yes	32	35	Yes
R2	34	35	Yes	39	35	No (+4)	38	35	No (+3)
R3	30	35	Yes	34	35	Yes	33	35	Yes
R4	34	35	Yes	39	35	No (+4)	38	35	No (+3)
R5	20	35	Yes	25	35	Yes	25	35	Yes
R7	29	35	Yes	33	35	Yes	32	35	Yes
R8	29	35	Yes	33	35	Yes	32	35	Yes
R9 <sup>1</sup>	33	45	Yes	38	N/A	N/A	37	N/A	N/A
R10	17	35	Yes	23	35	Yes	23	35	Yes

## Notes:

- 1) The approval condition states a noise level criteria of 35 dB(A), to which the following note applies, "Noise limits for Mayfield East Public School is an internal noise level for the noisiest 1-hour period when in use". As such a 10 dB reduction has been assumed between external and internal noise levels based upon a window being open for adequate natural ventilation for the purposes of assessing an external noise level. Additionally, "N/A" is noted for the evening and a night period as the school is not in use during these times.

### 2.3.2 Reasonable worst case amenity (whole of day, evening or night period) scenarios

The following are the modelled results whole of period amenity operating scenarios. The modelling scenarios are presented in Section 2.2.6.

Table 11 Reasonable worst case amenity scenario – Neutral meteorological conditions

Period	Day			Evening			Night		
Assessed Meteorological Condition	Neutral			Neutral			Neutral		
Receiver	Predicted noise level, $L_{Aeq}(15\text{ min})$ , dB(A)	Criteria dB(A)	Compliance with noise criteria, dB(A)	Predicted noise level, $L_{Aeq}(15\text{ min})$ , dB(A)	Criteria dB(A)	Compliance with noise criteria, dB(A)	Predicted noise level, $L_{Aeq}(15\text{ min})$ , dB(A)	Criteria dB(A)	Compliance with noise criteria, dB(A)
R1	29	TBA <sup>2</sup>	TBA <sup>2</sup>	27	TBA <sup>2</sup>	TBA <sup>2</sup>	27	TBA <sup>2</sup>	TBA <sup>2</sup>
R2	36	TBA <sup>2</sup>	TBA <sup>2</sup>	33	TBA <sup>2</sup>	TBA <sup>2</sup>	34	TBA <sup>2</sup>	TBA <sup>2</sup>
R3	30	TBA <sup>2</sup>	TBA <sup>2</sup>	29	TBA <sup>2</sup>	TBA <sup>2</sup>	29	TBA <sup>2</sup>	TBA <sup>2</sup>
R4	36	TBA <sup>2</sup>	TBA <sup>2</sup>	33	TBA <sup>2</sup>	TBA <sup>2</sup>	34	TBA <sup>2</sup>	TBA <sup>2</sup>
R5	22	TBA <sup>2</sup>	TBA <sup>2</sup>	19	TBA <sup>2</sup>	TBA <sup>2</sup>	20	TBA <sup>2</sup>	TBA <sup>2</sup>
R7	30	TBA <sup>2</sup>	TBA <sup>2</sup>	28	TBA <sup>2</sup>	TBA <sup>2</sup>	28	TBA <sup>2</sup>	TBA <sup>2</sup>
R8	30	TBA <sup>2</sup>	TBA <sup>2</sup>	28	TBA <sup>2</sup>	TBA <sup>2</sup>	28	TBA <sup>2</sup>	TBA <sup>2</sup>
R9 <sup>1</sup>	34	TBA <sup>2</sup>	TBA <sup>2</sup>	32	TBA <sup>2</sup>	TBA <sup>2</sup>	33	TBA <sup>2</sup>	TBA <sup>2</sup>
R10	20	TBA <sup>2</sup>	TBA <sup>2</sup>	17	TBA <sup>2</sup>	TBA <sup>2</sup>	18	TBA <sup>2</sup>	TBA <sup>2</sup>

Notes:

- 1) The approval condition states a noise level criteria of 35 dB(A), to which the following note applies, "Noise limits for Mayfield East Public School is an internal noise level for the noisiest 1-hour period when in use". As such a 10 dB reduction has been assumed between external and internal noise levels based upon a window being open for adequate natural ventilation for the purposes of assessing an external noise level. Additionally, "N/A" is noted for the evening and a night period as the school is not in use during these times.
- 2) These cumulative amenity noise quota levels are subject to approval by PON and DP&E, and will be included once approved.

Table 12 Reasonable worst case amenity scenario – Worst case temperature inversion condition

Period	Day			Evening			Night		
Assessed meteorological condition				Temperature inversion (F-Class, 3°C/100 m)			Temperature inversion (F-Class, 3°C/100 m)		
Receiver	Predicted noise level, $L_{Aeq}$ (15 min), dB(A)	Criteria dB(A)	Compliance with noise criteria, dB(A)	Predicted noise level, $L_{Aeq}$ (15 min), dB(A)	Criteria dB(A)	Compliance with noise criteria, dB(A)	Predicted noise level, $L_{Aeq}$ (15 min), dB(A)	Criteria dB(A)	Compliance with noise criteria, dB(A)
R1	N/A	N/A	N/A	27	TBA <sup>2</sup>	TBA <sup>2</sup>	26	TBA <sup>2</sup>	TBA <sup>2</sup>
R2	N/A	N/A	N/A	33	TBA <sup>2</sup>	TBA <sup>2</sup>	34	TBA <sup>2</sup>	TBA <sup>2</sup>
R3	N/A	N/A	N/A	28	TBA <sup>2</sup>	TBA <sup>2</sup>	28	TBA <sup>2</sup>	TBA <sup>2</sup>
R4	N/A	N/A	N/A	32	TBA <sup>2</sup>	TBA <sup>2</sup>	33	TBA <sup>2</sup>	TBA <sup>2</sup>
R5	N/A	N/A	N/A	19	TBA <sup>2</sup>	TBA <sup>2</sup>	20	TBA <sup>2</sup>	TBA <sup>2</sup>
R7	N/A	N/A	N/A	28	TBA <sup>2</sup>	TBA <sup>2</sup>	28	TBA <sup>2</sup>	TBA <sup>2</sup>
R8	N/A	N/A	N/A	28	TBA <sup>2</sup>	TBA <sup>2</sup>	27	TBA <sup>2</sup>	TBA <sup>2</sup>
R9 <sup>1</sup>	N/A	N/A	N/A	32	TBA <sup>2</sup>	TBA <sup>2</sup>	32	TBA <sup>2</sup>	TBA <sup>2</sup>
R10	N/A	N/A	N/A	17	TBA <sup>2</sup>	TBA <sup>2</sup>	18	TBA <sup>2</sup>	TBA <sup>2</sup>

## Notes:

- 1) The approval condition states a noise level criteria of 35 dB(A), to which the following note applies, "Noise limits for Mayfield East Public School is an internal noise level for the noisiest 1-hour period when in use". As such a 10 dB reduction has been assumed between external and internal noise levels based upon a window being open for adequate natural ventilation for the purposes of assessing an external noise level. Additionally, "N/A" is noted for the evening and a night period as the school is not in use during these times.
- 2) These cumulative amenity noise quota levels are subject to approval by PON and DP&E, and will be included once approved.

Table 13 Reasonable worst case amenity scenario – Worst case wind condition

Period	Day			Evening			Night		
Assessed meteorological condition	3 m/s source to receiver wind			3 m/s source to receiver wind			3 m/s source to receiver wind		
Receiver	Predicted noise level, $L_{Aeq}$ (15 min), dB(A)	Criteria dB(A)	Compliance with noise criteria, dB(A)	Predicted noise level, $L_{Aeq}$ (15 min), dB(A)	Criteria dB(A)	Compliance with noise criteria, dB(A)	Predicted noise level, $L_{Aeq}$ (15 min), dB(A)	Criteria dB(A)	Compliance with noise criteria, dB(A)
R1	29	TBA <sup>2</sup>	TBA <sup>2</sup>	27	TBA <sup>2</sup>	TBA <sup>2</sup>	27	TBA <sup>2</sup>	TBA <sup>2</sup>
R2	36	TBA <sup>2</sup>	TBA <sup>2</sup>	33	TBA <sup>2</sup>	TBA <sup>2</sup>	34	TBA <sup>2</sup>	TBA <sup>2</sup>
R3	30	TBA <sup>2</sup>	TBA <sup>2</sup>	29	TBA <sup>2</sup>	TBA <sup>2</sup>	29	TBA <sup>2</sup>	TBA <sup>2</sup>
R4	36	TBA <sup>2</sup>	TBA <sup>2</sup>	33	TBA <sup>2</sup>	TBA <sup>2</sup>	34	TBA <sup>2</sup>	TBA <sup>2</sup>
R5	22	TBA <sup>2</sup>	TBA <sup>2</sup>	19	TBA <sup>2</sup>	TBA <sup>2</sup>	20	TBA <sup>2</sup>	TBA <sup>2</sup>
R7	30	TBA <sup>2</sup>	TBA <sup>2</sup>	28	TBA <sup>2</sup>	TBA <sup>2</sup>	28	TBA <sup>2</sup>	TBA <sup>2</sup>
R8	30	TBA <sup>2</sup>	TBA <sup>2</sup>	28	TBA <sup>2</sup>	TBA <sup>2</sup>	28	TBA <sup>2</sup>	TBA <sup>2</sup>
R9 <sup>1</sup>	34	TBA <sup>2</sup>	TBA <sup>2</sup>	32	TBA <sup>2</sup>	TBA <sup>2</sup>	33	TBA <sup>2</sup>	TBA <sup>2</sup>
R10	20	TBA <sup>2</sup>	TBA <sup>2</sup>	17	TBA <sup>2</sup>	TBA <sup>2</sup>	18	TBA <sup>2</sup>	TBA <sup>2</sup>

## Notes:

- 1) The approval condition states a noise level criteria of 35 dB(A), to which the following note applies, "Noise limits for Mayfield East Public School is an internal noise level for the noisiest 1-hour period when in use". As such a 10 dB reduction has been assumed between external and internal noise levels based upon a window being open for adequate natural ventilation for the purposes of assessing an external noise level. Additionally, "N/A" is noted for the evening and a night period as the school is not in use during these times.
- 2) These cumulative amenity noise quota levels are subject to approval by PON and DP&E, and will be included once approved.

### 2.3.3 Sleep disturbance assessment

The following are the modelled results to determine noise impacts with the potential to cause sleep disturbance against the required approval criteria. The sound power levels for the peak noise events at the sight are included in Table 8.

Table 14 Reasonable worst case amenity scenario – Worst case temperature inversion condition

Period	Night			Night			Night		
Assessed meteorological condition	Neutral			3 m/s source to receiver wind			Temperature inversion (F-Class, 3°C/100 m)		
Receiver	Predicted noise level, $L_{Aeq}(15 \text{ min})$ , dB(A)	Criteria dB(A)	Compliance with noise criteria, dB(A)	Predicted noise level, $L_{Aeq}(15 \text{ min})$ , dB(A)	Criteria dB(A)	Compliance with noise criteria, dB(A)	Predicted noise level, $L_{Aeq}(15 \text{ min})$ , dB(A)	Criteria dB(A)	Compliance with noise criteria, dB(A)
R1	40	52	Yes	44	52	Yes	43	52	Yes
R2	45	52	Yes	48	52	Yes	47	52	Yes
R3	45	52	Yes	48	52	Yes	47	52	Yes
R4	44	52	Yes	47	52	Yes	46	52	Yes
R5	29	54	Yes	35	54	Yes	34	54	Yes
R7	46	52	Yes	49	52	Yes	48	52	Yes
R8	46	52	Yes	49	52	Yes	49	52	Yes
R10	24	66	Yes	30	66	Yes	30	66	Yes

## 2.4 Discussion

Day, evening and night-time noise emissions were predicted to each of the required assessment locations and compared against the site noise limits, in accordance with the requirements of the Minister for Planning's Project Approval (Application 08\_0130) dated 10 July 2014. It is required that the noise emissions be assessed under worst case wind and temperature inversion conditions.

Compliance has been found for the  $L_{Aeq\ 15\text{-minute}}$  intrusive scenarios and sleep disturbance assessments during all scenarios at all receiver locations, except for the following:

- 1) Receiver 2 (2 Crebert St, Mayfield)
  - a) Day, evening and night reasonable 'worst' case 15-minute intrusive scenarios.
- 2) Receiver 4 (21 Crebert St, Mayfield)
  - a) Day, evening and night reasonable 'worst' case 15-minute intrusive scenarios.

It should be noted that these two locations are essentially the same location, and are separated by approximately 40 m.

An analysis of the noise emission results for the two above locations where exceedances are predicted, it is noted that the key noise contributor is the operation of the motor/pumps during the pumping scenario, followed by the operations of the trucks on site.

However, with regards to the exceedances the following points should be noted as these exceedances are not considered significant, and are seen as manageable.

### 2.4.1 Noise impacts are significantly below the background noise level at the receive locations

Presented in **Table 4** are the attended noise measurements at each of the key nearby assessment receiver locations. At receiver R2, which is across the road from R4, the  $L_{A90\ 15\text{ minute}}$  noise level ("background noise level") at 1:21 am was 49 dB(A). As such, the worst case 15-minute compliance noise emission result from the site is 41 dB(A) under worst case meteorological conditions. Temperature inversion conditions were not presented during the period of 1:00 am to 2:00 am period based upon a review of the EPA Newcastle AWS using the sigma-theta (EPA INP), as such the background noise level could increase even further under temperature inversion conditions as the background noise level was controlled by industrial noise to the north, as presented in **Table 4**.

### 2.4.2 Noise impacts comply with derived criteria in accordance with the EPA INP

The conditions of consent intrusive criteria was given as 35 dB(A)  $L_{Aeq\ 15\text{ minute}}$  at all residential receiver locations, for the original site approval conditions, based upon the predicted noise levels in the original noise impact assessment for the Facility. Even though the compliance noise emissions exceed the conditions of consent noise limits, it should be noted that the noise emissions meet the EPA INP applicable intrusive criteria.

Table 15 EPA INP Intrusiveness criteria – Night period

Period		Night											
Assessed meteorological condition		Neutral				3 m/s source to receiver wind				Temperature inversion (F-Class, 3°C/100 m)			
Receiver	Criteria <sup>1</sup> dB(A)	Scenario 1, L <sub>Aeq</sub> (15 min), dB(A)	Compliance with noise criteria, dB(A)	Scenario 2, L <sub>Aeq</sub> (15 min), dB(A)	Compliance with noise criteria, dB(A)	Scenario 1, L <sub>Aeq</sub> (15 min), dB(A)	Compliance with noise criteria, dB(A)	Scenario 2, L <sub>Aeq</sub> (15 min), dB(A)	Compliance with noise criteria, dB(A)	Scenario 1, L <sub>Aeq</sub> (15 min), dB(A)	Compliance with noise criteria, dB(A)	Scenario 2, L <sub>Aeq</sub> (15 min), dB(A)	Compliance with noise criteria, dB(A)
R1	42	26	Yes	28	Yes	31	Yes	32	Yes	30	Yes	32	Yes
R2	42	36	Yes	34	Yes	41	Yes	39	Yes	40	Yes	38	Yes
R3	42	28	Yes	30	Yes	32	Yes	34	Yes	32	Yes	33	Yes
R4	42	36	Yes	34	Yes	41	Yes	39	Yes	40	Yes	38	Yes
R5	44	20	Yes	20	Yes	26	Yes	25	Yes	25	Yes	25	Yes
R7	42	27	Yes	29	Yes	32	Yes	33	Yes	31	Yes	32	Yes
R8	42	27	Yes	29	Yes	31	Yes	33	Yes	31	Yes	32	Yes
R9 <sup>1</sup>	45 <sup>2</sup>	33	Yes	33	Yes	38	Yes	38	Yes	37	Yes	37	Yes
R10	51 <sup>3</sup>	18	Yes	17	Yes	24	Yes	23	Yes	24	Yes	23	Yes

Notes:

- 1) This criteria is presented in the site assessment prepared by AECOM, "Stolthaven Bulk Fuel Facility - Phase 1A Noise and Vibration Impact Assessment" 60212465.RPT02.01, 8 November 2012, on which the approval Minister for Planning's Project Approval (Application 08\_0130) dated 10 July 2014 is based upon.
- 2) In the INP the school classroom criteria is an internal noise level, with an acceptable noise level of 35 dB(A) and a recommended maximum of 40 dB(A). A 10 dB reduction has been assumed between external and internal noise levels based upon a window being open for adequate natural ventilation.
- 3) 218 Fullerton Road, Stockton from AECOM report Noise Impact Assessment, Modification of Project Approval 08\_0129, referenced as 60306451, Rev 3, dated 13 November 2013, with measurements undertaken from 20 May 2013 until 28 May 2013

#### 2.4.3 Noise emissions comply during neutral meteorological conditions

The compliance noise emission results presented in Table 9 and Table 10 show compliance is achieved at receivers R2 and R4 under neutral meteorological conditions.

#### 2.4.4 No noise complaints have been received as a result of operational noise

AECOM has been advised by Stolthaven that no noise complaints have been received to date.

### 3.0 Conclusion

AECOM Australia Pty Ltd (AECOM) was commissioned by Stolthaven Australasia Pty Ltd (Stolthaven) to undertake a compliance noise assessment of operations at the Stolthaven Bulk Liquids Fuel Storage Facility (the Facility) operated by Stolthaven at the Port of Newcastle, Mayfield, NSW.

This acoustic assessment was conducted to determine compliance with the requirement in the Minister for Planning's Project Approval (Application 08\_0130) dated 10 July 2014.

As the Facility lies within the Mayfield Concept Plan approval area, it requires noise emissions from the site to be consistent with the environmental assessment requirements of the Mayfield Concept Plan Approval. Consistency with the Mayfield Concept Plan Approval requirements has also been addressed in this report.

Attended noise measurements were undertaken on 28 July 2014 at the closest nearby residential receiver locations. It was found that it was not possible to directly measure the impact of noise arising from operations at the Facility due to the influence from extraneous noise sources, i.e. existing industrial noise from other industrial areas unrelated to the Facility and traffic noise on Industrial Drive. As such, an alternative method was required in order to demonstrate the compliance noise levels. The compliance assessment was therefore carried out using SoundPLAN noise modelling software, based upon on-site attended noise measurements undertaken on 28 July 2014 to assist with development of a calibrated computer noise model of the operations at the Facility.

This method of noise compliance assessment is in accordance of the Chapter 11 of the NSW Environment Protection Authority's (EPA) NSW Industrial Noise Policy (INP). In order to determine compliance of the site operational noise emissions with the required noise limits, the assumptions of 'reasonable' worst case operational scenarios are presented, along with the predicted noise levels at the required assessment locations.

Day, evening and night-time noise emissions were predicted to each of the required assessment locations and compared against the site noise limits, in accordance with the requirements of the Minister for Planning's Project Approval (Application 08\_0130) dated 10 July 2014. It is required that the noise emissions be assessed under worst case wind and temperature inversion conditions.

Compliance has been found for the  $L_{Aeq\ 15\text{-minute}}$  intrusive scenarios and sleep disturbance assessments during all scenarios at all receiver locations, except for the following:

- 3) Receiver 2 (2 Crebert St, Mayfield)
  - a) Day, evening and night reasonable 'worst' case 15-minute intrusive scenarios.
- 4) Receiver 4 (21 Crebert St, Mayfield)
  - a) Day, evening and night reasonable 'worst' case 15-minute intrusive scenarios.

It should be noted that the maximum predicted noise levels are 8 dB(A) below the measured background noise level at these receiver locations, the compliance noise emission levels comply during neutral meteorological conditions, the compliance noise emission levels comply with the requirement in accordance with the EPA INP.

As such, even though there are modelled exceedances of the conditions of consent noise limits they are not considered significant, and as such discussion with the approving authority should be undertaken.