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Dear Will

Hexham Relief Roads - noise and vibration assessment for the Submissions Report

This letter provides an assessment of potential noise and vibration impacts for the proposed design amendments for the Hexham Relief Roads Project (the Project).

Where appropriate the assessment has referenced assessment methodologies and results from the Environmental Impact Statement (EIS) noise and vibration assessment prepared for the Project; *Hexham Relief Roads Noise and Vibration Assessment* (Parsons Brinckerhoff, 4 July 2012).

1. Project design amendments

It is understood an assessment of the potential noise and vibration impacts is required for the Project design amendments detailed in Table 1.

Table 1 Design amendments for the Project

Design amendment	Relevant information for the noise and vibration assessment
Construction access road realignment	The revised design relocates the construction access road 300 metres from the nearest residence. The original alignment was, at its nearest point, 30 m from the residence on Woodlands Close. No change in road traffic volumes or traffic speed will occur, however during the initial 3 months of construction no heavy vehicles will utilise the access road.
Crossing of Purgatory Creek	The site access roads will require the construction of a crossing for the Purgatory Creek.
Relocation of the construction compound	The construction compound is to be relocated from the Tarro Interchange access road to a location off Woodlands Close. The relocation of the compound does not influence the approximate 400 m separation distance between the compound location and nearest residences on Woodlands Close.

Design amendment	Relevant information for the noise and vibration assessment
Extension of the Relief Roads	The revised design extends the Relief Roads to connect to the existing Up Coal Line at 17,6700m rather than 17,6400m as proposed in the EIS and is an additional 160 m of rail.
Extension of the Swale Drain	The revised design includes refinement of the route, location and diameter of the swale drain proposed in the EIS design to improve stormwater run-off from the site during construction and operation. The proposed extension is not expected to influence the predicted noise and vibration levels in the EIS.
Private access road realignment	The revised design includes the relocation of the private access track to the west of the Relief Roads to allow for a more suitable access arrangement to adjoining properties to the west and south.
Adjustment to the service road alignment	The proposed amendment of the service road alignment changes the separation distance between the roads and nearest receivers by less than 10m.
Overhead conveyor for material delivery	An overhead conveyor will be constructed across the rail corridor at approximately CH 175700. The conveyor will be used to transport imported quarried materials from the Eastern to western side of the rail corridor for construction of the relief roads and associated access roads.

The construction methodologies, operational rail volumes and road traffic volumes (construction and operation) have not been amended from the EIS.

The construction works associated with the proposed design amendments will be during standard day time hours of Monday to Friday 7am to 6pm and Saturday 8am to 1pm. Construction works may be required outside of these hours as discussed in Section 6.2.2 of the EIS noise and vibration assessment.

2. Noise and vibration assessment criteria

Detailed in Section 4.2 of the EIS noise and vibration assessment construction noise levels have been assessed in consideration to the *Interim Construction Noise Guideline* (ICNG, 2009).

Consistent with the *Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects* (IGANRIP, 2007) residential rail noise triggers of 65 dB(A) $L_{Aeq,15hr}$ day time, 60 dB(A) $L_{Aeq,9hr}$ night time and 85 dB(A) L_{AMax} have been adopted from Section 4.1 of the EIS noise and vibration assessment for the assessment of operational rail noise.

Road traffic noise during construction and operation has been assessed to the *Environmental Criteria for Road Traffic Noise* (ECRTN, 1999) as detailed in Section 4.3 of the noise and vibration assessment.

Detailed in Section 4.4 of the EIS noise and vibration assessment; ground vibration disturbance impacts have been assessed with reference to the *Environmental Noise Management Assessing Vibration: a technical guideline* and cosmetic structural damage impacts assessed to the *German Standard DIN 4150*.

3. Assessment of potential noise and vibration impacts

3.1 Construction access road realignment

Referencing the assessment of noise during access road construction from the EIS noise and vibration assessment; worse case construction noise levels of 55 dB(A) $L_{Aeq,15min}$ have been predicted at the nearest assessed residence, receiver R1 at Woodlands Close. This represents a potential reduction in predicted construction noise levels of up to 15 dB(A) L_{Aeq} from the original alignment assessed in the EIS.

The predicted construction noise level complies with the adopted 71 dB(A) $L_{Aeq,15min}$ construction noise management level (NML) at receiver R1.

Where construction is undertaken outside of the standard day time construction hours, predicted noise impacts would comply with a 55 dB(A) $L_{Aeq,15min}$ NML at receiver R1.

Based on the 300m separation distance any perceptible or measureable ground vibration from access road construction would comply with the adopted disturbance (VDV) and cosmetic structural damage (PPV) vibration goals in the EIS noise and vibration assessment.

3.2 Construction road traffic noise

Based on a 300 m separation distance to the amended construction access road location, potential hourly construction road traffic noise levels at nearest assessed residences have been predicted to be 19 dB(A) $L_{Aeq, 1hour}$ during staff arrival/ departure and 30 dB(A) $L_{Aeq, 1hour}$ for delivery and departure between 7am to 6pm.

Potential construction road traffic noise levels comply with the day time 55 dB(A) $L_{Aeq, 1hour}$ construction traffic noise goal.

Realigning the construction access road realignment at a greater separation distance from residences is predicted to reduce predicted road traffic noise impacts at receiver R1 at Woodlands Close by at least 14 dB(A) $L_{Aeq, 1hour}$.

During the initial 3 months of construction, where only light vehicles will utilise the existing Woodlands Close, predicted construction noise levels of 32 dB(A) $L_{Aeq,1hour}$ at receiver R1 at Woodlands Close comply with the construction traffic noise goal.

4. Crossing of Purgatory Creek

Based on the proposed access road location potential construction noise from the crossing of Purgatory Creek would not be increased from construction noise levels predicted in Section 6.2 of the EIS noise and vibration assessment. Potential noise levels comply with the residential and commercial NMLs at nearest receivers.

5. Construction compound relocation

The relocation of the construction compound does not alter the approximate separation distance of 400 m to the nearest residential receiver R1 at Woodlands Close. The Tarro Interchange compound was to be located approximately 400m from the nearest assessed residences.

Based on the same separation distance to nearest receivers, predicted noise impacts of 19 to 37 $L_{Aeq,15min}$ in Section 6.2 of the EIS noise and vibration assessment are consistent with potential noise impacts for the relocated compound site.

Potential construction noise impacts comply with the NMLs for day time and outside of standard day time at all nearest assessed receivers.

Based on the 400 m separation distance any perceptible or measureable ground vibration from access road construction would comply with the adopted disturbance (VDV) and cosmetic structural damage (PPV) vibration goals in the EIS noise and vibration assessment.

6. Extension of the Relief Roads

The revised design extends the Relief Roads to connect to the existing Up Coal Line at 17,6700m rather than 17,6400m as proposed in the EIS and is an additional 160 m of rail.

The proposed amendment will not influence the predicted day time, night time and maximum rail noise levels for the year of operation (2014) and future operations (2024) at the assessed receivers presented in the EIS noise assessment. Predicted rail noise levels are consistent with the noise impacts for 2014 and 2024 in the EIS noise and vibration assessment.

The extension of the Relief Roads has amended the alignment to be directly adjacent to residential receivers on the New England Highway that were not assessed in the EIS. The additional receivers included in this supplemental assessment are R23, R24 and R25 are detailed in Figure 1.

Predicted L_{Aeq} noise levels at these additional receivers for operations in 2014 and 2024 are detailed in Table 2 for the day time (7am to 10pm) and Table 2 for the night time (10pm – 7am). Maximum (L_{AMax}) noise levels are detailed in Table 3.

The predicted day time and night time L_{Aeq} and L_{AMax} noise levels comply with the adopted IGANRIP noise triggers at the additional assessed receivers. Based on the predicted noise levels no new management or mitigation measures are required to reduce or control potential noise levels from the Project.

Figure 1 Assessed residential receivers on New England Highway

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Table 2 Predicted day time L_{Aeq} noise levels

Receiver	Existing rail	With the Relief Roads Project (amended design), day time $L_{Aeq,15hr}$ dB(A)				IGANRIP noise triggers	
		Main lines	Coal lines	Relief Roads	Total	Base trigger	Change from existing
Residential IGANRIP triggers 65 dB(A) $L_{Aeq,15hr}$							
Year of operation 2014							
R23 New England Highway	58	54	56	38	58	No	0
R24 New England Highway	59	54	56	39	58	No	-1
R25 New England Highway	60	54	57	41	59	No	-1
Year of operation 2024							
R23 New England Highway	62	55	59	38	61	No	-1
R24 New England Highway	62	55	59	39	61	No	-1
R25 New England Highway	63	56	60	41	62	No	-1

Notes Values expressed as A-weighted dB and rounded to nearest dB(A); L_{Aeq} = equivalent continuous (energy average) A-weighted sound pressure level

Table 3 Predicted night time L_{Aeq} noise levels

Receiver	Existing rail	With the Relief Roads Project (amended design), day time $L_{Aeq,9hr}$ dB(A)				IGANRIP noise triggers	
		Main lines	Coal lines	Relief Roads	Total	Base trigger	Change from existing
Residential IGANRIP triggers 60 dB(A) $L_{Aeq,9hr}$							
Year of operation 2014							
R23 New England Highway	58	53	54	38	57	No	-1
R24 New England Highway	58	53	54	39	57	No	-1
R25 New England Highway	59	54	55	41	57	No	-2
Year of operation 2024							
R23 New England Highway	61	53	59	38	60	No	-1
R24 New England Highway	61	53	59	38	60	No	-1
R25 New England Highway	62	54	59	40	61	Yes	-1

Notes Values expressed as A-weighted dB and rounded to nearest dB(A); L_{Aeq} = equivalent continuous (energy average) A-weighted sound pressure level

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Table 4 Predicted maximum (L_{AMax}) noise levels

Receiver	Existing rail	With the Relief Roads Project (amended design), day time $L_{Aeq,15hr}$ dB(A)				IGANRIP noise triggers	
		Main lines	Coal lines	Relief Roads	Total	Base trigger	Change from existing
Residential IGANRIP triggers 85 dB(A) L_{AMax}							
Year of operation 2014 and 2024							
R23 New England Highway	76	60	75	73	77	No	1
R24 New England Highway	76	60	76	73	77	No	2
R25 New England Highway	76	61	76	74	78	No	2

Notes Values expressed as A-weighted dB and rounded to nearest dB(A); L_{AMax} = maximum noise level exceeded for 95% of rail pass-by noise events

7. Private access road realignment

The amendment to the private access road is not expected to result in change to the predicted construction noise and vibration impacts in the EIS noise and vibration assessment.

Potential noise levels at nearest receivers during the construction of the private access road would not be a dominant influence above noise levels from the main construction of the Project. Any potential receiver construction noise would be adequately controlled by the noise management measures recommended in the EIS noise and vibration assessment.

8. Extension of the Swale Drain

Short term construction works for the construction of the Swale Drain, including extension, are not expected to trigger the NMLs at nearest receivers. Any potential impacts would be controlled by the recommended noise and vibration management measures in the EIS noise and vibration assessment.

9. Adjustment to service road alignment

The proposed amendment of the service road alignment changes the separation distance between the roads and nearest receivers by less than 10 m. This amendment is not sufficient to change the predicted operational road traffic noise levels in the EIS noise and vibration assessment. Daily and hourly operational road traffic volumes will be the same as assessed in the EIS.

Consistent with the EIS noise and vibration assessment, predicted operational road traffic noise levels at nearest receivers would comply with the adopted 55 dB(A) $L_{Aeq,1hour}$ road traffic noise criteria at nearest assessed residences.

10. Overhead conveyor

At peak capacity of the conveyor will be approximately 150 tonnes per hour which equates to approximately 4 truck and dog movements per hour. Materials will be loaded into the feed hoper immediately after tipping and completed between deliveries. Material will be deposited into stockpiles and handled at both ends by front end loaders.

The concept design of the conveyor allows for a conveyor of 7.1 m height, 40 m length across the corridor with a speed of 3.2 m per second (m/s). The conveyor will be semi enclosed with a polymer cover on the top side and spill trays on the underside. For the purpose of assessing noise levels it has been assumed the drive motor will be located at 7.1 m above ground level.

Based on the concept design information, source noise levels in Table 4 have been referenced from previous measured noise levels undertaken by Parsons Brinckerhoff for coal handling conveyors of similar dimension and an operating speed.

Table 5 Conveyor source noise levels

Noise source	Sound pressure level, dB(A) L_{Aeq} at 1 m
Conveyor noise (rollers and belt)	91
A drive motor at the eastern section of the conveyor	91
Front end loader (one at each end of the conveyor)	97

Notes Values expressed as A-weighted dB and rounded to nearest dB(A);
L_{Aeq} = equivalent continuous (energy average) A-weighted sound pressure level

The conveyor alignment was digitised in the noise prediction model developed for the EIS noise and vibration assessment. Consistent with the ICNG, predicted noise levels in Table 6 include a 5 dB(A) L_{Aeq} addition for potential annoyance tonal noise characteristics which can be experienced from the operation of the conveyor rollers.

Table 6 Predicted construction noise levels from

Receiver	Predicted noise level, dB(A) $L_{Aeq,15min}$
ICNG NML: Residential 53 dB(A) $L_{Aeq,15min}$, Commercial 70 dB(A) $L_{Aeq,15min}$	
Nearest commercial premises on Old Maitland Road (50 m from conveyor)	70
Nearest residences on Old Maitland Road (300 m from conveyor)	47

Notes Values expressed as A-weighted dB and rounded to nearest dB(A);
L_{Aeq} = equivalent continuous (energy average) A-weighted sound pressure level

Based on the predicted noise levels the operation of the conveyor will comply with the 70 dB(A) $L_{Aeq,15min}$ NML at nearest commercial receivers and the 53 dB(A) $L_{Aeq,15min}$ NML at nearest residences on Old Maitland Road.

Where the conveyor is required to operate outside of the standard day time hours potential noise levels of 47 dB(A) $L_{Aeq,15min}$ at residences on Old Maitland Road comply with an adopted NML of 48 dB(A) $L_{Aeq,15min}$ for the most sensitive 10pm to 7am night time period.

Where the conveyor operates simultaneously with other construction activity, potential cumulative construction noise levels at nearest receivers may be increased by 1 to 3 dB(A) $L_{Aeq,15min}$. Allowing for a 3 dB(A) increase to predicted worse case construction noise levels in Section 6.2 of the EIS noise and vibration assessment; cumulative noise levels of 50 to 59 dB(A) $L_{Aeq,15min}$ at most noise affected residential receivers are predicted to potentially exceed the NMLs, triggering the requirement for construction noise management.

Potential construction noise levels of 47 dB(A) $L_{Aeq,15min}$ may be audible during the night time period. Audible noise which may contain tonal noise characteristics could result in sleep disturbance at nearest residences.

Recommendation for the management and mitigation of construction noise, including potential sleep disturbance impacts, is provided in Section 11 of this assessment and Section 8.2 of the EIS noise and vibration assessment.

For ready installation on site the conveyor will be arrive as a prefabricated structure. Potential construction noise levels from conveyor construction are expected to be short term (less than 1 week) and unlikely to exceed the adopted NMLs at nearest receivers.

Potential construction road traffic noise levels for the 4 heavy vehicles per hour would comply with the day time 55 dB(A) $L_{Aeq,\ 1hour}$ construction traffic noise goal at nearest residences.

Based on the proposed conveyor operations any potential vibration would be localised and contained within the immediate on-site area, no impacts are expected at off-site commercial or residential receivers.

Based on a conceptual design for a scaffolding pedestrian overpass, potential construction noise levels are expected to be short term (less than 1 week) and should be controlled by the noise management measures recommended in the EIS noise and vibration assessment.

11. Recommended noise and vibration management and mitigation

Based on this supplemental noise and vibration assessment the recommended construction noise and vibration management and mitigation measures in Section 8.2 of the EIS noise and vibration assessment are

appropriate for the reduction and control of potential impacts from the construction works considered in the submissions report.

Potential noise and vibration impacts for all construction works would be managed through the Construction Environmental Management Plan (CEMP).

Upon confirmation of the conveyor design, the assessed noise levels in Table 6 should be reviewed and, as required, a detailed assessment of off-site noise levels is to be provided in the CEMP to demonstrate compliance to the ICNG and determine any noise control requirements.

Where a reduction in conveyor noise levels is required potential noise mitigation measures could include; enclosure of the conveyor facades with rubber curtains, enclosure of the drive motor, the use of polymer rollers and operation instructions for the front end loader to minimise noise through controlled loading and unloading of material.

At the time of this assessment a CEMP has been prepared for the Project and will be implemented throughout the construction program.

Consistent with the Section 8.1 of the EIS noise and vibration assessment where the predicted rail noise levels comply with the IGANRIP residential noise triggers, no new noise management or mitigation measures are required.

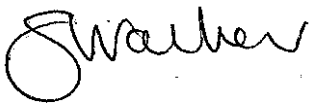
12. Cumulative assessment with the QR TSF development

The proposed design amendments do not influence the predicted worse case construction and operation noise and vibration impacts in Section 9 of the EIS noise and vibration assessment where the Project and the Queensland Rail (QR) Trains support Facility are simultaneously developed and operated.

13. Concluding comment

As required, please contact the undersigned on (07) 3854 6552 or swalker@pb.com.au to discuss this assessment further.

Yours sincerely



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