Noise Impact Assessment

Greenbank Development and Area 1

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

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Executive Summary

ATP Consulting Engineers was engaged by MWH to prepare a noise impact assessment for the proposed Greenbank development over Lot 205 and Lot 434 on RP845844 and Lot 9 on S312355 in Greenbank. The proposed development is a master-planned community beginning with the early release Area 1 which is planned to accommodate 510 residential allotments.

The dominant noise constraint on the development is traffic noise from Teviot Road, Greenbank Road and major internal collector roads.

Traffic noise propagation modelling was carried out considering the future traffic flows for a planning horizon of 2031. The results of the noise propagation modelling indicate that, without noise mitigation measures, the proposed development site will be impacted by traffic noise from Teviot Road, Greenbank Road and the major internal collector roads.

To mitigate traffic noise the following noise control measures should be implemented:

- Earth mound OR acoustic fence should be constructed along Teviot Road. The minimum height of the earth mound should be 2.0m above the existing ground levels, except at Lots 2001 to 2006 where it should be up to 3.0m above the existing ground levels. The recommended alignment and heights of the earth mound are presented in Appendix K. The minimum height of the acoustic fence should be 1.8m above the existing ground levels, except at Lots 2003 to 2005 where it should be 2.4m above the existing ground levels. The recommended alignment and heights of the acoustic fence are presented in Appendix M.
- No noise control measures are required at the southern site boundary along Greenbank Road, provided that dwellings have minimum setback distance of 40m for low-set buildings and 60m for high-set buildings.
- 1.8m high acoustic fence should be constructed along the northern boundaries of Lots 1001, 1029 to 1038, and Lots 1115 to 1122 to protect the private open spaces.
- Private open spaces at Lots 1242 to 1260 should be located on the protected facades.
- The ground and upper floors of Lots 1242 to 1260 have to be designed as per AS3671-1989 to mitigate traffic noise ingress.
- The upper floors of the first row of allotments facing Teviot Road, Greenbank Road and the trunk connector road (southern side only) have to be designed as per AS3671-1989 to mitigate traffic noise ingress.

Provided that the recommended planning and design noise control measures are implemented in the construction of Area 1 of the Greenbank Development, road traffic noise will not impose any further constraints on the establishment of the proposed development.

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1. Introduction

1.1 Project Background

ATP Consulting Engineers was engaged by MWH to prepare a noise impact assessment for the proposed Greenbank development over Lot 205 and Lot 434 on RP845844 and Lot 9 on S312355 in Greenbank.

The development is subject to approval by Economic Development Queensland (EDQ) as a priority development area (PDA) under the *Economic Development Act 2012*.

The noise impact assessment has been requested by EDQ in an Information Request (DEV2016/768) in response to the development application for the Greenbank Development.

The results of the noise assessment and proposed noise mitigation strategy for the development are presented in this report.

1.2 Study Objectives

Study objectives are as follows:

- Site specific noise measurements at two representative locations within the subject site to obtain information about the existing noise levels over a typical seven day period.
- Review of the location of the development and its surroundings and detailed site observations to identify all potential acoustic constraints on the proposed development.
- Consideration of relative importance, with regards to development approval process, of all the identified acoustic constraints to determine the noise sources that require consideration in the acoustic assessment in support of the development approval process.
- Development of a three dimensional noise propagation model using SoundPLAN software with consideration of identified dominant noise sources (in this case, the road traffic) and the proposed development layout.
- Calculation of the traffic noise ($L_{10(18\text{-hour})}$) at the noise sensitive land-uses within the development considering traffic along Teviot Road, Greenbank Road and the planned internal collector roads within a 10 year planning horizon after establishment of the proposed development.
- Recommendation of traffic noise control measures to mitigate traffic noise impacts at the allotments within the zone of traffic noise impact.

1.3 Subject Site

The proposed Greenbank development is a master-planned community to be established over Lot 205 and Lot 434 on RP845844 and Lot 9 on S312355 in Greenbank.

The subject site has a total area of 482.1 ha with frontage to Teviot Road to the west and Greenbank Road to the south. The existing Greenbank Shopping Centre is located opposite the proposed development on the corner of Teviot Road and Pub Lane.

The proposed development site is located within the Greater Flagstone priority development area (PDA).

The location of the subject site and the surroundings is presented in Figure 1.1.

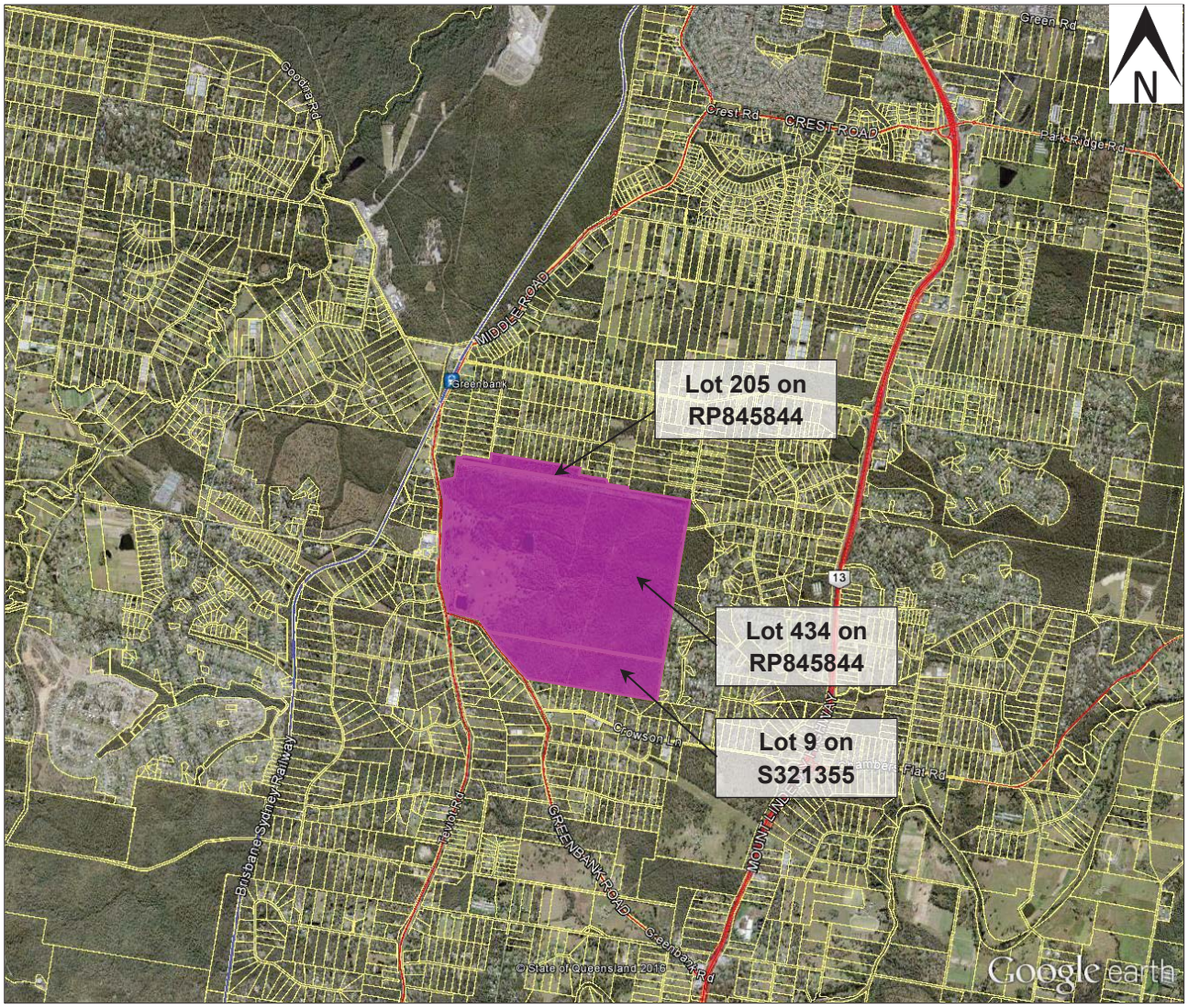


Figure 1.1 Site Location

1.4 Proposed Development

The Greenbank Development is proposed to be developed in stages, beginning with early release area (Area 1).

- Area 1:
    - Residential lots: 510;
    - A major linear park;
    - Regional recreation park; and
    - Neighbourhood recreation park.

- Other land uses:

    - Conservation Parklands;
    - Community Facility;
    - State Primary School;
    - Balance Regional Recreation Park;
    - Neighbourhood Parks;
    - Regional Sports Park;
    - Residential Lots; and
    - Neighbourhood Centre.

The proposed development layout is presented in Appendix A.

2. Existing Noise Amenity

2.1 Noise Measurement Location

Noise measurements were carried out at two locations within the site to obtain information about the traffic and background noise levels at the subject site. Additionally, attended traffic noise measurements were carried out along Teviot Road on 28 August 2015.

The noise measurement locations are presented in Figure 2.1 and site photos are presented in Appendix B.

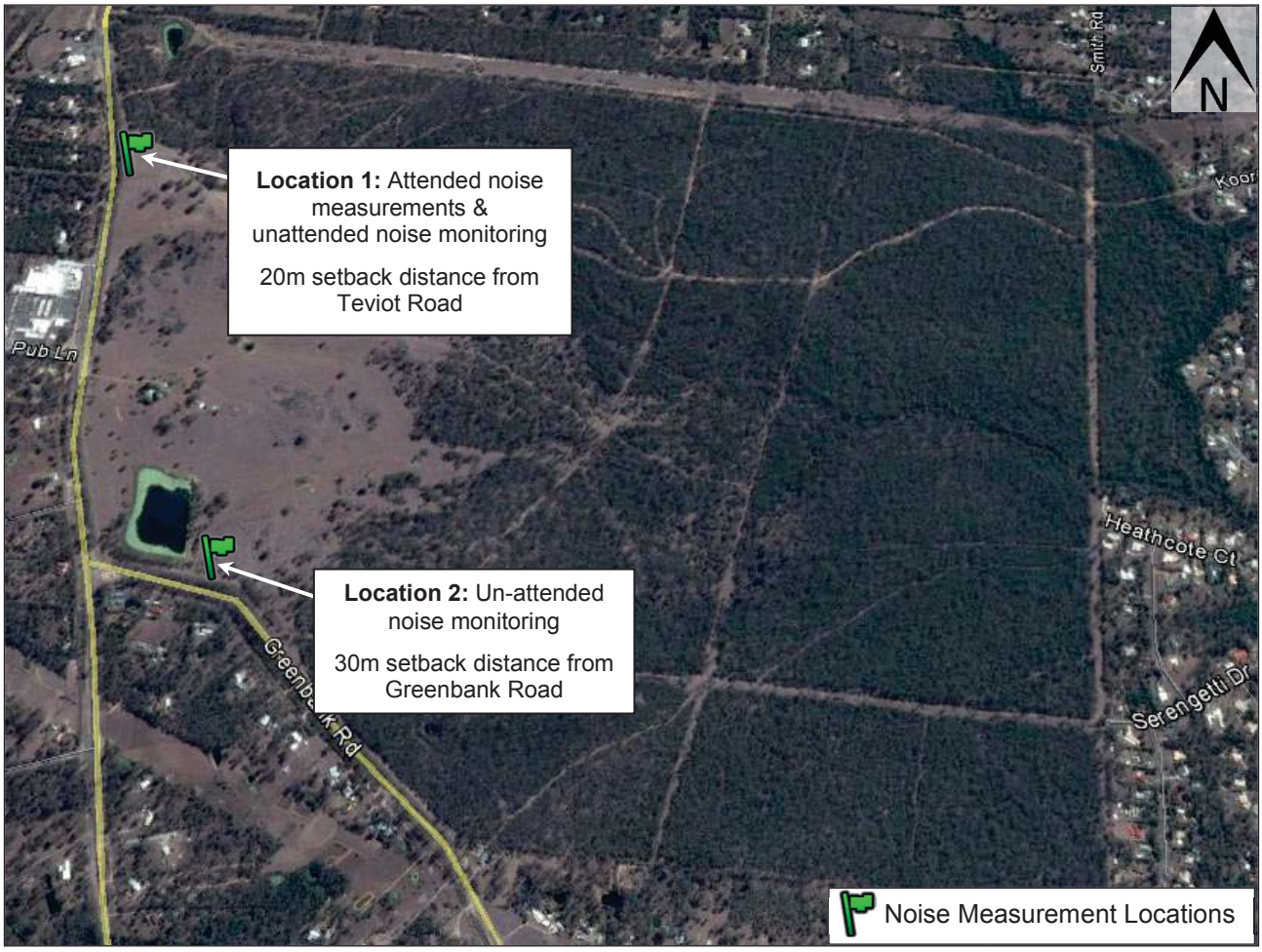


Figure 2.1 Noise Measurement Location

The noise monitoring at Location 1 and Location 2 was carried out from 29 August to 5 September 2015 and 25 September to 2 October 2015 respectively.

2.2 Equipment Used

The noise measurements were carried out using the following equipment:

- Environmental Noise Logger - Acoustic Research Laboratories Ngara;
- Sound Level Meter – SVAN949; and
- Sound Level Calibrator – NC 74

The noise measurement instruments conform to ASIEC61672.1-2004 and the measurements were undertaken in accordance with AS1055-1997 and AS2702-1984. Calibration was performed before and after field measurements with the noise loggers and sound level meter, with a calibration drift of <0.1dB.

2.3 Meteorological Conditions

The meteorological conditions during the monitoring periods were variable with rain and heavy winds experienced on some of the days. Only the days with no adverse weather and with complete 24 hours of noise data were considered in the assessment.

The meteorological conditions during the attended noise measurements on 28 August were fine with light to moderate winds.

The meteorological data[1] for the noise measurement period are presented in Appendix C.

2.4 Noise Measurement Results

2.4.1 Un-attended Noise Measurements

The results of the noise measurements at Location 1 are presented in Table 2.1.

Table 2.1 Noise Measurement Results – Location 1

Date	Day	$L_{90(11\text{-hour})}$ Day (7am–6pm)	$L_{90(4\text{-hour})}$ Evening (6pm–10pm)	$L_{90(9\text{-hour})}$ Night (10pm–7am)	$L_{10(18\text{-hour})}$ (6am–12am)	$L_{90(18\text{-hour})}$ (6am–12am)	$L_{90(8\text{-hour})}$ (10pm–6am)
29 August 2015	Saturday	51	54	47	65	52	47
31 August 2015	Monday	51	48	37	64	49	35
1 September 2015	Tuesday	51	49	37	65	49	34
2 September 2015	Wednesday	51	48	38	65	49	36
3 September 2015	Thursday	55	48	37	66	51	35
4 September 2015	Friday	52	52	37	65	51	36
5 September 2015	Saturday	50	48	34	64	49	33
Arithmetic Average (All days)		**52**	**50**	**38**	-	-	-
Arithmetic Average (Weekdays only)		-	-	-	**65**	**50**	**35**

[1] Daily weather observation data sourced from www.bom.gov.au for Logan City Waste Treatment Plant station (Id 040854).

The results of the noise measurements at Location 2 are presented in Table 2.2.

Table 2.2 Noise Measurement Results – Location 2

Date	Day	$L_{90(11\text{-hour})}$ Day (7am–6pm)	$L_{90(4\text{-hour})}$ Evening (6pm–10pm)	$L_{90(9\text{-hour})}$ Night (10pm–7am)	$L_{10(18\text{-hour})}$ (6am–12am)	$L_{90(18\text{-hour})}$ (6am–12am)	$L_{90(8\text{-hour})}$ (10pm–6am)
25 September 2015	Friday	48	44	38	57	46	38
26 September 2015	Saturday	47	43	32	57	45	31
27 September 2015	Sunday	44	41	33	55	42	31
29 September 2015	Tuesday	48	45	36	56	46	34
1 October 2015	Thursday	45	46	37	56	45	35
2 October 2015	Friday	45	46	31	56	44	33
Arithmetic Average (All days)		**46**	**44**	**36**	-	-	-
Arithmetic Average (Weekdays only)		-	-	-	**55**	**44**	**34**

Detailed noise monitoring results for Locations 1 & 2 are presented in Appendix D.

2.4.2 Attended Noise Measurements

The results of the attended traffic noise measurement results carried out on 28 August 2015 (Friday) are presented in Table 2.3 and in Appendix D.

Table 2.3 Attended Noise Measurement Results

Time	$L_{eq(1\text{-min})}$ dB(A)	$L_{10(1\text{-min})}$ dB(A)	$L_{90(1\text{-min})}$ dB(A)
2:45 PM	65	68	56
2:46 PM	62	65	51
2:47 PM	61	66	49
2:48 PM	61	64	54
2:49 PM	60	64	53
2:50 PM	62	66	53
2:51 PM	64	67	56
2:52 PM	62	65	56
2:53 PM	65	66	59
2:54 PM	63	66	57
2:55 PM	59	62	53
2:56 PM	64	66	58
2:57 PM	62	65	54
2:58 PM	64	67	60
2:59 PM	59	63	49
3:00 PM	63	65	58
3:01 PM	64	67	60
3:02 PM	65	67	60
3:03 PM	62	66	52
3:04 PM	62	65	56
3:05 PM	64	67	54
3:06 PM	60	63	53
3:07 PM	64	66	59
3:08 PM	64	66	59
3:09 PM	64	67	60
3:10 PM	65	68	60
3:11 PM	62	66	53
3:12 PM	65	67	58
3:13 PM	64	66	57
3:14 PM	64	67	58
Average	**63**	**66**	**56**

2.5 Potential Noise Constraints

2.5.1 Overview

ATP Consulting Engineers carried out site-specific and desktop analysis of the general environmental noise constraints in the wider area around the proposed development site. A list of noise sources and their potential for impact on the development is presented in Table 2.4.

Table 2.4 Noise Constraints

Environmental Noise Sources	Description	Noise Impact	Comments
Traffic Noise	Mt. Lindsay Highway	No	The site is located more than 1.5km from the nearest State-controlled road (Mt Lindsay Highway). The site location relative to the designated transport noise corridors of Mt Lindsay Highway and Teviot Road is presented in Figure 2.2.
Traffic Noise	Teviot Road	Yes	Teviot Road is a local government-controlled road under the administration of Logan City Council. This road runs along the western boundary and has a potential to impact on the noise amenity inside the Greenbank development site.
Traffic Noise	Greenbank Road	Yes	Greenbank Road is a significant local road connecting Teviot Road and Mt Lindsay Highway. The road is located to the south of the proposed development site and has a potential to impact on the noise amenity inside the Greenbank development site.
Traffic Noise	Planned internal collector roads	Yes	Major trunk and neighbourhood collector roads at the proposed development are expected to carry a significant volume of traffic and will contribute to traffic noise impact on both sides of the road.
Aircraft Noise	Amberley RAAF Base	No	The site is located approximately 28 km from the RAAF Base, well outside of the applicable ANEF contours. There is no aircraft noise impact at the proposed development. Refer to Figure 2.3.
Railway Noise	Queensland/New South Wales rail line	No	The Queensland/New South Wales rail line runs divergent with the western boundary of the proposed development. The minimum separation distance is approximately 350m, thus no rail noise impact is expected.
Commercial Noise	N/A	No	Existing Greenbank Shopping Centre and service station are at least 70m distance from the proposed development and are expected to have no noise impacts.
Industrial Noise	N/A	No	There are no industrial noise sources within 500 m from the proposed development site.
Recreational Noise	Recreational Park and Sports Park	Yes	There are no existing sporting venues near the proposed development. Recreational and sports parks are planned internal to the development. The assessment of noise impact associated with these internal recreational noise sources will be assessed during detailed design stage through consideration of noise emissions, buffer between the noise sources and the dwellings and site terrain.

2.5.2 Traffic Noise

Department of Transport and Main Roads (TMR) has designated a number of state-controlled roads in Queensland as 'Transport Noise Corridors' under Queensland Development Code (QDC) MP4.4 (*Buildings in a Transport Noise Corridor*). Mt Lindsay Road is a designated transport noise corridor and any noise sensitive developments located within the zone of traffic noise impact of this road has to be designed for prevention of noise ingress. The zone of traffic noise impact is dependent on the traffic flow and may extent as far as 250 metres on both sides from major road (e.g. Pacific Motorway). In this case the Greenbank development is located at a distance of more than 1.5km from the nearest designated transport noise corridors, thus there is no traffic noise constraint from any State-controlled roads.

Teviot Road is a local government-controlled road under the administration of Logan City Council (LCC). The proposed development is within the transport noise corridor of Teviot Road and detailed traffic noise impact assessment considering traffic on this road is required. Greenbank Road is not a designated transport noise corridor, however as a rural collector connecting Teviot Road and Mt Lindsay Highway, this road is also considered in the traffic noise assessment. The location of the proposed development site relative to the transport noise corridors of Mt Lindsay Highway and Teviot Road is presented in Figure 2.2.

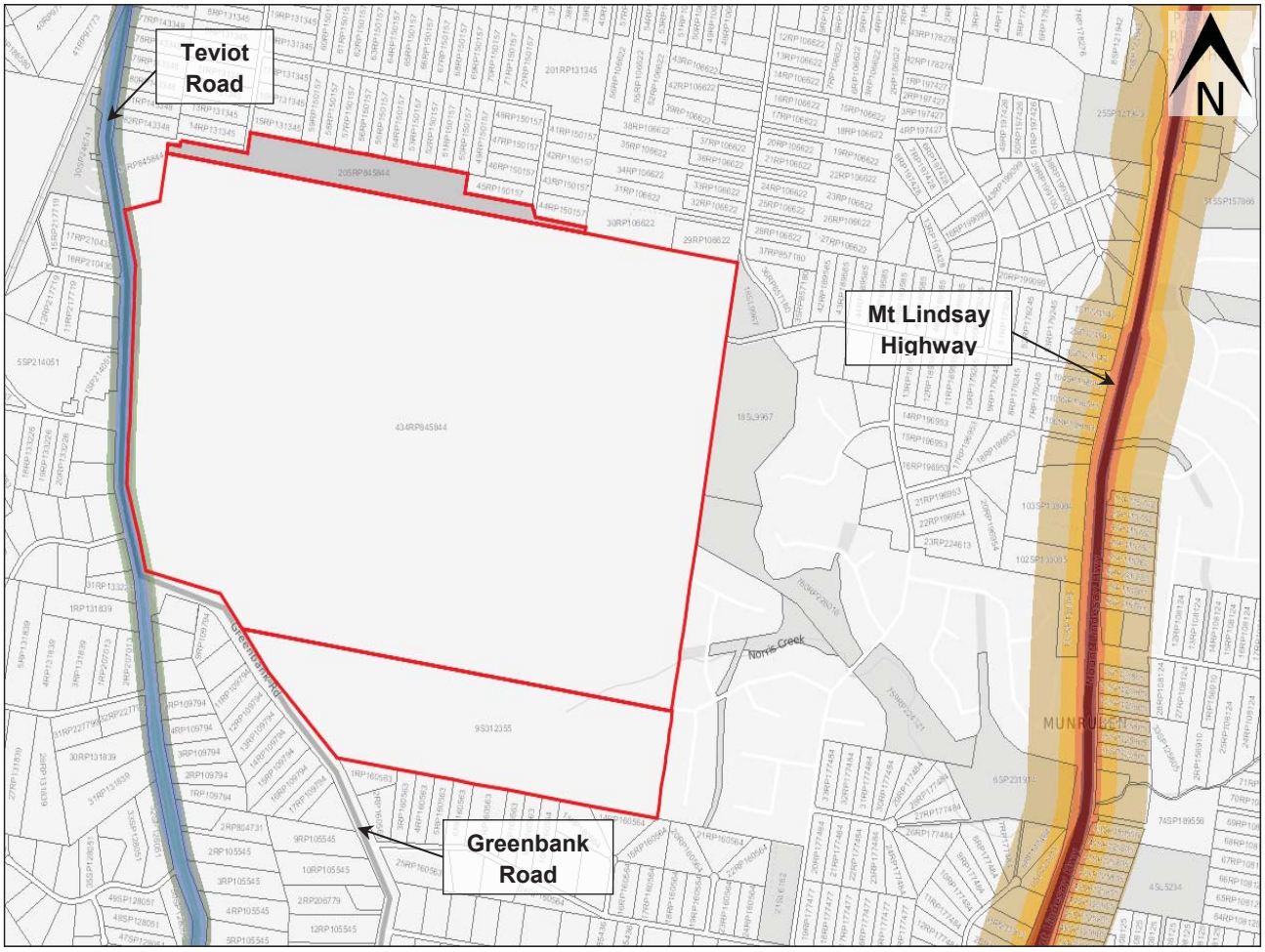


Figure 2.2 Subject Site Relative to Designated Transport Noise Corridors (QDC Extract)

Traffic volumes for the planned internal collector roads at the development will be lesser than Teviot Road and Greenbank Road, but are still significant. The estimated traffic volumes, in terms of annual average daily traffic (AADT), have been calculated for the major trunk and neighbourhood collector roads[2] (higher order roads), as presented in Appendix E.

2.5.3 Aircraft Noise

The Amberley RAAF Base is another major noise constraint that was considered as well as the Archerfield Airport. Because of the significant distance to these two airports and the pattern of the designated flight-paths, aircraft noise will impose no constraints on the proposed Greenbank Development.

The relationship of the proposed development site relative to the Amberley RAAF Base and the Archerfield Airport is illustrated in Figure 2.3.

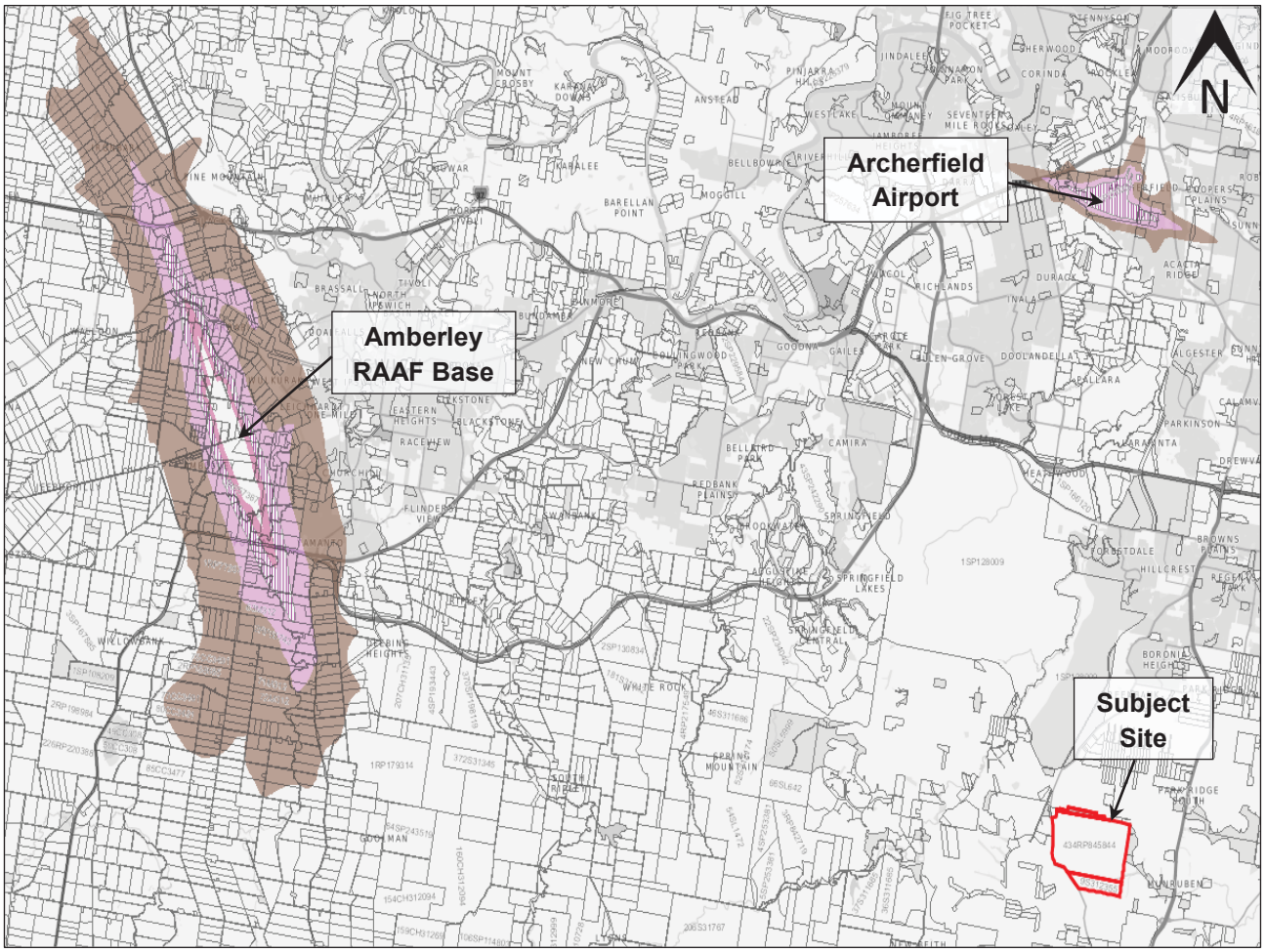


Figure 2.3 Subject Site Relative to Amberley RAAF Base and Archerfield Airport Flight-Paths

[2] Traffic volume data was provided by MWH Global.

2.5.4 Rail Noise

The Queensland/New South Wales rail line is a continuation of the standard gauge of the NSW North Coast railway line to Roma Street station in Brisbane. The line primarily services freight trains, however the XPT regional train makes a return trip from Sydney to Brisbane once daily. The line is not electrified and therefore cannot support the passenger trains that service the city and surrounding suburbs. The rail corridor runs divergent to the western boundary of the proposed development site.

The minimum separation distance between the rail corridor and the site is 350m towards the north-western corner of the site. Halfway down the site boundary the separation distance is approximately 650m. The railway track then bends away and maintains a separation distance of 1.5km. Refer to Figure 2.4 for alignment of the railway.

The Queensland/New South Wales railway line is not a designated transport noise corridor under the QDC, in recognition of the low frequency of train pass-by events. Other than the return Sydney-Brisbane-Sydney XPT passenger train, approximately six freight trains operate in either direction daily[3]. Given the setback distance and alignment of the track relative to the proposed development site there will be no noise impact from the Queensland/New South Wales rail line on the proposed Greenbank Development.

[3] As counted by the Australian Transport Safety Bureau in August, 2005.

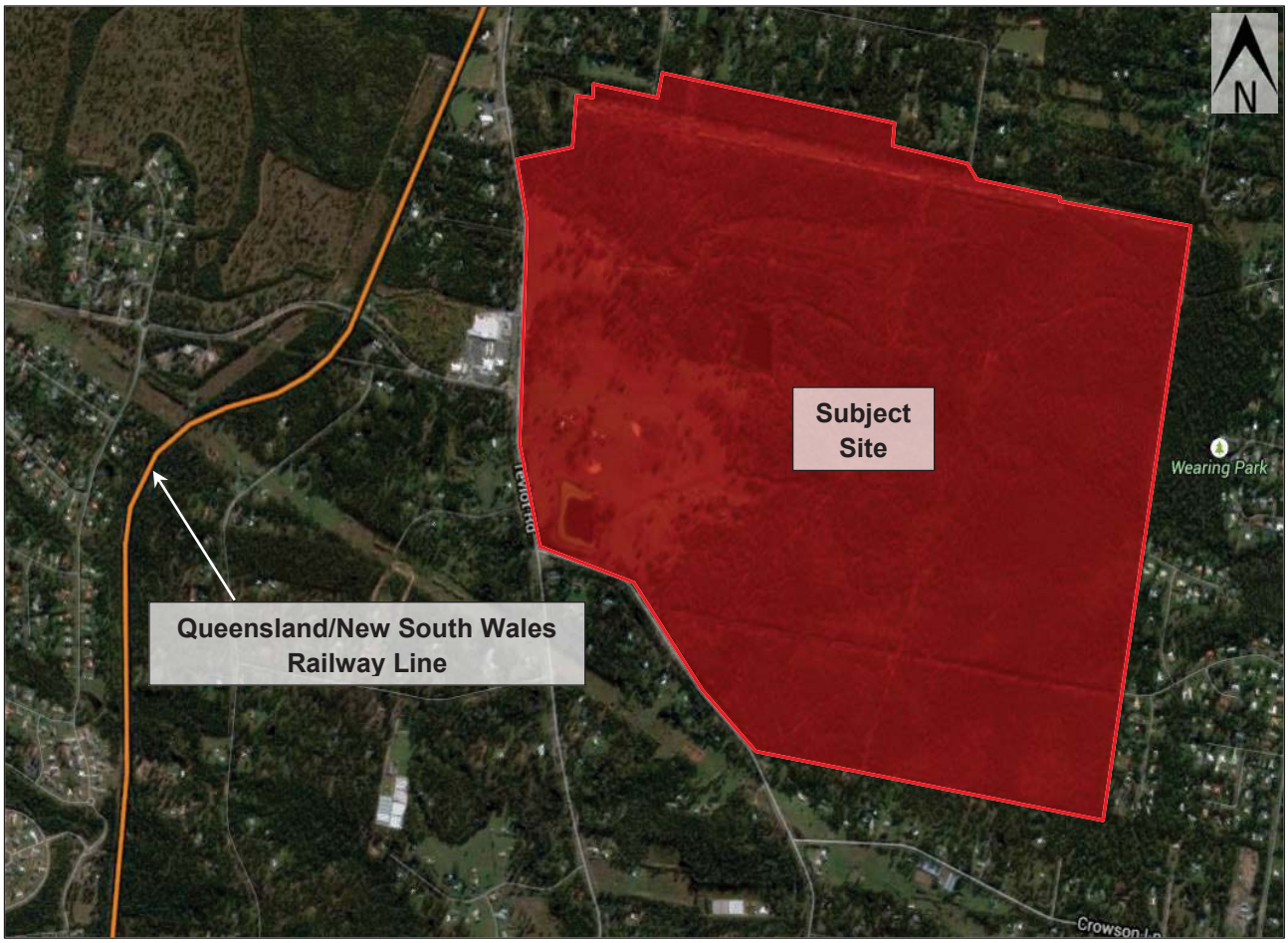


Figure 2.4 Subject Site Relative to Brisbane to Sydney Railway Line

2.5.5 Commercial, Industrial and Recreational Noise

The development site is located in a semi-rural locality with no major commercial, industrial or recreational facilities. The only existing external operational noise source is the Greenbank Shopping Centre, located on the corner of Teviot Road and Pub Lane.

There is a large separation distance between the Greenbank Shopping Centre and nearest residential dwellings within the development located across the Teviot Road from the shopping centre. Also, the noise amenity of the dwellings along Teviot Road will be dominated by the traffic noise emissions from Teviot Road. Considering this, no noise impact on the proposed development due to the noise emissions associated with the Greenbank Shopping Centre is expected.

Based on the assessment of various noise sources and the potential of noise impact on the proposed development, it is established that the only noise constraint is the potential traffic noise impact from Teviot Road, Greenbank Road and Internal Planned Roads of the development.

Hence, these traffic noise sources are considered in this noise impact assessment. The details are presented in the following sections.

3. Traffic Noise Impact Assessment

3.1 Traffic Noise Assessment Criteria

The development site is located within the Greater Flagstone PDA, a priority development area designated by Economic Development Queensland (EDQ).

There are no traffic noise criteria specific to the Greater Flagstone PDA. Traffic noise impact assessment for the Greenbank development should be carried out in accordance with the Department of Transport and Main Roads (TMR) *Road Traffic Noise Management: Code of Practice*.

The relevant traffic noise criteria are TMR's *Policy for Development on Land Affected by Environmental Emissions from Transport and Transport Infrastructure Version 2* and DSDIP's *State Development Assessment Provisions* (SDAP), Module 1: *Community Amenity.*

The relevant traffic noise criteria are presented in Table 3.1.

Table 3.1 External Noise Criteria

Development type	Location within Development	Environmental Criteria
Accommodation activities	All facades	≤60dB(A) L_{10}(18hr) façade corrected (measured L_{90}(8hr) free field between 10pm and 6am ≤ 40dB(A))
		≤63dB(A) L_{10}(18hr) façade corrected (measured L_{90}(8hr) free field between 10pm and 6am > 40dB(A))
	Private open spaces	≤57dB(A) L_{10}(18hr) free field (measured L_{90}(18hr) free field between 6am and midnight ≤ 45dB(A))
		≤60dB(A) L_{10}(18hr) free field (measured L_{90}(18hr) free field between 6am and midnight > 45dB(A))

The relevant façade adjusted[4] road traffic noise criterion for the building facades is 63dB(A)$L_{10,18hr}$[5].

The designated private open spaces (outdoor living areas) have to comply with the free-field traffic noise criterion of 60dB(A)$L_{10,18hr}$.

3.2 Internal Noise Criteria

Where the external noise criteria cannot be met, the residential dwellings must be designed to mitigate intrusion of traffic noise into habitable rooms. At the building approval stage the dwellings

[4] The façade adjusted noise criteria contains +2.5dB(A) adjustment factor for the sound energy that is result of the reflection of the sound wave from the hard surface of typical buildings. This adjustment is applicable for areas within 3m from a hard reflective vertical surface.
[5] Within a 10 year planning horizon, as the development is established, background noise levels in the vicinity of Teviot Road and Greenbank Road are expected to be greater than 40dB(A) $L_{90,8hr}$ between 10pm and 6am.

at the affected allotments should be designed and constructed as per AS3671-1989 (floor-plan specific acoustic design) or acceptable forms of construction from QDC MP4.4.

When carrying out acoustic design as per AS3671, it is recommended to adopt the internal noise criteria specified in AS/NZS2107:2000 as presented in Table 3.2.

Table 3.2 Internal Noise Criteria (Dwellings)

Type of occupancy	Maximum L_{Aeq}
Living areas	45 dB(A)
Sleeping areas	40 dB(A)

3.3 Traffic Noise Calculation Methodology

The traffic noise from Teviot Road, Greenbank Road and major internal roads were calculated using SoundPLAN noise propagation modelling software as per the procedure specified in the UK Department of Transport Welsh Office *Method of Calculation of Road Traffic Noise* (CoRTN'88). This is an accepted traffic noise calculation procedure applied widely in Australia[6].

Traffic noise levels have been calculated for a planning horizon of 2031 across the whole Greenbank development. Detailed results are calculated for Area 1 (early release area).

3.4 Traffic Noise Model Validation

The noise data collected during the monitoring period (as presented in Tables 2.1 and 2.2) was used to validate the accuracy of the SoundPLAN model prior to calculating future road traffic noise levels.

Traffic flow data, as considered in the SoundPLAN validation model, is presented in Table 3.3.

Table 3.3 Traffic Flow Data for Validation

Road	2006 Traffic Flow AADT[7]	2015 Traffic Flow AADT[8]	Heavy Vehicles (%)
Teviot Road	4,155	5,421	5.0
Greenbank Road	2,065	2,694	8.0

The additional factors and assumptions considered in the model are presented in Table 3.4.

[6] CoRTN (Calculation of Road Traffic Noise) is a widely accepted procedure in Australia for calculation of traffic noise and it is specifically recommended in QLD TMR's Code of Practice Volume 1, Section 4.3.2, Page 29.
[7] Most recent traffic data available for Teviot Road and Greenbank Road was from a 2006/2007 study by the Department for Transport and Main Roads (TMR, 2010).
[8] Traffic flow growth rates of 3.0% per annum from 2006 to 2015 where estimated based on typical growth of South East Queensland roads.

Table 3.4 Data and Assumptions – Model Validation

Parameter	Date/Assumptions
Mean Vehicle Speed	• **Teviot Road:** 70 km/hr north of Pub Lane and 80 km/hr south of Pub Lane • **Greenbank Road:** 80 km/hr
Calculation Procedure	• CoRTN (Calculation of Road Traffic Noise) • SoundPLAN grid spacing is 1m while the increment for angle of view is 1°
Road Traffic Volume for CoRTN procedure	• The CoRTN procedure requires 18 hours traffic volume data. Traffic volume for 18-hours (6:00am to midnight) was considered as 95% of the 24 hour AADT.
Road Surface	• **Teviot Road:** Bituminous seal, requiring an adjustment of +3dB in the model • **Greenbank Road:** Bituminous seal, requiring an adjustment of +3dB in the model
Noise Logger	Each noise logger was situated at a free field location with a microphone height of 1.2m above ground level.

The results of the SoundPLAN model validation are presented in Table 3.5 and in Appendix F.

Table 3.5 SoundPLAN Validation Results

Receiver	Measured* $L_{10(18\text{-hour})}$ dB(A)	Calculated* $L_{10(18\text{-hour})}$ dB(A)	Difference dB(A)	Validation Factor
Noise Logger – Location 1	65	65	0	N/A
Noise Logger – Location 2	55	57	+2	N/A

**Free-field*

The calculated traffic noise levels are within ± 2 dBA tolerance limit, hence no correction factor is required.

3.5 Traffic Noise Calculations

Traffic noise calculations were carried out for a planning horizon of 2031, 10 years after Area 1 of the development is established.

The traffic flows for 2031 are presented in Table 3.6 and in Appendix E.

Table 3.6 Traffic Flow Data for Calculation

Road	Road Segment	2031 Traffic Flow AADT[9]	Heavy Vehicles (%)
Teviot Road	North of Leanne Court	30,217	5.0
Teviot Road	Between Shopping Centre and Leanne Court	27,926	5.0
Teviot Road	Between Pub Lane and Shopping Centre	26,680	5.0
Teviot Road	Between Greenbank Road and Pub Lane	17,751	5.0
Teviot Road	South of Greenbank Road	15,442	5.0
Greenbank Road	Between Teviot Road and High Order Road 2	14,713	8.0
Greenbank Road	Between High Order Road 2 and Crowson Lane	17,148	8.0
High Order Road 1 (within development)	Pub Lane to school road	7,226	3.0
High Order Road 1 (within development)	School Road to High Order Road 2	2,171	3.0
High Order Road 2 (within development)	Leanne Court to Neighbourhood Centre	12,779	3.0
High Order Road 2 (within development)	Neighbourhood Centre to school road	7,321	3.0
High Order Road 2 (within development)	School Road to High Order Road 1	2,861	3.0
High Order Road 2 (within development)	High Order Road 1 to Greenbank Road	6,637	3.0

The various additional factors considered in the model are presented in Table 3.7.

Table 3.7 Data and Assumptions - Road Traffic Noise Calculations

Parameter	Date/Assumptions
Mean Vehicle Speed	• **Teviot Road:** 70 km/hr north of Pub Lane and 80 km/hr south of Pub Lane • **Greenbank Road:** 80 km/hr • **Internal roads:** 50 km/hr
Calculation Procedure	• CoRTN (Calculation of Road Traffic Noise) • SoundPLAN grid spacing is 1m while the increment for angle of view is 1°
Road Traffic Volume for CoRTN procedure	• The CoRTN procedure requires 18 hours traffic volume data. Traffic volume for 18-hours (6:00am to midnight) was considered as 95% of the 24 hour AADT.
Road Type and Alignment	• **Teviot Road:** Dual carriageway, two lanes in each direction (after road upgrade). Median width 2m, lane width 3.5m • **Greenbank Road:** Single carriageway, one lane in each direction. Lane width 3.5m • **Internal trunk connectors:** Dual carriageway, one lane in each direction. Lane width 3.5m • **Neighbourhood connectors:** Single carriageway, one lane in each direction. Lane width 3.5m
Road Surface	• **Teviot Road & Greenbank Road:** Dense graded asphalt (after road upgrade) • **Internal roads:** Dense graded asphalt. Dense graded asphalt requires no adjustment factor.

[9] Traffic volume data was provided by MWH Global.

Buildings	• Residential buildings on all lots were considered as one storey high with total height of 4m. • Front and rear setbacks are generally 8.0m from the traffic lanes and side setbacks are minimum 1.0m from the lot boundaries. • Neighbourhood fences were not considered in the model.
Receivers	**Façade noise levels** • Although buildings were considered as single-storey, receivers were allocated to ground (1.8m AGL) as well as upper floor (4.6m AGL) to calculate noise levels at potential two-storey houses. AGL: above ground level • SoundPLAN adds +2.5dB(A) to the calculated noise levels when the receivers are attached to the buildings, thus the tabulated traffic noise levels are façade adjusted. **Private open spaces** • Receivers were placed at the outdoor living areas of most exposed allotments (first row of dwellings facing Teviot Road, Greenbank Road and major internal roads). • Outdoor living areas are considered to be located on the side of houses opposite the street (i.e. backyards). • Receivers were placed at a free-field location 4m from the building façades. • Receivers were placed at 1.5m AGL.
CoRTN correction factor	• Application of CoRTN correction factor of –1.7dB for receivers located 1m from building façades is considered in Australia, and –0.7dB for free-field receivers, as recommended by *TMR Code of Practice*.
Terrain	• Elevation contours and finished pad levels are provided by ETS.
Noise control measures	• Traffic noise levels were calculated with and without noise control measures. Noise control measures consist of: - earth mound; or acoustic fence as detailed in Section 4 of this report.

3.6 Calculated Traffic Noise Levels

3.6.1 No Noise Mitigation Measures

The calculated road traffic noise levels at the most exposed façades of the future dwellings of Area 1, for year 2031 and without noise mitigation measures, are presented in Table 3.8.

Table 3.8 Façade Noise Levels – No Noise Mitigation Measures

Location	Number of lots	Floor	Calculated Traffic Noise Level Façade-adjusted	Compliance with traffic noise criterion 63dB(A) $L_{10(18h)}$
			$L_{10(18h)}$ dB(A)	
Lots 1009 to 1016, 2001 to 2005	12	GF	66	No
Lots 1005 to 1008, 1017 to 1022, 2006 to 2013, 2052 & 2053	20	GF	65	No
Lots 1001 to 1004, 1023, 1029 to 1035, 1038, 1243 to 1245, 1247 to 1250, 1254 to 1256, 1258, 1259, 1335 to 1338	29	GF	64	No
All other Area 1 allotments	449	GF	63 or less	Yes
Total (Area 1)	**510**			

At ground level, the façade noise criterion of 63dB(A) $L_{10,18hr}$ is exceeded at 61 out of 510 allotments. At the first floor, the façade noise criterion is exceeded at 94 out of 510 allotments.

The free-field noise levels at the most exposed outdoor living areas of Area 1 (first row of allotments only) are presented in Table 3.9.

Table 3.9 Free-field Noise Levels – No Noise Mitigation Measures

Location	Calculated Traffic Noise Level Façade-adjusted	Compliance with traffic noise criterion 60dB(A) $L_{10(18h)}$
	$L_{10(18h)}$ dB(A)	
Lots 1013 to 1015, 2001, 2002, 2004, 2005	65	No
Lots 1005 to 1012, 1016 to 1020, 1030 to 1035, 1115, 1337, 1338, 2003, 2006 to 2013, 2038, 2052 & 2053	64	No
Lots 1001, 1003, 1004, 1021 to 1023, 1029, 1116 to 1122, 1335, 1336, 2051	63	No
Lots 1002, 1024, 1028, 1336 to 1338	62	No
Lots 1339 to 1341	61	No

With no noise mitigation measures, the noise criterion for private open spaces of 60dB(A) $L_{10,18hr}$ is exceeded at 67 out of 71 allotments in the first row.

The calculated road traffic noise levels (SoundPLAN Result Tables) for Area 1 allotments are presented in Appendix G.

The noise contours (SoundPLAN Noise Grid Maps) showing the road traffic noise propagation over the whole development site are presented in Appendix H.

3.6.2 With Noise Mitigation Measures – Earth Mound along Teviot Road

The results in this section consider an earth mound along Teviot Road, a 40m setback from Greenbank Road and acoustic fence along southern side of the trunk connector, as discussed in Section 4 of this report.

The calculated road traffic noise levels at most exposed façades of the future dwellings of Area 1, for year 2031, with noise mitigation measures, are presented in Table 3.10.

Table 3.10 Façade Noise Levels – With Noise Mitigation Measures

Location	Number of lots	Floor	Calculated Traffic Noise Level Façade-adjusted $L_{10(18h)}$ dB(A)	Compliance with traffic noise criterion 63dB(A) $L_{10(18h)}$	Noise Control Measure
Lots 1243 to 1245, 1247 to 1250, 1254 to 1256, 1258, 1259, 1336 to 1338	15	GF	64	No	Acoustic design as per AS3671 OR Acoustic setback (Lots 1336 to 1338)
All Area 1 allotments	495	GF	63 or less	Yes	
Total (Area 1)	**510**				

The traffic noise levels at the ground floors of the future dwellings will be compliant at all allotments, except the front-loaded Lots 1242 to 1260 and within the 40m buffer along Greenbank Road. At the first floor, the façade noise criterion is exceeded at 90 out of 510 allotments, all of which are located in the first row (refer to Figure 4.7).

The free-field noise levels at the most exposed outdoor living areas of Area 1 (first row of allotments only) are presented in Table 3.11.

Table 3.11 Free-field Noise Levels – With Noise Mitigation Measures

Location	Calculated Traffic Noise Level Façade-adjusted $L_{10(18h)}$ dB(A)	Compliance with traffic noise criterion 60dB(A) $L_{10(18h)}$
All allotments	60 or less	Yes

With noise mitigation measures, all allotments comply with the noise criterion for private open spaces of 60dB(A) $L_{10,18hr}$.

3.6.3 With Noise Mitigation Measures – Acoustic Fence along Teviot Road

The results in this section consider an acoustic fence along Teviot Road, a 40m setback from Greenbank Road and acoustic fence along southern side of the trunk connector, as discussed in Section 4 of this report.

The calculated road traffic noise levels at most exposed façades of the future dwellings of Area 1, for year 2031, with noise mitigation measures, are presented in Table 3.12.

Table 3.12 Façade Noise Levels – With Noise Mitigation Measures

Location	Number of lots	Floor	Calculated Traffic Noise Level Façade-adjusted $L_{10(18h)}$ dB(A)	Compliance with traffic noise criterion 63dB(A) $L_{10(18h)}$	Noise Control Measure
Lots 1254 to 1259, 1336 to 1338	9	GF	64	No	Acoustic design as per AS3671 OR Acoustic setback (Lots 1336 to 1338)
All Area 1 allotments	501	GF	63 or less	Yes	
Total (Area 1)	**510**				

The acoustic fence along Teviot Road provides similar level of protection as the earth mound. The traffic noise levels at the ground floors of the future dwellings will be compliant at all allotments, except the front-loaded Lots 1242 to 1260 and within the 40m buffer along Greenbank Road. At the first floor, the façade noise criterion is exceeded at 79 out of 510 allotments, all of which are located in the first row (refer to Figure 4.7).

The free-field noise levels at the most exposed outdoor living areas of Area 1 (first row of allotments only) are presented in Table 3.13.

Table 3.13 Free-field Noise Levels – With Noise Mitigation Measures

Location	Calculated Traffic Noise Level Façade-adjusted $L_{10(18h)}$ dB(A)	Compliance with traffic noise criterion 60dB(A) $L_{10(18h)}$
All allotments	60 or less	Yes

With noise mitigation measures, all allotments comply with the noise criterion for private open spaces of 60dB(A) $L_{10,18hr}$.

The calculated road traffic noise levels (SoundPLAN Result Tables) for Area 1 allotments are presented in Appendix I.

The noise contours (SoundPLAN Noise Grid Maps) showing the road traffic noise propagation over the whole development site are presented in Appendix J.

4. Discussion and Recommendations

Based on extensive site-specific and desktop analysis of the general environmental noise constraints in the wider area around the proposed development site, the dominant noise constraint on the development is traffic noise from Teviot Road, Greenbank Road and major internal collector roads.

Traffic noise propagation modelling was carried out considering the future traffic flows for a planning horizon of 2031. The results of the noise propagation modelling indicate that, without noise mitigation measures, the proposed development site will be impacted by traffic noise from Teviot Road, Greenbank Road and the major internal collector roads.

A noise control strategy has been adopted in the planning of the Greenbank development. The general objectives of the noise control strategy are as follows:

1. Ensure that at all allotments, there is at least one private open space (outdoor living area) which complies with the traffic noise criterion of 60dB(A) $L_{10,18hr}$ (free-field).

2. Ensure compliance with the façade traffic noise criterion of 63dB(A) $L_{10,18hr}$ at all allotments where it is practical to do so (i.e. where noise barrier or acoustic setback is feasible). Typically, for traffic noise levels of 63dB(A) or lesser, standard construction of the building envelope is acceptable.

3. At allotments where noise barrier or acoustic setback is not feasible and traffic noise criterion of 63dB(A) $L_{10,18hr}$ is exceeded, the building envelope should be constructed in accordance with QDC MP4.4 or AS3671 to ensure compliance with the internal noise criteria from AS2107.

The proposed noise mitigation measures are as follows:

- Earth mound OR Acoustic fence along Teviot Road;
- Acoustic setback along Greenbank Road;
- Acoustic fence along internal collector roads, at rear-loaded allotments where the outdoor living areas face the road;
- For front-loaded allotments on the major internal collector roads, ensure that outdoor living areas are located on the protected façade;
- Acoustic setback along internal collector roads (allotments separated from road by linear parks); and
- Acoustic design to be carried out at the building approval stage for any dwellings where the traffic noise criterion is exceeded. This may include upper floors of two storey houses and houses on front loaded allotments facing internal collector roads.

Summary of the noise control strategy at Area 1 of the Greenbank Development is presented in Figure 4.1.

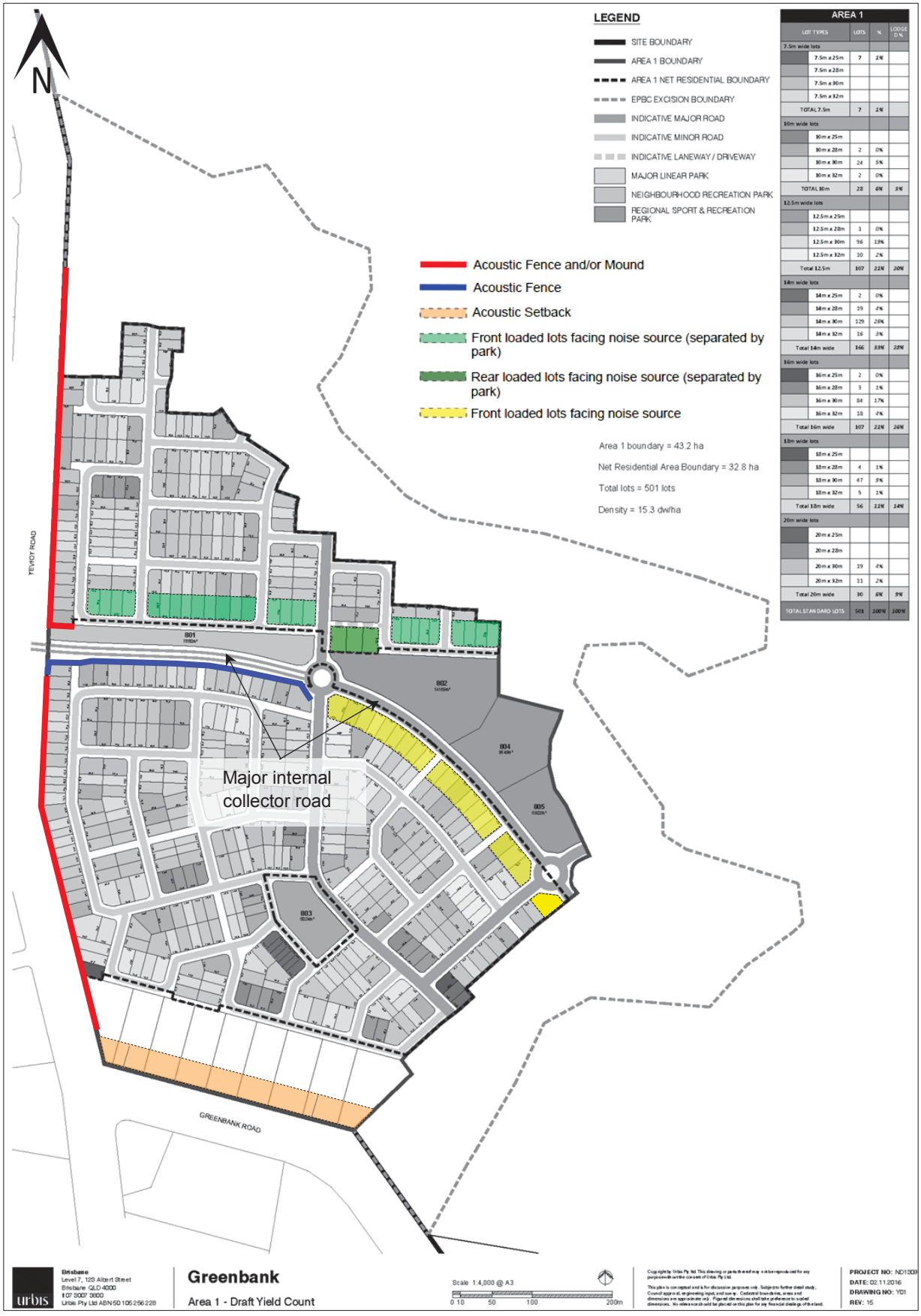


Figure 4.1 Noise Control Strategy – Area 1

4.1 Earth Mound

One of the noise control options along Teviot Road is a landscaped earth mound. The earth mound should be constructed in accordance with the guidelines from Chapter 7: *Integrated Noise Barrier Design* of TMR's *Road Traffic Noise Management: Code of Practice*.

The SoundPLAN noise propagation model considers an earth mound constructed as follows:

- **Alignment:** Mound should be constructed between the development boundary and Teviot Road, as presented in Figure 4.2. There is a 30m return on the southern boundary of Lot 2001.
- **Height:** Generally 2.0m above the existing ground levels. Adjacent to Lots 2001 to 2006 the mound varies from 2.5m to 3.0m above the existing ground levels, to compensate for a depression in the terrain. Mark-up plan showing recommended heights of the earth mound is presented in Appendix K.
- **Batter:** 1 in 2 on side facing development, 1 in 3 on side facing road reserve.

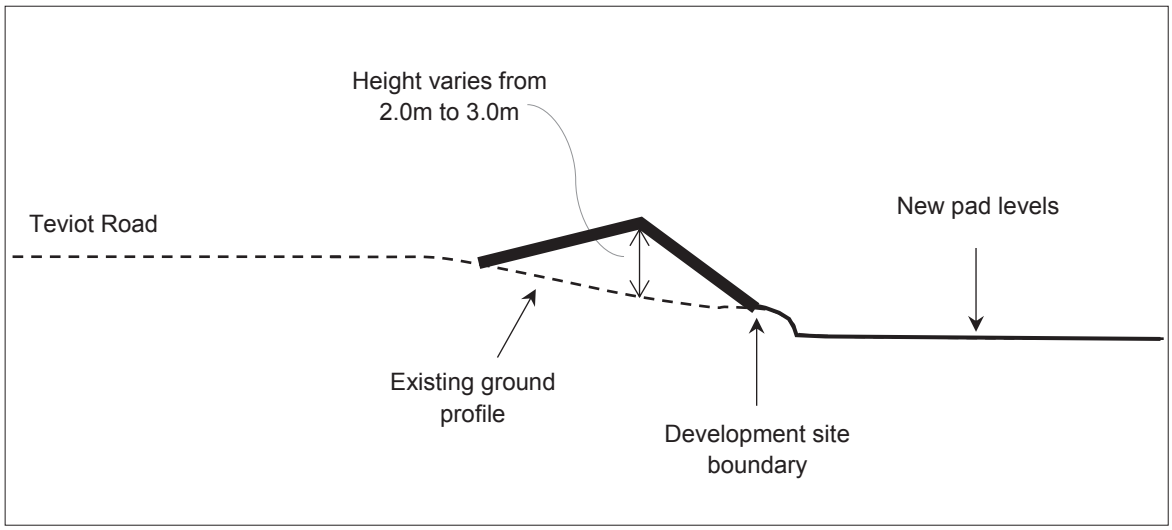


Figure 4.2 Earth mound cross-section (typical)

Based on the results of the noise propagation modelling, compliance with the traffic noise criteria for ground floor facades and private open spaces can be achieved with earth mound as specified. There is no requirement for a noise barrier fence on top of the earth mound.

4.2 Acoustic Fence

Along Teviot Road

As an alternative to an earth mound, it is acceptable to construct an acoustic fence along Teviot Road. The acoustic fence should be constructed to comply with TMR's *Road Traffic Noise Management: Code of Practice*.

The SoundPLAN noise propagation model considers an acoustic fence constructed as follows:

- **Alignment:** The alignment of the proposed acoustic fence follows the western site boundary facing Teviot Road. There is a 30m return on the southern boundary of Lot 2001.

  Unlike the earth mound, which would be centred approximately 4m west of the site boundary because of its 1-in-2 batter, the acoustic fence may be positioned precisely on the site boundary. The fence can be constructed on top of the proposed retaining walls which will be built during the earthworks stage. The finished pad levels of the first row of allotments generally sits below the height of Teviot Road. Therefore, positioning the acoustic fence on top of the retaining wall will maximise screening of road traffic noise. Locating the fence on the site boundary, in close proximity to the noise sensitive outdoor living areas, will also maximise the "acoustic shadow". Recommended location of the acoustic fence relative to the allotments on Teviot Road is presented in Figure 4.3.

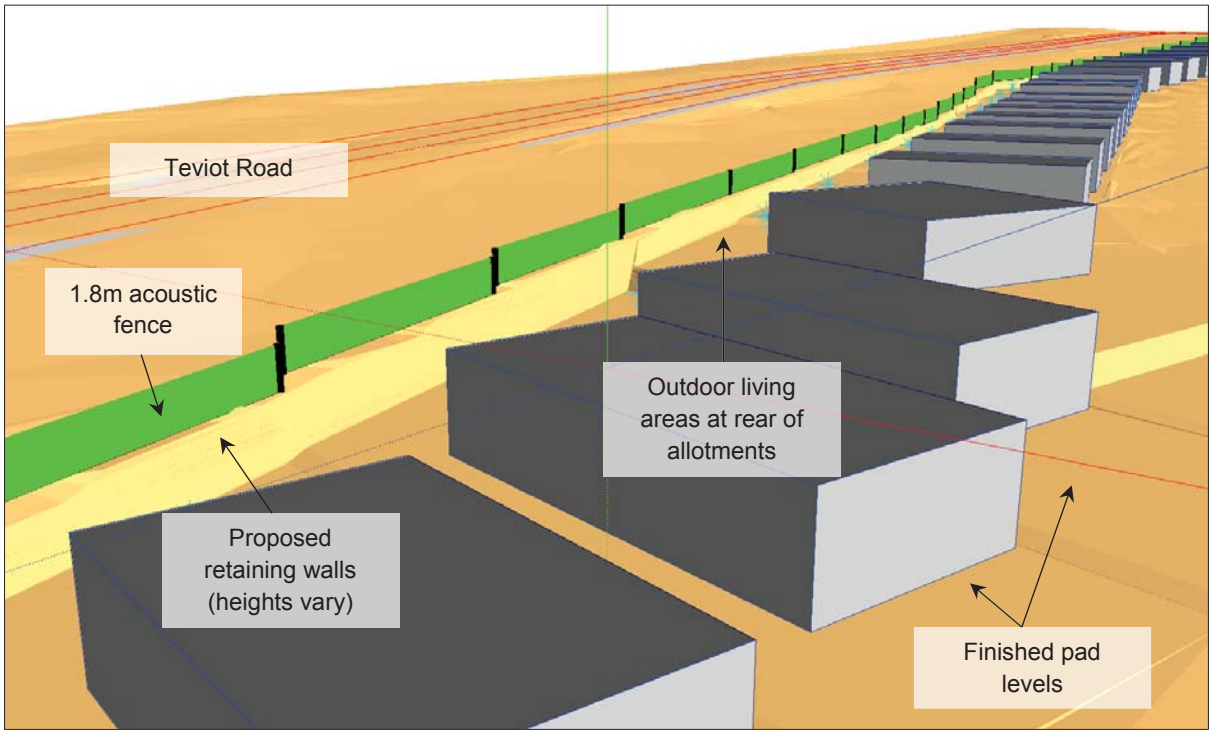


Figure 4.3 Acoustic fence – 3d perspective

- **Height:** Generally 2.0m above the existing ground levels. Adjacent to Lots 2003, 2004 & 2005 the height of the fence should be 2.4m, due to a depression in the terrain. Mark-up plan showing recommended heights of the fence is presented in Appendix L. ***Note***: The acoustic fence was modelled as multiple segments in a "stepped" fashion. Each fence segment has a level base corresponding to the top of the retaining wall and each segment has constant height. The retaining wall is assumed to be built to the maximum height of the adjoining ground.

Along Internal Collector Road

To protect the outdoor living areas, a 1.8m high acoustic fence should be constructed along the northern boundary of Lots 1001, 1029 to 1038, and Lots 1115 to 1122, facing the trunk connector

road. The fence should extend along the western boundary of Lot 1001 (16m length, facing Teviot Road) and part of the eastern boundary of Lot 1122 (length 24m, facing roundabout).

The recommended alignment of the acoustic fence is presented in Figure 4.4.

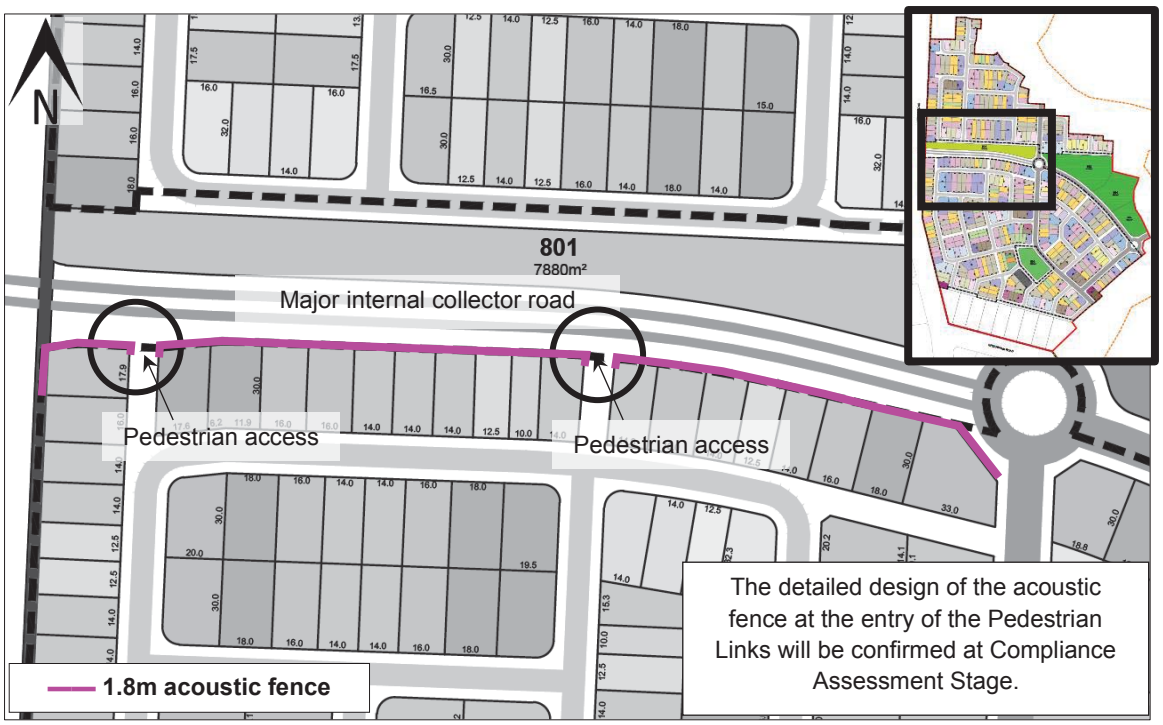


Figure 4.4 Alignment of acoustic fence

Pedestrian access is required at two locations along the acoustic fence. The design of this section of the acoustic barrier wall should consider best 'safety in design' principles to ensure:

- Passive surveillance;
- Suitable landscaping that will not impose safety hazards; and
- Suitable safety lighting.

Acceptable form of construction for the acoustic fences is as follows:

- Material with minimum surface density of 15kg/m^2, e.g. timber palings with minimum thickness 20mm; fibre-cement sheeting with minimum thickness of 12mm; masonry; and aerated concrete.
- The noise barrier should be free of any gaps. If the noise barrier is constructed of timber palings, planks should have minimum 35mm overlap.
- The noise barrier should be of durable construction.

A typical timber noise barrier fence construction is illustrated in Figure 4.5.

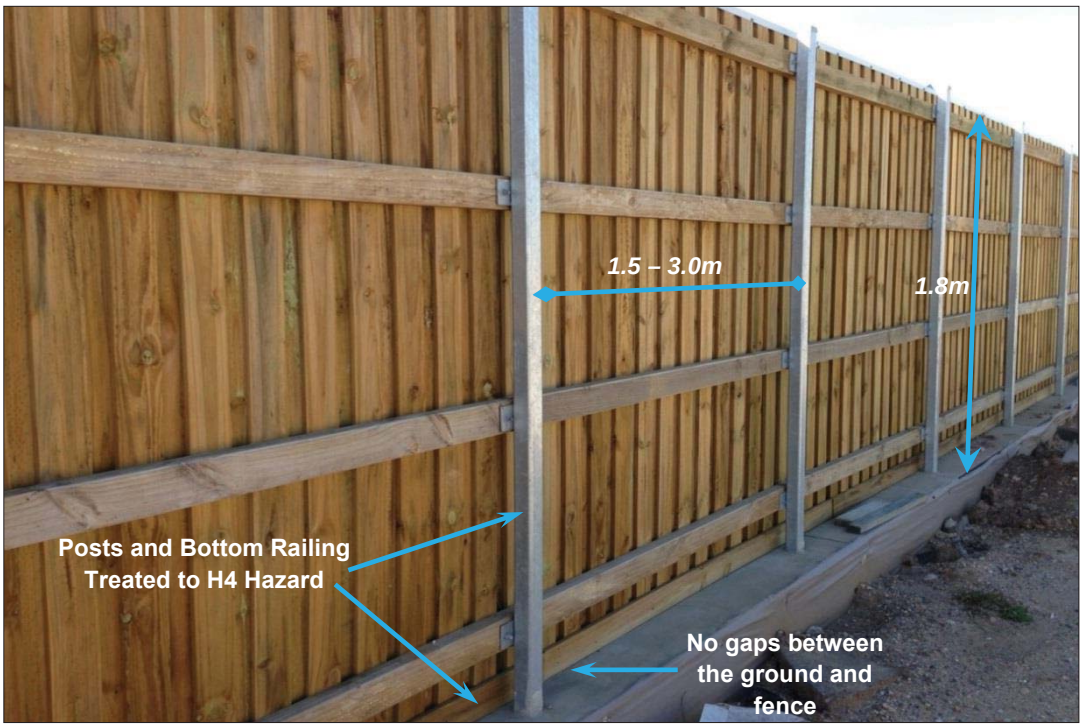


Figure 4.5 Typical Timber Noise Barrier Fence

4.3 Acoustic Setbacks

The traffic noise model was used to assess the effectiveness of the proposed acoustic setbacks along Greenbank Road and the internal collector roads. The following conclusions can be made:

Private Open Spaces:

- **Interface Lots along Greenbank Road:** Private open spaces at the Interface Lots (Lots 1335 to 1343) should have minimum setback distance of 40m from the site boundary. If the private open spaces are protected by 1.8m high noise barrier, or located in a protected courtyard recessed into the building, the private open spaces are allowed to be within 40m of the site boundary.

- **Lots Separated by a Park:** Private open spaces at the front loaded lots separated from the internal collector road by a park (Lots 2026 to 2029, 2119 to 2127, 2128 to 2131, 2157 to 2161, and 2164 to 2167) are fully protected from traffic noise. Private open spaces at the rear loaded lots opposite the park (Lots 2149 to 2151) are setback from the road by at least 35m and do not require additional noise control measures.

Building Facades:

- **Interface Lots along Greenbank Road:** Buildings located within 40m buffer from the site boundary require acoustic design to the ground and upper floors. Buildings located 40 to 60m from the site boundary require acoustic design to the upper floors only. Beyond 60m no acoustic design will be required.

- **Lots Separated by a Park:** All allotments on the northern side of the park comply with the façade traffic noise criterion of 63dB(A) $L_{10,18hr}$. Standard construction is acceptable for these allotments.

The development plan includes a row of Interface Lots (Lots 1335 to 1343) along Greenbank Road. Acoustic buffer zone of 40m (for low-set dwellings) and 60m (for high-set dwellings) is the preferred noise control strategy and will eliminate the need for an earth mound or acoustic fence. Outside the buffer zone no acoustic design is required.

4.4 Front Loaded Lots Facing Internal Collector Road

Front loaded lots facing the internal collector road (Lots 1242 to 1260, refer to Figure 4.1) will have traffic noise impacts on the most exposed façade. The traffic noise level on the ground floor, at the most exposed façade, is predicted to be 64dB(A) $L_{10,18hr}$ for setback distance of 8m from the traffic lane. The Design Criteria for the development allows for minimum setback distance of 3m from front lot boundary. At 3m, the façade noise level is predicted to be 67dB(A) $L_{10,18hr}$.

At the building approval stage, future houses at Lots 1242 to 1260 should be designed and constructed as per AS3671 (floor-plan specific acoustic design) or acceptable forms of construction from QDC MP4.4 to mitigate intrusion of traffic noise into habitable rooms.

At Lots 1242 to 1260 it is recommended to locate the private open spaces at the rear of the houses. Provided that the private open spaces are located along the protected rear façades (facing away from the road), or in a protected courtyard recessed into the side of the buildings, compliance with the traffic noise criterion will be achieved.

Typical layout showing outdoor living area located on the protected façade is presented in Figure 4.6.

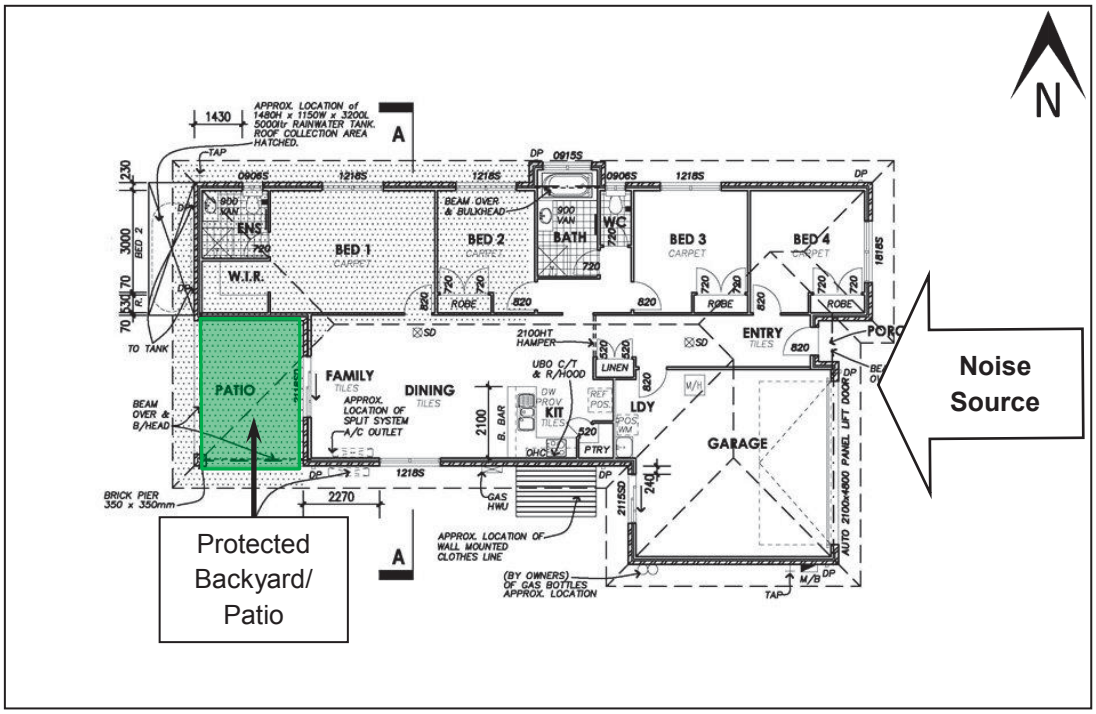


Figure 4.6 Outdoor Living Area on Protected Facade

4.5 Summary of Lots Requiring Acoustic Design

The results of the noise propagation modelling indicate that the proposed noise control strategy is highly effective.

Private Open Spaces **–** With the proposed noise barriers and acoustic setbacks, compliance with the traffic noise criterion for private open spaces can be achieved at all allotments.

Building Facades – Some allotments will require acoustic design to the building envelope to mitigate intrusion of traffic noise at the most exposed façade. The following is concluded:

Ground floors

The traffic noise levels at the ground floors of the future dwellings will be compliant at all allotments, except the front-loaded Lots 1242 to 1260 and within the 40m buffer along Greenbank Road (Lots 1335 to 1343).

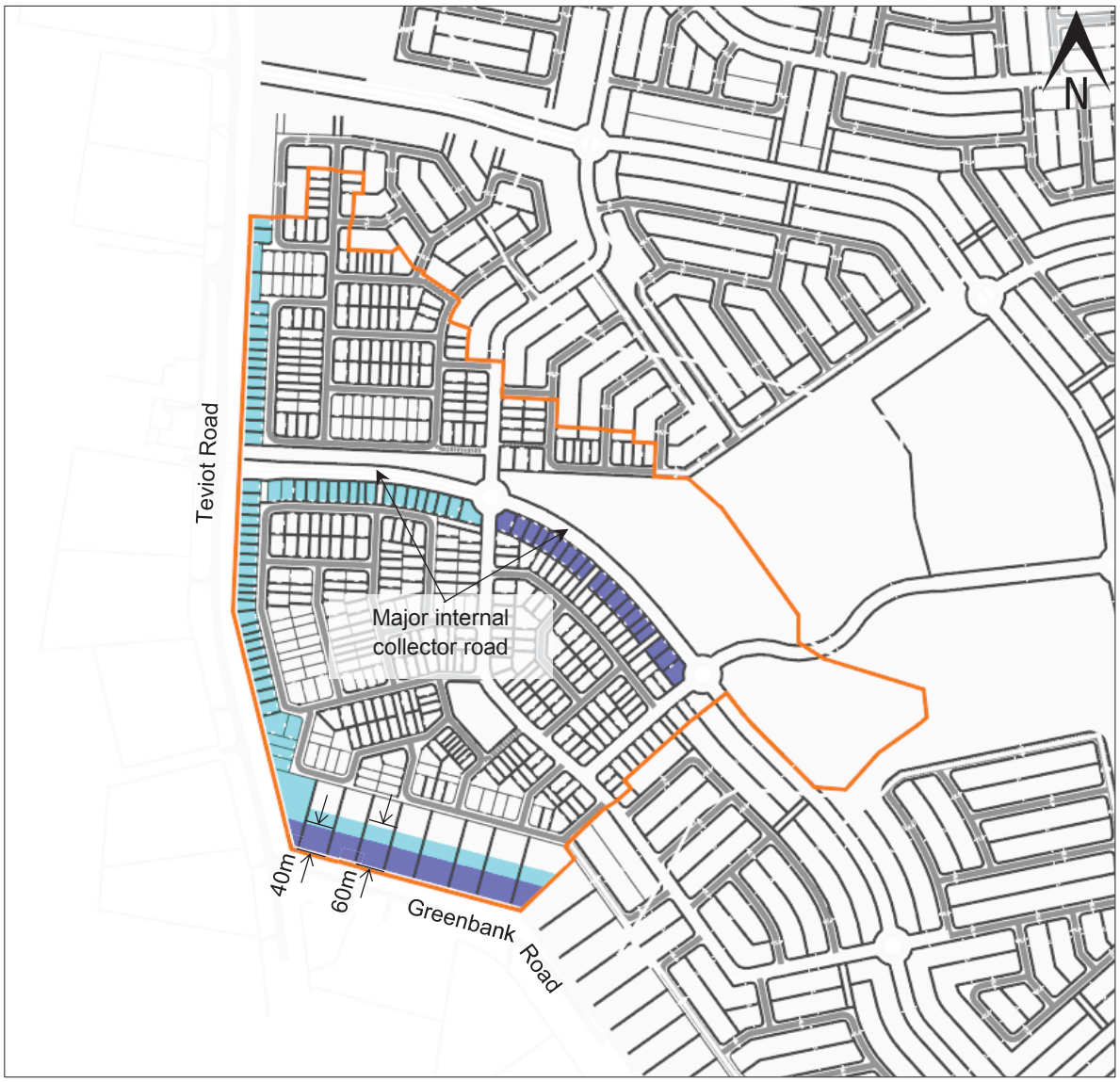
Upper floors

The traffic noise levels at the upper floors of future dwellings in the first row of allotments facing Teviot Road, Greenbank Road and the major internal collector road will exceed the traffic noise criterion. The affected allotments include the following:

- **Teviot Road:** Lots 1001 to 1028, 2001 to 2013, 2038, 2051 to 2053.
- **Greenbank Road:** Lots 1335 to 1340 (within 60m of site boundary).
- **Internal collector road:** Lots 1029 to 1038, 1115 to 1122, 1241 to 1260.

The noise control measures are primarily designed to protect the ground floors of the allotments. For protection of the upper floors of any high-set dwellings, the most practical approach is acoustic treatment to the building envelope (external walls, windows and roof/ceiling). At the building approval stage, the upper floors of the houses on the affected allotments should be designed and constructed as per AS3671 (floor-plan specific acoustic design) or acceptable forms of construction from QDC MP4.4 to mitigate intrusion of traffic noise into habitable rooms.

Mark-up plan showing allotments which require acoustic design is presented in Figure 4.7.



Legend

Colour	Requirement
	Acoustic design required to upper floors only
	Acoustic design required to ground and upper floors

Figure 4.7 Lots Requiring Acoustic Design – Area 1

Provided the recommended planning and design noise control measures are implemented in the construction of Area 1 of the Greenbank Development, road traffic noise will not impose any further constraints on the establishment of the proposed development.

5. Conclusions

Based on the results of the noise impact assessment for Area 1 of the proposed Greenbank development, the following is concluded:

- The dominant noise constraint on the development is traffic noise from Teviot Road, Greenbank Road and major internal collector roads.
- Earth mound OR acoustic fence should be constructed along Teviot Road. The minimum height of the earth mound should be 2.0m above the existing ground levels, except at Lots 2001 to 2006 where it should be up to 3.0m above the existing ground levels. The minimum height of the acoustic fence should be 1.8m above the existing ground levels, except at Lots 2003 to 2005 where it should be 2.4m above the existing ground levels.
- No noise control measures are required at the southern site boundary along Greenbank Road, provided that dwellings have minimum setback distance of 40m for low-set buildings and 60m for high-set buildings.
- 1.8m high acoustic fence should be constructed along the northern boundaries of Lots 1001, 1029 to 1038, and Lots 1115 to 1122 to protect the private open spaces.
- Private open spaces at Lots 1242 to 1260 should be located on the protected facades.
- The ground and upper floors of Lots 1242 to 1260 have to be designed as per AS3671-1989 to mitigate traffic noise ingress.
- The upper floors of the first row of allotments facing Teviot Road, Greenbank Road and the trunk connector road (southern side only) have to be designed as per AS3671-1989 to mitigate traffic noise ingress.
- Provided the recommended planning and design noise control measures are implemented in the construction of Area 1 of the Greenbank Development, road traffic noise will not impose any further constraints on the establishment of the proposed development.

6. References

- Australian Standard AS1055.1-1997 (*Acoustics - Description and Measurement of Environmental Noise Part 1: General Procedures*)
- Australian Standard AS1055.2-1997 (*Acoustics - Description and Measurement of Environmental Noise Part 2: Application to Specific Situations*)
- Australian Standard AS/NZS2107-2000 (*Acoustics – Recommended design sound levels and reverberation times for building interiors*)
- Australian Standard ASIEC61672.1-2004 (*Electroacoustics - Sound level meters – Specifications*)
- Australian Standard *AS3671-1989 (Acoustics – Road Traffic Noise Intrusion – Building sitting and construction)*
- Department of State Development Infrastructure and Planning, 2016, *State Development Assessment Provisions* (Version 1.9), 22 July 2016
- Department of Transport and Main Roads, 2013, *Transport Noise Management: Code of Practice, Volume 1 – Road Traffic Noise*
- Department of Transport and Main Roads, 2013*, Policy for Development on Land Affected by Environmental Emissions from Transport and Transport Infrastruct*ure (Version 2)
- Logan City Council, 2015, *Logan Planning Scheme 2015*
- Queensland Government, 2010, '*Queensland Development Code (QDC) MP4.4 (Buildings in a Transport Noise Corridor)*'

Appendix A – Proposed Development Layout

Legend

- SITE BOUNDARY
- CADASTRE BOUNDARIES
- AREA 1 BOUNDARY
- GREATER FLAGSTONE UDA BOUNDARY
- EXISTING EASEMENTS
- RAIL CORRIDOR
- POTENTIAL TRAIN STATION [1]
- TRUNK CONNECTOR ROAD NETWORK
- NEIGHBOURHOOD CONNECTOR ROAD NETWORK
- RESIDENTIAL ACCESS STREETS

Land Uses

- RESIDENTIAL - STANDARD LOTS
- RESIDENTIAL - INTERFACE LOTS - NORTH
- RESIDENTIAL - INTERFACE LOTS - SOUTH
- NEIGHBOURHOOD CENTRE
- DISTRICT CENTRE (EXTERNAL) [1]
- COMBINED REGIONAL RECREATION AND REGIONAL SPORTS PARK
- INDICATIVE LOCATIONS OF MAJOR LINEAR PARKS
- CONSERVATION PARKLAND
- POTENTIAL ECO LOT PRECINCT (SUBJECT TO FURTHER ASSESSMENT)
- INDICATIVE LOCATIONS OF NEIGHBOURHOOD PARKS
- INDICATIVE LOCATION OF STATE PRIMARY SCHOOL
- COMMUNITY FACILITY

1 Location as nominated in the Greater Flagstone PDA Development Scheme. These items are outside the area controlled by the applicant and are subject to approval and delivery by others.

Note: Locations of Context Plan features are indicative and subject to detailed design.

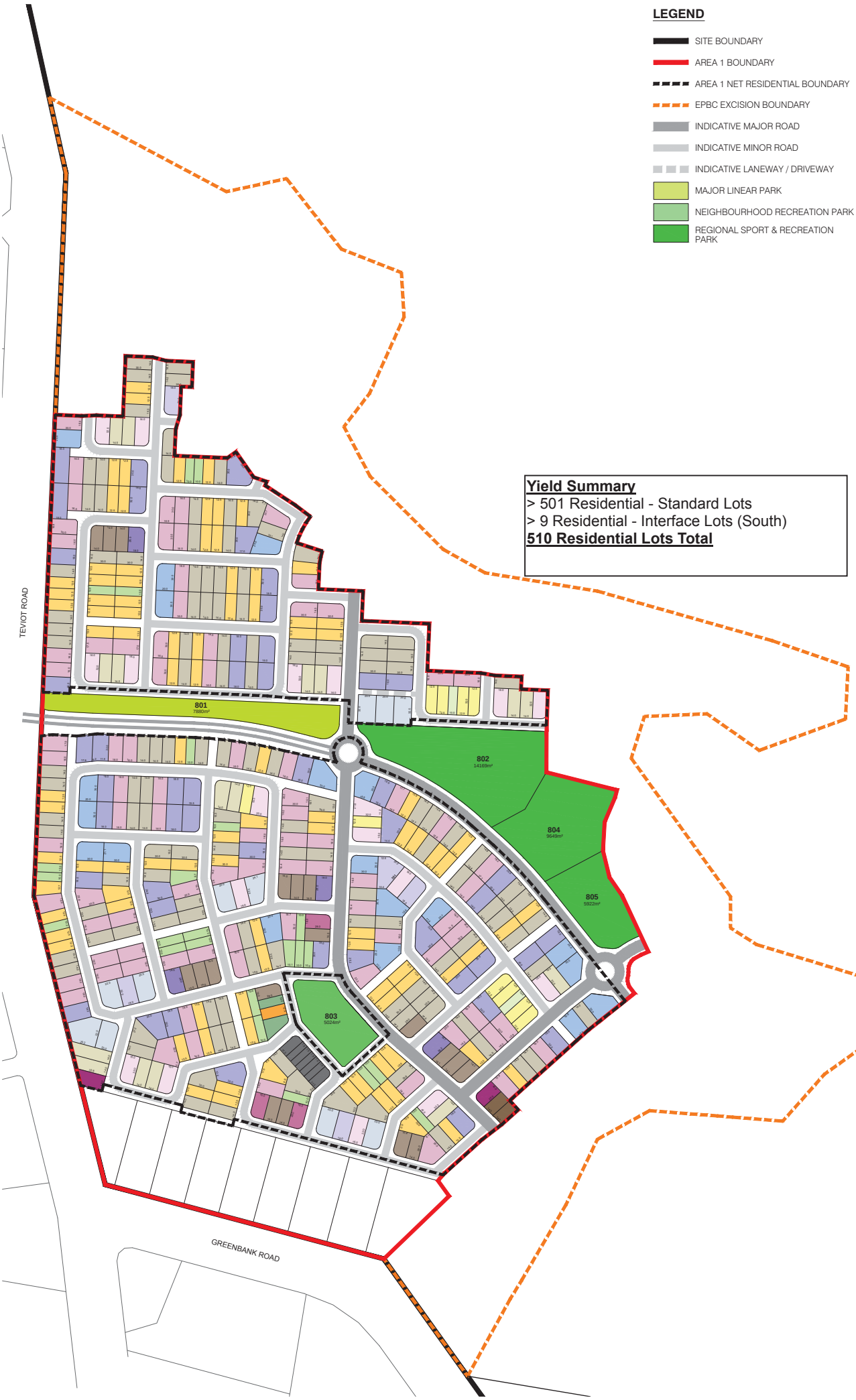
URBIS

GREENBANK
LAND USE PLAN WITH AREA 1

1:15,000 @ A3

0 200 400 600 800

DATE: 02.11.2016
JOB NO: ND1309
DWG NO: LU:02
REV: 5



AREA 1				
LOT TYPES		LOTS	%	LODGED %
7.5m wide lots				
	7.5m x 25m	7	1%	
	7.5m x 28m			
	7.5m x 30m			
	7.5m x 32m			
TOTAL 7.5m		7	1%	
10m wide lots				
	10m x 25m			
	10m x 28m	2	0%	
	10m x 30m	24	5%	
	10m x 32m	2	0%	
TOTAL 10m		28	6%	3%
12.5m wide lots				
	12.5m x 25m			
	12.5m x 28m	1	0%	
	12.5m x 30m	96	19%	
	12.5m x 32m	10	2%	
Total 12.5m		107	21%	20%
14m wide lots				
	14m x 25m	2	0%	
	14m x 28m	19	4%	
	14m x 30m	129	26%	
	14m x 32m	16	3%	
Total 14m wide		166	33%	28%
16m wide lots				
	16m x 25m	2	0%	
	16m x 28m	3	1%	
	16m x 30m	84	17%	
	16m x 32m	18	4%	
Total 16m wide		107	21%	26%
18m wide lots				
	18m x 25m			
	18m x 28m	4	1%	
	18m x 30m	47	9%	
	18m x 32m	5	1%	
Total 18m wide		56	11%	14%
20m wide lots				
	20m x 25m			
	20m x 28m			
	20m x 30m	19	4%	
	20m x 32m	11	2%	
Total 20m wide		30	6%	9%
TOTAL STANDARD LOTS		501	100%	100%

Brisbane
Level 7, 123 Albert Street
Brisbane QLD 4000
t 07 3007 3800
Urbis Pty Ltd ABN 50 105 256 228

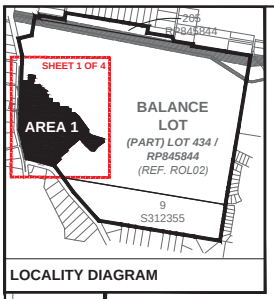
Greenbank

Area 1 - Draft Yield Count

Scale 1:4,000 @ A3

0 10 50 100 200m

PROJECT NO: ND1309
DATE: 02.11.2016
DRAWING NO: Y01
REV: 15



LOCALITY DIAGRAM

AREA 1 - YIELD SUMMARY

LOT TYPE		INDICATIVE LOT FRONTAGE	TOTAL LOTS	TOTAL %
	Terrace	7.5m wide	7 lots	1%
	Villa	10m wide	28 lots	6%
	Premium Villa	12.5m wide	107 lots	21%
	Courtyard	14m wide	166 lots	33%
	Premium Courtyard	16m wide	107 lots	21%
	Traditional	18m wide	56 lots	11%
	Premium Traditional	20m wide	27 lots	5%
Interface Lots (Lots 562 - 572)			9 lots	2%
Future Residential Lots (Interim Sales Office)			3 lots	1%
TOTAL RESIDENTIAL - STANDARD LOTS (excludes Interface Lots)			501 lots	100%

Yield Summary
> 501 Residential - Standard Lots
> 9 Residential - Interface Lots (South)
510 Residential Lots Total

BALANCE LOT
(PART) LOT 434 / RP845844
(REF. ROL02)
352.90ha

TEVIOT ROAD

GREENBANK ROAD

LEGEND
- Site boundary
- Area 1 boundary
- Proposed Recreation Sport Park
- Proposed Neighborhood Park
- Proposed Linear Park
- Proposed Pedestrian Link
- Proposed Lot Boundaries
- Future Lots (Interim Sales Office)
- Proposed Indicative Road Carriageways
- Sales Office (Interim Use)

NOTE:
- Balance lots, while not appearing on Area 1: Reconfiguration of a Lot Plans, will be included on the relevant survey plans as development progresses.
- This ROL plan may be changed via compliance assessment in accordance with the Area 1: Plan of Development - Design Criteria document.

URBIS

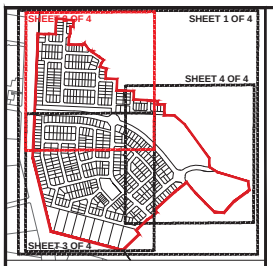
GREENBANK

RECONFIGURATION OF A LOT PLAN - AREA 1 - SHEET 1 OF 4

Scale: 1:3,500 @ A3

0 50 100 150 200

PROJECT NO: BD1309
DATE: 27.10.2016
DRAWING NO: ROL01-1
REV: -



LOCALITY DIAGRAM

LEGEND

GENERAL

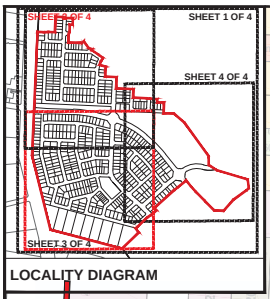
- Site Boundary
- Area 1 Boundary
- Proposed Lot Boundaries
- Proposed Major Linear Park
- Proposed Regional Sports Park
- Proposed Pedestrian Link
- Future Lots (Interim Sales Office)
- Sales Office (Interim Use)

RESIDENTIAL - STANDARD LOTS

HOUSE (DETACHED)

- Villa
- Premium Villa
- Courtyard
- Premium Courtyard
- Traditional
- Premium Traditional

NOTE:
- Balance lots, while not appearing on Area 1: Reconfiguration of a Lot Plans, will be included on the relevant survey plans as development progresses.
- This ROL plan may be changed via compliance assessment in accordance with the Area 1: Plan of Development - Design Criteria document.



LOCALITY DIAGRAM

JOINS PLAN ROL01-1 *(SHEET 1 OF 4)*

JOINS PLAN ROL01-4 *(SHEET 4 OF 4)*

LEGEND

GENERAL

- Site Boundary
- Area 1 Boundary
- Proposed Lot Boundaries
- Proposed Neighbourhood Park
- Proposed Pedestrian Links

RESIDENTIAL - STANDARD LOTS

HOUSE (DETACHED)

- Terrace
- Villa
- Premium Villa
- Courtyard
- Premium Courtyard
- Traditional

NOTE:

- Balance lots, while not appearing on Area 1: Reconfiguration of a Lot Plans, will be included on the relevant survey plans as development progresses.
- This ROL plan may be changed via compliance assessment in accordance with the Area 1: Plan of Development - Design Criteria document.

GREENBANK ROAD

URBIS

GREENBANK

RECONFIGURATION OF A LOT PLAN - AREA 1 - SHEET 3 OF 4

Scale: 1:2,000 @ A3

0 20 40 60 80 100

PROJECT NO: BD1309
DATE: 27.10.2016
DRAWING NO: ROL01-3
REV: -

Appendix B – Site Photos

Photo 1 – Noise Measurement Location 1 (Teviot Road)

Photo 2 – Noise Measurement Location 2 (Greenbank Road)

Appendix C – Meteorological Data

Logan City, Queensland
August 2015 Daily Weather Observations

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Sa	8.0	23.5	0	0.9					13.1	80	0	SW	2							
2	Su	9.2	24.9	0	2.0					13.6	88	1	W	2							
3	Mo	11.0		0	3.0					17.5	81	1	SW	2							
4	Tu		24.0	0												19.1	62	2	SE	4	
5	We	6.2	20.1	0	5.2					10.6	61	1	W	17		20.0	37	1	W	7	
6	Th	5.4	20.5	0	3.0					12.4	59	1	W	6		19.4	37	1	SW	13	
7	Fr	4.8	20.9	0	3.8					10.0	72	0	W	11		19.2	47	4	E	9	
8	Sa	5.4	20.2	0	2.2					11.1	76	0	W	6							
9	Su	7.0	20.6	0	2.1					12.5	79	6	WNW	7							
10	Mo	7.8	24.5	0	2.0					13.0	83	0	W	6							
11	Tu	10.2	26.5	0	2.7					12.0	92	7	W	2		25.7	29	0	SE	2	
12	We	11.5	24.0	0.4	4.0					18.7	75	2	W	2		22.1	65	3	NNW	11	
13	Th	12.4	22.6	1.0	2.6					16.0	42	0	SW	11		22.0	28	0	SW	11	
14	Fr	6.4	22.3	0	4.8					13.0	67	0	SW	4		21.6	35	0		Calm	
15	Sa	6.1	21.6	0	3.6					11.5	82	6	W	4							
16	Su	9.7	20.5	0	0.6					16.5	78	3		Calm							
17	Mo	10.5	25.1	0	1.0					15.4	83	1	W	4		21.5	51	4	SE	2	
18	Tu	9.1	23.4	0.4	3.8					14.0	87	0	W	7		22.9	33	0		Calm	
19	We	9.5	22.4	0	4.0					18.0	62	5	ESE	4		20.6	65	4	ESE	20	
20	Th	9.3	21.7	0	2.5					16.8	77	1		Calm		20.7	64	7	ESE	7	
21	Fr	15.5	22.1	4.0	7.1					19.0	77	7	SE	19		20.1	80	8	SE	28	
22	Sa	15.6	23.8	2.0	1.8					19.2	93	7		Calm							
23	Su	14.1	24.1	0.1	3.5					18.5	96	7		Calm							
24	Mo	15.9	24.7	0	0.8					21.8	74	6	N	4		23.1	74	7	N	11	
25	Tu	17.0	28.6	2.2	2.2					19.9	92	5	SW	2		25.4	70	3	NNE	7	
26	We	15.0	29.0	0	3.2					20.5	64	1	SW	2		28.5	43	1	W	4	
27	Th	14.9	21.2	0	4.0					17.0	66	7	WSW	2							
28	Fr	13.4	25.1	5.6	1.6					16.2	94	7	W	2		23.8	50	2	NW	6	
29	Sa	10.7	22.6	0	3.8					15.9	81	6	WSW	4							
30	Su	13.1	23.5	7.5	1.9					15.5	93	7	SW	2							
31	Mo	9.2	24.0	0	1.6					15.4	66	0	W	4		23.5	35	2	SW	19	
Statistics for August 2015																					
	Mean	10.5	23.3		2.8					15.5	77	3		4		22.2	50	2		8	
	Lowest	4.8	20.1		0.6					10.0	42	0		Calm		19.1	28	0		Calm	
	Highest	17.0	29.0	7.5	7.1					21.8	96	7	SE	19		28.5	80	8	SE	28	
	Total			23.2	85.3																

Observations were drawn from Logan City Water Treatment Plant {station 040854}

IDCJDW4073.201508 Prepared at 13:05 GMT on 13 Sep 2016

Logan City, Queensland
September 2015 Daily Weather Observations

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Tu	7.5	25.1	0	3.6					15.6	68	0	SW	6		24.1	25	0	N	6	
2	We	6.1	23.7	0	4.0					16.4	54	2	N	2		23.2	35	1	ESE	15	
3	Th	13.8	26.4	0.8	4.6					20.0	89	7	WSW	6		26.0	31	1	W	26	
4	Fr	11.8	24.4	0	3.2					18.1	56	1	WSW	7		23.1	46	7	ESE	6	
5	Sa	10.7	23.0	0	5.8					18.0	75	1	W	2							
6	Su	11.3	25.0	0	3.8					17.6	79	7	S	2							
7	Mo	12.8	25.3	0	2.2					19.8	92	6		Calm		24.4	55	5	NNE	19	
8	Tu	14.1	29.2	0	1.6					21.8	65	2	N	6		26.8	45	6	N	7	
9	We	9.0	24.7	0	3.2					18.0	39	1	WSW	15		21.5	37	1	ESE	11	
10	Th	9.5	24.0	0	4.0					18.4	62	1	NNW	2		22.4	52	3	ESE	15	
11	Fr	12.7	21.6	0	6.2					19.4	55	7	SE	15		20.4	56	6	SSE	17	
12	Sa	14.9	23.9	0	3.2					18.4	68	8		Calm							
13	Su	11.7	23.9	0.1	3.8					18.7	71	7		Calm							
14	Mo	11.2	24.4	0	4.0					18.9	69	7		Calm		23.1	50	6	ESE	11	
15	Tu	12.3	26.6	0	4.0					19.5	71	2	W	2		23.8	59	1	NNE	7	
16	We	12.9	29.2	0	3.4					20.0	73	0	SSW	15		25.0	57	7	NE	7	
17	Th	15.0	18.7	4.6	2.1					17.2	93	8	NNE	7		18.6	93	8	NE	4	
18	Fr	10.0	22.0	12.6	2.3					16.8	66	1	SSW	11		17.4	76	8	S	19	
19	Sa	14.9	22.9	0.8	4.2					20.1	53	1	S	22							
20	Su	10.3	22.3	0	5.4					19.3	62	3	S	9							
21	Mo	12.6	23.5	1.6	3.1					19.5	72	2	SSW	4		22.2	58	2	ENE	7	
22	Tu	12.3	29.9	0	4.0					18.8	77		S	4		27.0	40	6	NW	7	
23	We	12.6	22.2	0	4.0					17.9	68	4	SE	6		17.5	71	8	SE	22	
24	Th	7.8	22.1	1.3	5.1					16.6	47	1	WSW	6		20.0	46	2	E	19	
25	Fr	8.1	23.0	0	4.4					18.2	54	1	SW	6		20.0	56	7	SSE	22	
26	Sa	10.6	23.0	0	3.4					18.9	65	2	SW	11							
27	Su	10.7	22.8	0	4.0					18.9	66	2	WSW	4							
28	Mo	10.1		4.2	2.8					17.9	74	4	WNW	4		23.7	55	4	NE	13	
29	Tu		25.8	0																	
30	We	10.9	27.0	4.2	11.8					19.9	60	0	SW	4		24.9	51	2	ESE	7	
Statistics for September 2015																					
	Mean	11.3	24.3		4.0					18.6	67	3		6		22.6	52	4		12	
	Lowest	6.1	18.7		1.6					15.6	39	0		Calm		17.4	25	0	NE	4	
	Highest	15.0	29.9	12.6	11.8					21.8	93	8	S	22		27.0	93	8	W	26	
	Total			30.2	117.2																

Observations were drawn from Logan City Water Treatment Plant {station 040854}

IDCJDW4073.201509 Prepared at 13:05 GMT on 12 Sep 2016

Logan City, Queensland
October 2015 Daily Weather Observations

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Th	13.2	28.0	0	3.8					20.2	74	0	SW	11		26.1	49	3	ENE	28	
2	Fr	12.6	28.5	0	6.5					22.0	70	0	WNW	2		27.0	35	0	SE	7	
3	Sa	12.8	26.6	0	1.8					22.1	67	1	SE	9							
4	Su	10.1	29.6	0	7.6					20.5	74	0	SW	2							
5	Mo	10.3	33.3	0	6.5					24.5	46	0	WSW	2							
6	Tu		31.6	0	5.2					23.1	46	0	SW	2		30.8	22	0	NE	2	
7	We			0												28.3	41	0	NNE	4	
8	Th	13.9	24.8	0						23.4	60	7	SE	11		23.4	63	7	SE	13	
9	Fr	16.4	24.4	18.4	3.6					18.5	83	8	S	9		22.4	61	4	E	22	
10	Sa	15.2	24.8	1.7	3.9					21.5	54	7	E	7							
11	Su	11.1	25.6	0	6.4					22.1	56	3	NW	2							
12	Mo	15.2	27.3	0	3.5					23.4	57	1	NW	2		26.4	49	1	NE	4	
13	Tu	15.2	29.4	0.4	6.5					25.2	56	1	WSW	4		25.4	57	6	NE	15	
14	We	14.6	26.8	0.8	4.8					22.8	73	2	SE	2		25.4	57	2	ESE	11	
15	Th	15.3	26.2	0.6	4.6					23.4	69	6	ENE	7		25.1	54	4	ESE	11	
16	Fr	14.4	26.1	0	5.6					23.1	63	7	ESE	7		25.1	52	4	E	15	
17	Sa	12.8	27.9	0	6.8					24.1	63	4		Calm							
18	Su	14.0	26.7	0	5.0					24.2	64	6	E	4							
19	Mo	13.5	26.0	0	6.8					22.9	64	7	ESE	6		24.5	53	4	E	9	
20	Tu	12.0	25.2	0	6.4					24.0	60	6	SE	4		25.0	55	2	E	9	
21	We	12.4	28.0	0	3.6					25.0	72	1	W	2		23.6	63	0	NNE	28	
22	Th	14.8	28.3	0	7.5					24.8	55	2	NNE	4							
23	Fr	16.9	26.8	13.2	2.0					23.9	70	2	S	4		25.2	47	1	ESE	19	
24	Sa	15.2	24.1	0	7.2					22.7	66	7	SSE	7							
25	Su	14.9	25.6	0	4.0					22.9	64	7	SE	2							
26	Mo	15.2	28.9	0	4.0					25.5	66	4	WNW	2		26.4	60	4	NE	11	
27	Tu	16.9	30.5	1.6	7.2					24.9	74	1	SW	2		25.2	61	3	SE	19	
28	We	15.8	23.1	5.8	7.4					21.2	73	7	S	15		19.8	79	7	SE	15	
29	Th	15.0	21.7	9.2	3.8					19.0	84	8	S	4		21.6	66	8	ESE	9	
30	Fr	15.9	24.4	0.6	2.0					21.5	66	7	E	4		22.9	59	7	E	28	
31	Sa	13.5	24.4	0	2.2					22.9	55	8	E	19							
Statistics for October 2015																					
	Mean	14.1	26.8		5.0					22.8	64	4		5		25.0	54	3		13	
	Lowest	10.1	21.7		1.8					18.5	46	0		Calm		19.8	22	0	NE	2	
	Highest	16.9	33.3	18.4	7.6					25.5	84	8	E	19		30.8	79	8	#	28	
	Total			52.3	146.2																

Observations were drawn from Logan City Water Treatment Plant {station 040854}

IDCJDW4073.201510 Prepared at 13:05 GMT on 11 Sep 2016

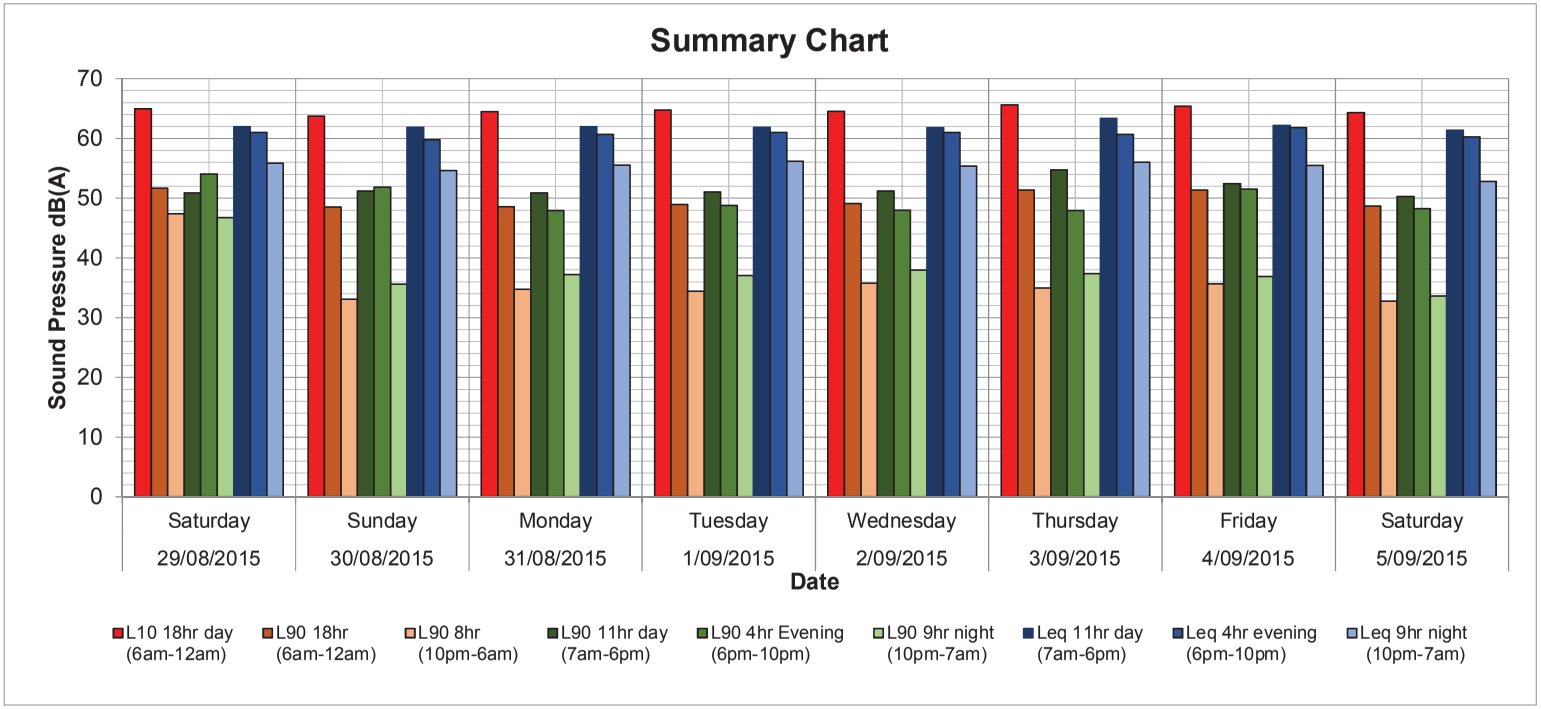
Appendix D – Noise Measurement Results

Summary of Unattended Noise Measurements

ATP150814 - Greenbank Development
Location 1 (North)
20 metres from edge of Teviot Road

Type 1 Environmental Noise Logger	
Logger Serial Number	8780d4
Measurement Title	20150828_145158
Measurement started at	28/08/2015 - 18:10:00
Measurement stopped at	6/09/2015 - 18:300:00
Frequency Weighting	A
Time Averaging	Fast
Statistical Interval	15 minutes
Auxiliary Power	Disabled
Tape Recorder	Disabled
Short Term Leq	Disabled
Short Term Leq Length	N/A
Start Trigger	N/A
Stop Trigger	N/A
Master Timer	N/A
Sub Timer	N/A
Pre-measurement Reference	94.0
Post-measurement Reference	93.9
Engineering Units	dB SPL

	Date	Day	L10 18hr day (6am-12am)	L90 18hr (6am-12am)	L90 8hr (10pm-6am)	L90 11hr day (7am-6pm)	L90 4hr Evening (6pm-10pm)	L90 9hr night (10pm-7am)	Leq 11hr day (7am-6pm)	Leq 4hr evening (6pm-10pm)	Leq 9hr night (10pm-7am)
	29/08/2015	Saturday	65	52	47	51	54	47	62	61	56
#	*30/08/2015*	*Sunday*	*64*	*49*	*33*	*51*	*52*	*36*	*62*	*60*	*55*
	31/08/2015	Monday	64	49	35	51	48	37	62	61	56
	1/09/2015	Tuesday	65	49	34	51	49	37	62	61	56
	2/09/2015	Wednesday	65	49	36	51	48	38	62	61	55
	3/09/2015	Thursday	66	51	35	55	48	37	63	61	56
	4/09/2015	Friday	65	51	36	52	52	37	62	62	55
	5/09/2015	Saturday	64	49	33	50	48	34	61	60	53
	Average (Only weekdays)		**65**	**50**	**35**	-	-	-	-	-	-
	Average (All days)					**52**	**50**	**38**	**62**	**61**	**55**



Legend

 # : Severe weather experienced on the day

Notes

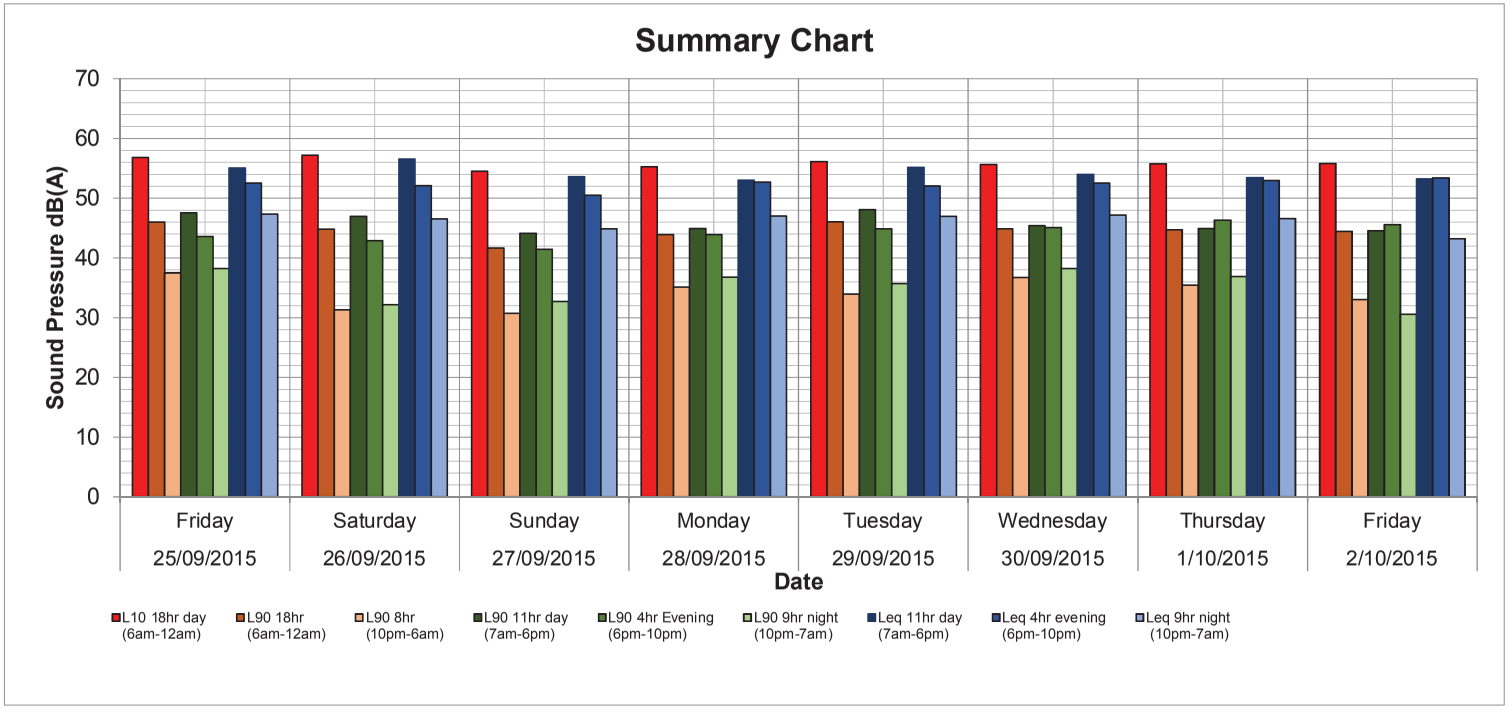
1: Only days with fine weather and 24 hours of recorded noise data were considered in the average

Summary of Unattended Noise Measurements

ATP150814 - Greenbank Development
Location 2 (South)
30 metres from edge of Greenbank Road

Type 1 Environmental Noise Logger	
Logger Serial Number	8780d4
Measurement Title	20150924_095323
Measurement started at	24/09/2015 - 18:00:00
Measurement stopped at	03/10/2015 - 18:30:00
Frequency Weighting	A
Time Averaging	Fast
Statistical Interval	15 minutes
Auxiliary Power	Disabled
Tape Recorder	Disabled
Short Term Leq	Disabled
Short Term Leq Length	N/A
Start Trigger	N/A
Stop Trigger	N/A
Master Timer	N/A
Sub Timer	N/A
Pre-measurement Reference	94.0
Post-measurement Reference	93.9
Engineering Units	dB SPL

	Date	Day	L10 18hr day (6am-12am)	L90 18hr (6am-12am)	L90 8hr (10pm-6am)	L90 11hr day (7am-6pm)	L90 4hr Evening (6pm-10pm)	L90 9hr night (10pm-7am)	Leq 11hr day (7am-6pm)	Leq 4hr evening (6pm-10pm)	Leq 9hr night (10pm-7am)
	25/09/2015	Friday	57	46	38	48	44	38	55	53	47
	26/09/2015	Saturday	57	45	31	47	43	32	57	52	47
	27/09/2015	Sunday	55	42	31	44	41	33	54	50	45
#	*28/09/2015*	*Monday*	*55*	*44*	*35*	*45*	*44*	*37*	*53*	*53*	*47*
	29/09/2015	Tuesday	56	46	34	48	45	36	55	52	47
#	*30/09/2015*	*Wednesday*	*56*	*45*	*37*	*45*	*45*	*38*	*54*	*53*	*47*
	1/10/2015	Thursday	56	45	35	45	46	37	53	53	47
	2/10/2015	Friday	56	44	33	45	46	31	53	53	43
	Average (Only weekdays)		**55**	**44**	**34**	-	-	-	-	-	-
	Average (All days)		-	-	-	**46**	**44**	**36**	**54**	**52**	**46**



Legend

 # : Severe weather experienced on the day

Notes

1: Only days with fine weather and 24 hours of recorded noise data were considered in the average

ATP150814
Project: Greenbank Development
Client: MWH

Short-term Attended Noise Measurements

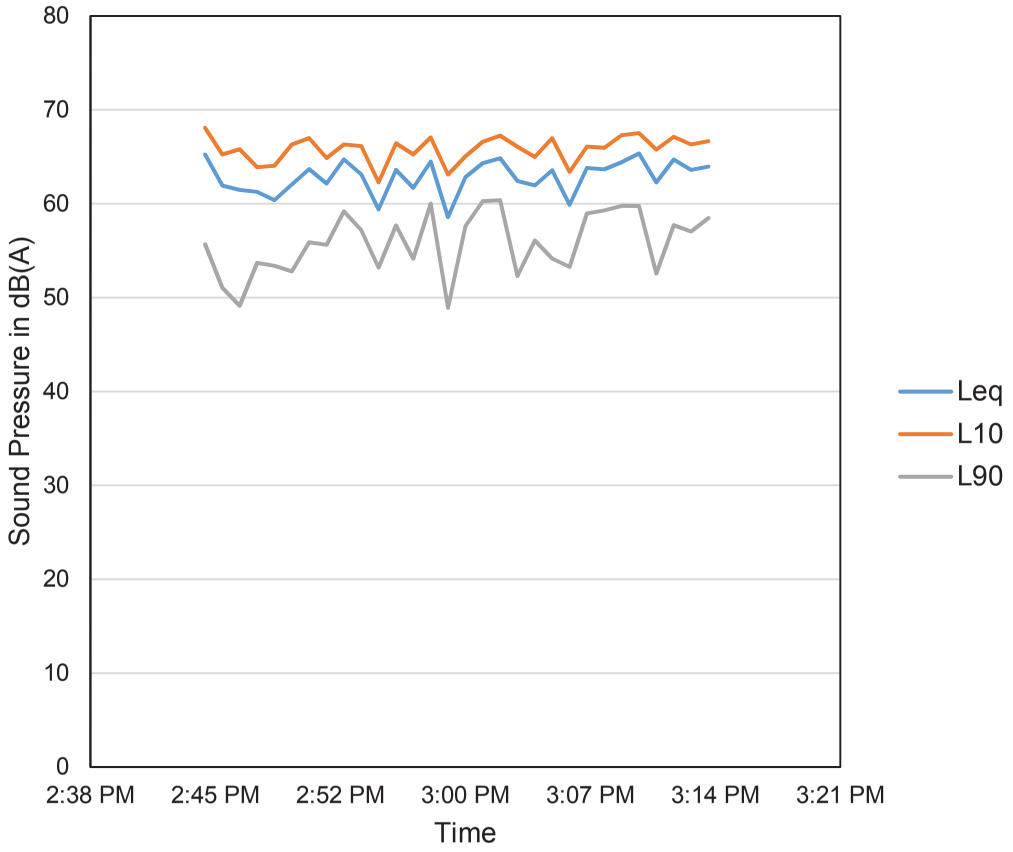
Date: Friday 28 August 2015

Measurement Location:
Lot 434 on RP845844, SW boundary,
20 metres from Teviot Road

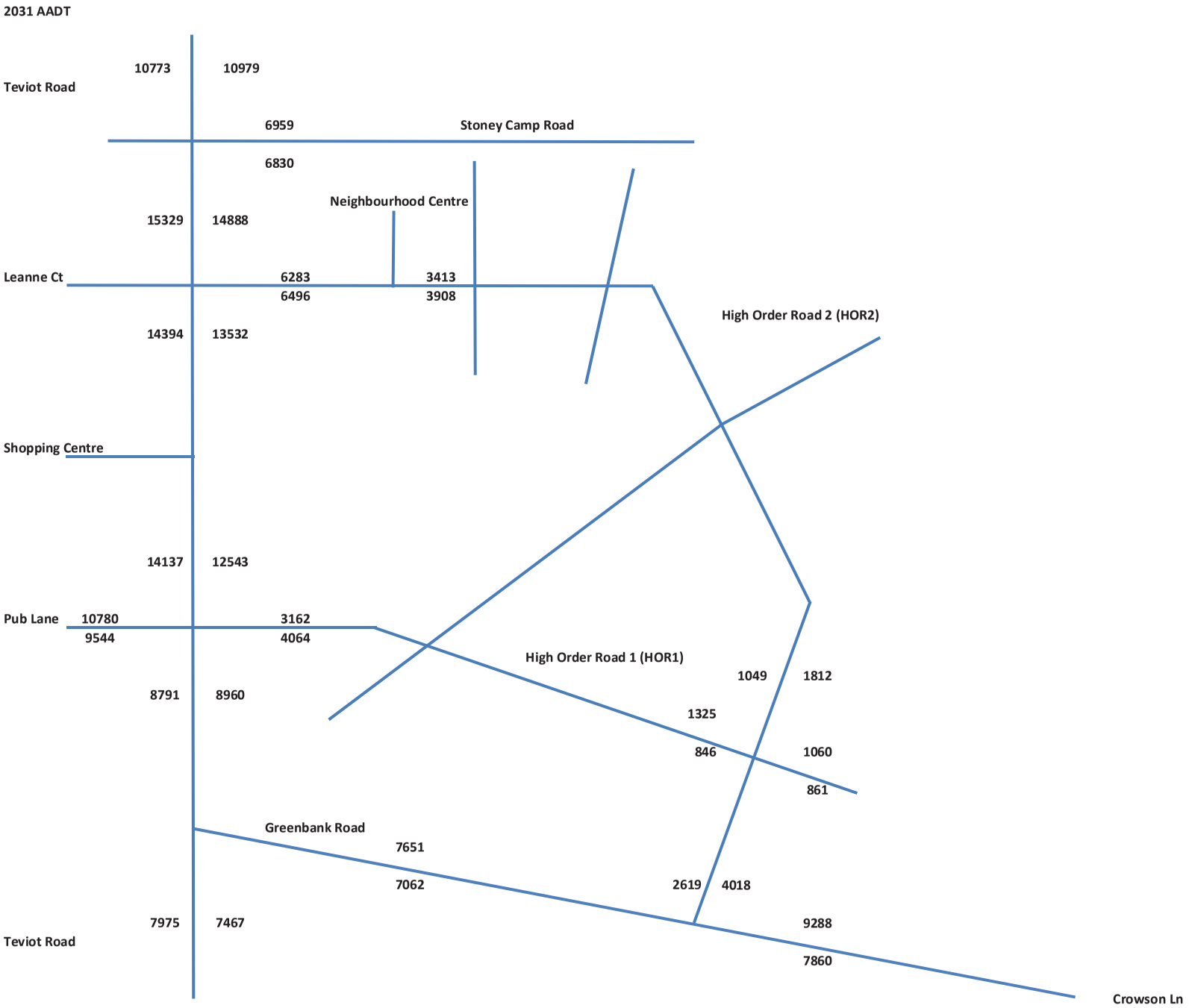
27°44'40.77" S 152°59'21.42" E

Measured Sound Pressure Levels in dB(A)

Time	$L_{Aeq,1min}$	$L_{A10,1min}$	$L_{A90,1min}$
2:45 PM	65	68	56
2:46 PM	62	65	51
2:47 PM	61	66	49
2:48 PM	61	64	54
2:49 PM	60	64	53
2:50 PM	62	66	53
2:51 PM	64	67	56
2:52 PM	62	65	56
2:53 PM	65	66	59
2:54 PM	63	66	57
2:55 PM	59	62	53
2:56 PM	64	66	58
2:57 PM	62	65	54
2:58 PM	64	67	60
2:59 PM	59	63	49
3:00 PM	63	65	58
3:01 PM	64	67	60
3:02 PM	65	67	60
3:03 PM	62	66	52
3:04 PM	62	65	56
3:05 PM	64	67	54
3:06 PM	60	63	53
3:07 PM	64	66	59
3:08 PM	64	66	59
3:09 PM	64	67	60
3:10 PM	65	68	60
3:11 PM	62	66	53
3:12 PM	65	67	58
3:13 PM	64	66	57
3:14 PM	64	67	58
Average	**63**	**66**	**56**



Appendix E – Traffic Volumes, AADT 2031


2031 AADT
10773
10979
Teviot Road
6959
Stoney Camp Road
6830
Neighbourhood Centre
15329
14888
Leanne Ct
6283
3413
6496
3908
High Order Road 2 (HOR2)
14394
13532
Shopping Centre
14137
12543
Pub Lane
10780
3162
9544
4064
High Order Road 1 (HOR1)
1049
1812
8791
8960
1325
846
1060
861
Greenbank Road
7651
7062
2619
4018
7975
7467
9288
Teviot Road
7860
Crowson Ln

Appendix F – Validation of Traffic Noise Model

Greenbank Development
Validation 2015 - Freefield Noise Levels

Receiver	Floor	L10(18h) dB(A)
Location 1_20m from Teviot Road	GF	65
Location 2_30m from Greenbank Road	GF	57

Appendix G – Traffic Noise Levels - No Noise Control Measures - SoundPLAN Table

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
1001	GF	E	59
	F 1		66
1001	GF	W	64
	F 1		68
1002	GF	E	56
	F 1		64
1002	GF	W	64
	F 1		67
1003	GF	E	55
	F 1		63
1003	GF	W	64
	F 1		67
1004	GF	E	54
	F 1		63
1004	GF	W	64
	F 1		67
1005	GF	E	54
	F 1		63
1005	GF	W	65
	F 1		67
1006	GF	W	65
	F 1		67
1006	GF	E	53
	F 1		63
1007	GF	E	53
	F 1		63
1007	GF	W	65
	F 1		67
1008	GF	E	53
	F 1		64
1008	GF	W	65
	F 1		68
1009	GF	E	53
	F 1		64
1009	GF	W	66
	F 1		68
1010	GF	E	53
	F 1		64
1010	GF	W	66
	F 1		68
1011	GF	E	53
	F 1		64
1011	GF	W	66
	F 1		68
1012	GF	E	53
	F 1		65
1012	GF	W	66
	F 1		68
1013	GF	W	66
	F 1		68
1013	GF	E	53
	F 1		65
1014	GF	W	66
	F 1		68
1014	GF	E	52
	F 1		65
1015	GF	E	52
	F 1		65

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
1015	GF	W	66
	F 1		68
1016	GF	W	66
	F 1		68
1016	GF	E	52
	F 1		64
1017	GF	E	52
	F 1		64
1017	GF	W	65
	F 1		67
1018	GF	E	52
	F 1		64
1018	GF	W	65
	F 1		67
1019	GF	E	52
	F 1		64
1019	GF	W	65
	F 1		67
1020	GF	W	65
	F 1		67
1020	GF	E	53
	F 1		65
1021	GF	E	53
	F 1		65
1021	GF	W	65
	F 1		67
1022	GF	E	53
	F 1		65
1022	GF	W	65
	F 1		67
1023	GF	E	53
	F 1		65
1023	GF	W	64
	F 1		67
1024	GF	NW	63
	F 1		67
1024	GF	SE	55
	F 1		65
1025	GF	N	54
	F 1		62
1025	GF	S	58
	F 1		63
1026	GF	W	62
	F 1		66
1026	GF	E	54
	F 1		64
1027	GF	W	63
	F 1		67
1027	GF	E	54
	F 1		64
1028	GF	E	57
	F 1		65
1028	GF	W	63
	F 1		67
1029	GF	S	55
	F 1		62
1029	GF	N	64
	F 1		66

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
1030	GF	N	64
	F 1		66
1030	GF	S	53
	F 1		61
1030	F 1		54
1031	GF	N	64
	F 1		66
1031	GF	S	53
	F 1		60
1032	GF	N	64
	F 1		66
1032	GF	S	52
	F 1		59
1033	GF	N	64
	F 1		66
1033	GF	S	52
	F 1		59
1034	GF	N	64
	F 1		66
1034	GF	S	51
	F 1		58
1035	GF	N	64
	F 1		66
1035	GF	S	51
	F 1		58
1036	GF	N	63
	F 1		65
1036	GF	S	50
	F 1		56
1037	GF	N	63
	F 1		65
1037	GF	S	50
	F 1		57
1038	GF	N	64
	F 1		65
1038	GF	S	51
	F 1		57
1039	GF	S	51
	F 1		57
1039	GF	N	52
	F 1		57
1040	GF	S	51
	F 1		57
1040	GF	N	52
	F 1		57
1041	GF	N	52
	F 1		57
1041	GF	S	52
	F 1		57
1042	GF	S	52
	F 1		58
1042	GF	N	52
	F 1		58
1043	GF	N	53
	F 1		58
1043	GF	S	53
	F 1		59
1044	GF	N	54

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
	F 1		59
1044	GF	S	54
	F 1		59
1045	GF	S	54
	F 1		60
1045	GF	N	55
	F 1		60
1046	GF	N	56
	F 1		61
1046	GF	S	56
	F 1		62
1047	GF	S	57
	F 1		61
1047	GF	N	54
	F 1		61
1048	GF	N	51
	F 1		58
1048	GF	S	54
	F 1		59
1049	GF	S	54
	F 1		59
1049	GF	N	51
	F 1		58
1050	GF	S	54
	F 1		58
1050	GF	N	51
	F 1		58
1051	GF	N	51
	F 1		58
1051	GF	S	54
	F 1		58
1052	GF	S	54
	F 1		58
1052	GF	N	51
	F 1		57
1053	GF	S	53
	F 1		57
1053	GF	N	51
	F 1		57
1054	GF	S	54
	F 1		57
1054	GF	N	51
	F 1		57
1055	GF	E	52
	F 1		61
1055	GF	W	58
	F 1		62
1056	GF	E	52
	F 1		61
1056	GF	W	58
	F 1		62
1057	GF	E	52
	F 1		61
1057	GF	W	58
	F 1		62
1058	GF	E	51
	F 1		61
1058	GF	W	58

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
	F 1		62
1059	GF	E	51
	F 1		61
1059	GF	W	58
	F 1		62
1060	GF	W	57
	F 1		62
1060	GF	E	51
	F 1		61
1061	GF	W	58
	F 1		62
1061	GF	E	51
	F 1		61
1062	GF	E	51
	F 1		61
1062	GF	W	58
	F 1		62
1063	GF	E	51
	F 1		61
1063	GF	W	58
	F 1		62
1064	GF	W	58
	F 1		61
1064	GF	E	52
	F 1		61
1065	GF	S	55
	F 1		60
1065	GF	N	53
	F 1		59
1066	GF	S	54
	F 1		58
1066	GF	N	52
	F 1		58
1067	GF	W	54
	F 1		58
1067	GF	E	49
	F 1		58
1068	GF	E	50
	F 1		59
1068	GF	W	55
	F 1		58
1069	GF	W	55
	F 1		59
1069	GF	E	50
	F 1		59
1070	GF	E	50
	F 1		59
1070	GF	W	55
	F 1		60
1071	GF	W	55
	F 1		59
1071	GF	E	50
	F 1		59
1072	GF	W	55
	F 1		59
1072	GF	E	50
	F 1		59
1073	GF	E	51

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
	F 1		59
1073	GF	W	54
	F 1		59
1074	GF	W	54
	F 1		59
1074	GF	E	52
	F 1		59
1075	GF	E	52
	F 1		59
1075	GF	W	54
	F 1		59
1076	GF	W	55
	F 1		58
1076	GF	E	50
	F 1		58
1077	GF	E	50
	F 1		58
1077	GF	W	55
	F 1		58
1078	GF	E	50
	F 1		58
1078	GF	W	55
	F 1		58
1079	GF	E	49
	F 1		58
1079	GF	W	54
	F 1		58
1080	GF	E	51
	F 1		58
1080	GF	W	54
	F 1		58
1081	GF	E	50
	F 1		58
1081	GF	W	55
	F 1		58
1082	GF	E	49
	F 1		58
1082	GF	W	55
	F 1		58
1083	GF	E	48
	F 1		57
1083	GF	W	54
	F 1		58
1084	GF	E	48
	F 1		57
1084	GF	W	54
	F 1		58
1085	GF	N	51
	F 1		57
1085	GF	S	53
	F 1		57
1086	GF	N	51
	F 1		57
1086	GF	S	52
	F 1		57
1087	GF	S	52
	F 1		57
1087	GF	N	51

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
	F 1		57
1088	GF	N	51
	F 1		57
1088	GF	S	53
	F 1		57
1089	GF	E	48
	F 1		56
1089	GF	W	52
	F 1		56
1090	GF	W	53
	F 1		57
1090	GF	E	48
	F 1		56
1091	GF	E	49
	F 1		57
1091	GF	W	53
	F 1		57
1092	GF	E	50
	F 1		57
1092	GF	W	53
	F 1		57
1093	GF	E	50
	F 1		57
1093	GF	W	54
	F 1		58
1094	GF	E	51
	F 1		57
1094	GF	W	55
	F 1		58
1095	GF	W	55
	F 1		58
1095	GF	E	52
	F 1		58
1096	GF	W	55
	F 1		58
1096	GF	E	52
	F 1		58
1097	GF	W	55
	F 1		58
1097	GF	E	52
	F 1		58
1098	GF	N	49
	F 1		56
1098	GF	S	53
	F 1		57
1099	GF	S	52
	F 1		56
1099	GF	N	48
	F 1		55
1100	GF	N	48
	F 1		55
1100	GF	S	52
	F 1		55
1101	GF	E	51
	F 1		56
1101	GF	W	53
	F 1		57
1102	GF	E	51

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
	F 1		57
1102	GF	W	54
	F 1		57
1103	GF	E	51
	F 1		57
1103	GF	W	54
	F 1		57
1104	GF	E	52
	F 1		57
1104	GF	W	54
	F 1		57
1105	GF	E	51
	F 1		57
1105	GF	W	54
	F 1		57
1106	GF	E	50
	F 1		56
1106	GF	W	53
	F 1		57
1107	GF	N	52
	F 1		56
1107	GF	S	50
	F 1		56
1108	GF	N	52
	F 1		56
1108	GF	S	50
	F 1		55
1109	GF	N	51
	F 1		55
1109	GF	S	50
	F 1		55
1110	GF	N	51
	F 1		55
1110	GF	S	50
	F 1		54
1111	GF	E	50
	F 1		55
1111	GF	W	50
	F 1		54
1112	GF	E	50
	F 1		55
1112	GF	W	50
	F 1		55
1113	GF	E	51
	F 1		56
1113	GF	W	51
	F 1		55
1114	GF	E	50
	F 1		55
1114	GF	W	51
	F 1		55
1115	GF	N	63
	F 1		65
1115	GF	S	51
	F 1		57
1116	GF	N	63
	F 1		65
1116	GF	S	50

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
	F 1		57
1117	GF	N	63
	F 1		65
1117	GF	S	50
	F 1		56
1118	GF	N	62
	F 1		65
1118	GF	S	50
	F 1		55
1119	GF	N	63
	F 1		65
1119	GF	S	50
	F 1		55
1120	GF	N	63
	F 1		65
1120	GF	S	50
	F 1		55
1121	GF	S	49
	F 1		56
1121	GF	N	63
	F 1		65
1122	GF	N	63
	F 1		65
1122	GF	S	49
	F 1		57
1123	GF	E	53
	F 1		56
1123	GF	W	51
	F 1		55
1124	GF	E	51
1124	GF	W	51
	F 1		55
1125	GF	W	52
	F 1		55
1125	GF	E	51
	F 1		56
1126	GF	W	52
	F 1		55
1126	GF	E	51
	F 1		56
1127	GF	W	53
	F 1		56
1127	GF	E	51
	F 1		56
1128	GF	E	50
	F 1		55
1128	GF	W	53
	F 1		55
1129	GF	N	48
	F 1		55
1129	GF	S	52
	F 1		55
1130	GF	S	52
	F 1		55
1130	GF	N	47
	F 1		55
1131	GF	N	47
	F 1		54

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
1131	GF	S	51
	F 1		54
1132	GF	N	48
	F 1		54
1132	GF	S	52
	F 1		54
1133	GF	W	50
	F 1		54
1133	GF	E	50
	F 1		55
1134	GF	W	50
	F 1		54
1134	GF	E	50
	F 1		55
1135	GF	E	51
	F 1		55
1135	GF	W	50
	F 1		54
1136	GF	W	50
	F 1		55
1136	GF	E	52
	F 1		55
1137	GF	W	49
	F 1		54
1137	GF	E	52
	F 1		56
1138	GF	W	50
	F 1		55
1138	GF	E	53
	F 1		56
1139	GF	W	51
	F 1		54
1139	GF	E	49
	F 1		54
1140	GF	W	51
	F 1		54
1140	GF	E	49
	F 1		55
1141	GF	S	53
	F 1		55
1141	GF	N	49
	F 1		55
1142	GF	S	53
	F 1		56
1142	GF	N	49
	F 1		55
1143	GF	S	54
	F 1		56
1143	GF	N	50
	F 1		56
1144	GF	S	53
	F 1		56
1144	GF	N	50
	F 1		56
1145	GF	S	53
	F 1		56
1145	GF	N	50
	F 1		56

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
1146	GF	N	49
	F 1		56
1146	GF	S	52
	F 1		56
1147	GF	N	50
	F 1		56
1147	GF	S	52
	F 1		56
1148	GF	S	52
	F 1		56
1148	GF	N	50
	F 1		56
1149	GF	S	53
	F 1		56
1149	GF	N	50
	F 1		56
1150	GF	N	49
	F 1		55
1150	GF	S	53
	F 1		56
1151	GF	S	52
	F 1		55
1151	GF	N	47
1152	GF	N	47
	F 1		55
1152	GF	S	52
	F 1		55
1153	GF	N	46
	F 1		54
1153	GF	S	52
	F 1		54
1154	GF	N	47
	F 1		54
1154	GF	S	52
	F 1		54
1155	GF	W	52
	F 1		56
1155	GF	E	49
	F 1		56
1156	GF	E	49
	F 1		56
1156	GF	W	52
	F 1		56
1157	GF	E	49
	F 1		56
1157	GF	W	52
	F 1		56
1158	GF	E	48
	F 1		55
1158	GF	W	51
	F 1		55
1159	GF	S	54
	F 1		57
1159	GF	N	51
	F 1		57
1160	GF	N	52
	F 1		57
1160	GF	S	55

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
	F 1		58
1161	GF	N	52
	F 1		58
1161	GF	S	55
	F 1		58
1162	GF	N	52
	F 1		58
1162	GF	S	55
	F 1		58
1163	GF	S	55
	F 1		59
1163	GF	N	53
	F 1		58
1164	GF	N	53
	F 1		59
1164	GF	S	55
	F 1		59
1165	GF	S	56
	F 1		60
1165	GF	N	53
	F 1		59
1166	GF	S	55
	F 1		60
1166	GF	N	54
	F 1		60
1167	GF	E	54
	F 1		61
1167	GF	W	57
	F 1		61
1168	GF	W	57
	F 1		62
1168	GF	E	55
	F 1		61
1169	GF	N	53
	F 1		61
1169	GF	S	58
	F 1		62
1170	GF	N	52
	F 1		60
1170	GF	S	57
	F 1		61
1171	GF	S	57
	F 1		61
1171	GF	N	51
	F 1		60
1172	GF	S	57
	F 1		60
1172	GF	N	51
	F 1		59
1173	GF	SE	52
	F 1		58
1173	GF	NW	52
	F 1		58
1174	GF	S	54
	F 1		58
1174	GF	N	50
	F 1		58
1175	GF	S	54

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
	F 1		58
1175	GF	N	50
	F 1		57
1176	GF	S	54
	F 1		58
1176	GF	N	49
	F 1		57
1177	GF	S	54
	F 1		57
1177	GF	N	49
	F 1		57
1178	GF	S	54
	F 1		57
1178	GF	N	49
	F 1		57
1179	GF	S	53
	F 1		57
1179	GF	N	49
	F 1		56
1180	GF	S	53
	F 1		56
1180	GF	N	48
	F 1		56
1181	GF	W	54
	F 1		59
1181	GF	E	53
	F 1		59
1182	GF	E	54
	F 1		60
1182	GF	W	55
	F 1		60
1183	GF	W	56
	F 1		60
1183	GF	E	54
	F 1		60
1184	GF	W	53
	F 1		58
1184	GF	E	53
	F 1		58
1185	GF	W	53
	F 1		58
1185	GF	E	53
	F 1		58
1186	GF	W	53
	F 1		58
1186	GF	E	52
	F 1		58
1187	GF	E	52
	F 1		57
1187	GF	W	53
	F 1		57
1188	GF	S	54
	F 1		57
1188	GF	N	49
	F 1		57
1189	GF	N	49
	F 1		57
1189	GF	S	54

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
	F 1		57
1190	GF	S	54
	F 1		57
1190	GF	N	49
	F 1		57
1191	GF	S	54
	F 1		57
1191	GF	N	49
	F 1		56
1192	GF	W	54
	F 1		58
1192	GF	E	52
	F 1		58
1193	GF	E	52
	F 1		57
1193	GF	W	53
	F 1		57
1194	GF	NW	52
	F 1		57
1194	GF	SE	53
	F 1		57
1195	GF	NE	47
	F 1		56
1195	GF	SW	52
	F 1		56
1196	GF	SW	53
	F 1		56
1196	GF	NE	47
	F 1		55
1197	GF	NE	47
	F 1		55
1197	GF	SW	53
	F 1		55
1198	GF	SW	53
	F 1		55
1198	GF	NE	47
	F 1		55
1199	GF	NE	47
	F 1		55
1199	GF	SW	53
	F 1		55
1200	GF	SW	52
	F 1		55
1200	GF	NE	47
	F 1		55
1201	GF	SW	53
	F 1		55
1201	GF	NE	48
	F 1		55
1202	GF	SE	51
	F 1		56
1202	GF	NW	51
	F 1		55
1203	GF	E	50
	F 1		56
1203	GF	W	51
	F 1		56
1204	GF	S	54

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
	F 1		56
1204	GF	N	49
	F 1		56
1205	GF	N	50
	F 1		56
1205	GF	S	54
	F 1		57
1206	GF	N	50
	F 1		56
1206	GF	S	54
	F 1		57
1207	GF	N	49
	F 1		56
1207	GF	S	54
	F 1		56
1208	GF	E	49
	F 1		55
1208	GF	W	52
	F 1		55
1209	GF	NW	51
	F 1		55
1209	GF	SE	51
	F 1		55
1210	GF	SE	51
	F 1		55
1210	GF	NW	50
	F 1		55
1211	GF	SE	51
	F 1		55
1211	GF	NW	50
	F 1		54
1212	GF	NW	50
	F 1		54
1212	GF	SE	50
	F 1		54
1213	GF	SE	50
	F 1		54
1213	GF	NW	50
	F 1		54
1214	GF	SE	50
	F 1		54
1214	GF	NW	50
	F 1		54
1215	GF	NE	47
	F 1		53
1215	GF	SW	51
	F 1		54
1216	GF	NE	47
	F 1		53
1216	GF	SW	51
	F 1		54
1217	GF	NW	50
	F 1		54
1217	GF	SE	50
	F 1		54
1218	GF	NW	51
	F 1		55
1218	GF	SE	51

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
	F 1		55
1219	GF	W	52
	F 1		56
1219	GF	E	50
	F 1		56
1220	GF	S	54
	F 1		56
1220	GF	N	49
	F 1		56
1221	GF	N	50
	F 1		57
1221	GF	S	55
	F 1		57
1222	GF	NW	51
	F 1		54
1222	GF	SE	49
	F 1		54
1223	GF	NW	50
	F 1		54
1223	GF	SE	49
	F 1		54
1224	GF	NE	47
	F 1		53
1224	GF	SW	50
	F 1		53
1225	GF	NE	47
	F 1		53
1225	GF	SW	50
	F 1		53
1226	GF	SE	49
	F 1		53
1226	GF	NW	50
	F 1		53
1227	GF	NW	51
	F 1		54
1227	GF	SE	50
	F 1		54
1228	GF	NW	51
	F 1		55
1228	GF	SE	51
	F 1		55
1229	GF	S	54
	F 1		57
1229	GF	N	49
	F 1		57
1230	GF	SW	51
	F 1		53
1230	GF	NE	47
	F 1		53
1231	GF	SW	51
	F 1		53
1231	GF	NE	47
	F 1		53
1232	GF	SW	51
	F 1		53
1232	GF	NE	47
	F 1		53
1233	GF	SE	48

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
	F 1		53
1233	GF	NW	50
	F 1		52
1234	GF	NW	50
	F 1		52
1234	GF	SE	49
	F 1		53
1235	GF	SE	49
	F 1		53
1235	GF	NW	50
	F 1		52
1236	GF	NW	50
	F 1		52
1236	GF	SE	49
	F 1		53
1237	GF	SE	49
	F 1		53
1237	GF	NW	50
	F 1		53
1238	GF	SE	49
	F 1		53
1238	GF	NW	50
	F 1		53
1239	GF	NW	51
	F 1		54
1239	GF	SE	50
	F 1		53
1240	GF	NW	53
	F 1		56
1240	GF	SE	51
	F 1		55
1241	GF	NW	56
	F 1		59
1241	GF	SE	54
	F 1		58
1242	GF	SW	49
	F 1		57
1242	GF	NE	63
	F 1		65
1243	GF	SW	50
	F 1		57
1243	GF	NE	64
	F 1		66
1244	GF	SW	50
	F 1		57
1244	GF	NE	64
	F 1		66
1245	GF	SW	50
	F 1		56
1245	GF	NE	64
	F 1		66
1246	GF	NE	63
	F 1		65
1246	GF	SW	50
	F 1		56
1247	GF	SW	50
	F 1		56
1247	GF	NE	64

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
	F 1		66
1248	GF	NE	64
	F 1		66
1248	GF	SW	49
	F 1		55
1249	GF	SW	50
	F 1		56
1249	GF	NE	64
	F 1		66
1250	GF	SW	49
	F 1		55
1250	GF	NE	64
	F 1		66
1251	GF	SW	50
	F 1		57
1251	GF	NE	63
	F 1		66
1252	GF	SW	49
	F 1		56
1252	GF	NE	63
	F 1		65
1253	GF	SW	49
	F 1		55
1253	GF	NE	63
	F 1		65
1254	GF	SW	49
	F 1		55
1254	GF	NE	64
	F 1		66
1255	GF	NE	64
	F 1		66
1255	GF	SW	49
	F 1		55
1256	GF	SW	49
	F 1		55
1256	GF	NE	64
	F 1		66
1257	GF	SW	49
	F 1		55
1257	GF	NE	63
	F 1		65
1258	GF	NE	64
	F 1		66
1258	GF	SW	49
	F 1		56
1259	GF	SW	48
	F 1		56
1259	GF	NE	64
	F 1		66
1260	GF	S	49
	F 1		57
1260	GF	N	63
	F 1		65
1261	GF	E	52
	F 1		57
1261	GF	W	54
	F 1		57
1262	GF	E	52

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
	F 1		57
1262	GF	W	53
	F 1		56
1263	GF	E	51
	F 1		55
1263	GF	W	52
	F 1		55
1264	GF	NE	53
	F 1		56
1264	GF	SW	50
	F 1		55
1265	GF	NE	52
	F 1		56
1265	GF	SW	50
	F 1		55
1266	GF	NE	52
	F 1		56
1266	GF	SW	51
	F 1		54
1267	GF	SW	51
	F 1		54
1267	GF	NE	52
	F 1		56
1268	GF	SW	51
	F 1		54
1268	GF	NE	52
	F 1		56
1269	GF	SW	51
	F 1		55
1269	GF	NE	54
	F 1		57
1270	GF	SW	51
	F 1		54
1270	GF	NE	53
	F 1		57
1271	GF	SW	51
	F 1		54
1271	GF	NE	52
	F 1		56
1272	GF	NE	51
	F 1		55
1272	GF	SW	51
	F 1		54
1273	GF	NE	50
	F 1		55
1273	GF	SW	50
	F 1		54
1274	GF	SW	50
	F 1		54
1274	GF	NE	50
	F 1		55
1275	GF	SW	50
	F 1		54
1275	GF	NE	51
	F 1		55
1276	GF	NE	52
	F 1		56
1276	GF	SW	50

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
	F 1		54
1277	GF	SW	50
	F 1		54
1277	GF	NE	52
	F 1		56
1278	GF	SW	50
	F 1		54
1278	GF	NE	52
	F 1		56
1279	GF	NW	51
	F 1		55
1279	GF	SE	52
	F 1		56
1280	GF	SE	50
	F 1		54
1280	GF	NW	50
	F 1		54
1281	GF	SW	49
	F 1		53
1281	GF	NE	48
	F 1		53
1282	GF	NE	48
	F 1		53
1282	GF	SW	49
	F 1		52
1283	GF	NE	48
	F 1		53
1283	GF	SW	49
	F 1		53
1284	GF	SW	49
	F 1		53
1284	GF	NE	48
	F 1		53
1285	GF	NE	48
	F 1		53
1285	GF	SW	50
	F 1		53
1286	GF	NE	48
	F 1		53
1286	GF	SW	50
	F 1		53
1287	GF	NE	48
	F 1		53
1287	GF	SW	51
	F 1		53
1288	GF	NE	48
	F 1		53
1288	GF	SW	51
	F 1		53
1289	GF	NE	48
	F 1		53
1289	GF	SW	51
	F 1		53
1290	GF	NE	49
	F 1		54
1290	GF	SW	51
	F 1		54
1291	GF	NE	49

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
	F 1		54
1291	GF	SW	51
	F 1		54
1292	GF	SW	51
	F 1		54
1292	GF	NE	48
	F 1		54
1293	GF	SW	52
	F 1		54
1293	GF	NE	49
	F 1		54
1294	GF	NE	49
	F 1		54
1294	GF	SW	51
	F 1		54
1295	GF	E	50
	F 1		55
1295	GF	W	52
	F 1		55
1296	GF	E	50
	F 1		55
1296	GF	W	52
	F 1		55
1297	GF	E	49
	F 1		55
1297	GF	W	52
	F 1		55
1298	GF	E	49
	F 1		55
1298	GF	W	52
	F 1		55
1299	GF	E	49
	F 1		54
1299	GF	W	52
	F 1		55
1300	GF	E	49
	F 1		55
1300	GF	W	52
	F 1		55
1301	GF	E	49
	F 1		54
1301	GF	W	52
	F 1		55
1302	GF	E	48
	F 1		54
1302	GF	W	52
	F 1		54
1302	GF	SW	50
	F 1		53
1302	GF	NE	47
	F 1		53
1303	GF	SW	52
	F 1		54
1303	GF	NE	47
	F 1		54
1304	GF	SW	52
	F 1		54
1304	GF	NE	47
	F 1		54

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
1305	GF	SW	52
	F 1		54
1305	GF	NE	47
	F 1		54
1306	GF	SW	52
	F 1		54
1306	GF	NE	47
	F 1		53
1307	GF	SW	52
	F 1		53
1307	GF	NE	47
	F 1		53
1308	GF	SW	51
	F 1		53
1308	GF	NE	46
	F 1		53
1309	GF	SW	50
	F 1		53
1309	GF	NE	47
	F 1		53
1310	GF	NE	46
	F 1		53
1310	GF	SW	50
	F 1		53
1311	GF	SW	51
	F 1		53
1311	GF	NE	47
	F 1		53
1312	GF	NE	47
	F 1		53
1312	GF	SW	51
	F 1		53
1313	GF	SW	51
1313	GF	NE	47
	F 1		53
1314	GF	W	50
	F 1		54
1314	GF	E	48
	F 1		54
1315	GF	W	50
	F 1		53
1315	GF	E	48
	F 1		53
1316	GF	W	49
	F 1		53
1316	GF	E	48
	F 1		53
1317	GF	SE	49
	F 1		53
1317	GF	NW	48
	F 1		53
1318	GF	NE	47
	F 1		53
1318	GF	SW	51
	F 1		53
1319	GF	NE	47
	F 1		53
1319	GF	SW	51

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
	F 1		53
1321	GF	NE	46
	F 1		52
1321	GF	SW	50
	F 1		52
1322	GF	SW	50
1322	GF	NE	47
	F 1		53
1323	GF	NW	49
	F 1		53
1323	GF	SE	49
	F 1		53
1324	GF	NW	49
	F 1		53
1324	GF	SE	49
	F 1		53
1325	GF	NW	49
	F 1		53
1325	GF	SE	49
	F 1		53
1326	GF	NW	49
	F 1		53
1326	GF	SE	49
	F 1		53
1327	GF	SW	51
	F 1		53
1327	GF	NE	47
	F 1		53
1328	GF	SW	51
	F 1		53
1328	GF	NE	47
	F 1		53
1329	GF	SW	51
	F 1		53
1329	GF	NE	47
	F 1		53
1330	GF	SW	51
	F 1		53
1330	GF	NE	46
	F 1		53
1331	GF	SE	48
	F 1		52
1331	GF	NW	48
	F 1		52
1332	GF	SE	49
	F 1		52
1332	GF	NW	48
	F 1		52
1333	GF	SE	48
	F 1		52
1333	GF	NW	48
	F 1		52
1334	GF	SE	48
	F 1		52
1334	GF	NW	48
	F 1		52
1335	GF	W	64
	F 1		67

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
1335	GF	N	57
	F 1		64
1335	GF	S	64
	F 1		68
1336	GF	N	53
	F 1		62
1336	GF	S	64
	F 1		67
1337	GF	N	54
	F 1		62
1337	GF	S	64
	F 1		66
1338	GF	N	53
	F 1		61
1338	GF	S	64
	F 1		66
1339	GF	N	52
	F 1		58
1339	GF	S	63
	F 1		66
1340	GF	N	51
	F 1		57
1340	GF	S	63
	F 1		66
1341	GF	N	51
	F 1		57
1341	GF	S	63
	F 1		65
1342	GF	N	51
	F 1		60
1342	GF	S	62
	F 1		65
1343	GF	S	62
	F 1		64
1343	GF	N	50
	F 1		60
2001	GF	W	66
	F 1		68
2001	GF	E	56
	F 1		65
2002	GF	E	55
	F 1		64
2002	GF	W	66
	F 1		68
2003	GF	E	53
	F 1		65
2003	GF	W	66
	F 1		68
2004	GF	E	53
	F 1		64
2004	GF	W	66
	F 1		68
2005	GF	E	52
	F 1		64
2005	GF	W	66
	F 1		68
2006	GF	W	65
	F 1		68

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
2006	GF	E	52
	F 1		64
2007	GF	E	52
	F 1		64
2007	GF	W	65
	F 1		67
2008	GF	W	65
	F 1		67
2008	GF	E	52
	F 1		64
2009	GF	E	52
	F 1		64
2009	GF	W	65
	F 1		67
2010	GF	E	52
	F 1		64
2010	GF	W	65
	F 1		67
2011	GF	W	65
	F 1		67
2011	GF	E	52
	F 1		63
2012	GF	E	52
	F 1		63
2012	GF	W	65
	F 1		67
2013	GF	E	51
	F 1		62
2013	GF	W	65
	F 1		67
2014	GF	S	54
	F 1		59
2014	GF	N	53
	F 1		59
2015	GF	S	52
	F 1		57
2015	GF	N	52
	F 1		57
2016	GF	N	51
	F 1		56
2016	GF	S	51
	F 1		56
2017	GF	N	51
	F 1		56
2017	GF	S	51
	F 1		56
2018	GF	W	58
	F 1		61
2018	GF	E	52
	F 1		60
2019	GF	W	58
	F 1		61
2019	GF	E	52
	F 1		60
2020	GF	W	58
	F 1		61
2020	GF	E	52
	F 1		60

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
2021	GF	E	52
	F 1		60
2021	GF	W	58
	F 1		61
2022	GF	E	51
	F 1		60
2022	GF	W	57
	F 1		61
2023	GF	W	57
	F 1		61
2023	GF	E	52
	F 1		60
2024	GF	E	52
	F 1		60
2024	GF	W	58
	F 1		61
2025	GF	W	58
	F 1		62
2025	GF	E	52
	F 1		61
2026	GF	N	55
	F 1		62
2026	GF	S	59
	F 1		63
2027	GF	S	59
	F 1		62
2027	GF	N	54
	F 1		61
2028	GF	S	59
	F 1		61
2028	GF	N	53
	F 1		60
2029	GF	S	58
	F 1		60
2029	GF	N	51
	F 1		58
2030	GF	E	51
	F 1		57
2030	GF	W	53
	F 1		57
2031	GF	W	53
	F 1		57
2031	GF	E	51
	F 1		57
2032	GF	W	53
	F 1		57
2032	GF	E	50
	F 1		57
2033	GF	E	51
	F 1		57
2033	GF	W	52
	F 1		57
2034	GF	W	52
	F 1		57
2034	GF	E	51
	F 1		57
2035	GF	E	51
	F 1		57

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
2035	GF	W	52
	F 1		56
2036	GF	W	52
	F 1		56
2036	GF	E	51
	F 1		57
2037	GF	E	50
	F 1		56
2037	GF	W	52
	F 1		56
2038	GF	S	62
	F 1		66
2038	GF	N	62
	F 1		67
2039	GF	S	58
	F 1		62
2039	GF	N	57
	F 1		62
2040	GF	S	56
	F 1		60
2040	GF	N	55
	F 1		60
2041	GF	N	54
	F 1		60
2041	GF	S	55
	F 1		59
2042	GF	S	53
	F 1		58
2042	GF	N	52
	F 1		58
2043	GF	N	51
	F 1		56
2043	GF	S	52
	F 1		56
2044	GF	N	51
	F 1		56
2044	GF	S	52
	F 1		56
2045	GF	N	52
	F 1		57
2045	GF	S	53
	F 1		57
2046	GF	S	53
	F 1		58
2046	GF	N	52
	F 1		58
2047	GF	N	53
	F 1		58
2047	GF	S	54
	F 1		58
2048	GF	S	54
	F 1		60
2048	GF	N	55
	F 1		60
2049	GF	S	55
	F 1		61
2049	GF	N	55
	F 1		61

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
2050	GF	S	57
	F 1		62
2050	GF	N	56
	F 1		61
2051	GF	N	62
	F 1		67
2051	GF	S	61
	F 1		66
2052	GF	W	65
	F 1		67
2052	GF	E	51
	F 1		61
2053	GF	E	51
	F 1		62
2053	GF	W	65
	F 1		68
2054	GF	N	57
	F 1		61
2054	GF	S	54
	F 1		60
2055	GF	S	53
	F 1		59
2055	GF	N	56
	F 1		60
2056	GF	N	55
	F 1		58
2056	GF	S	53
	F 1		58
2057	GF	N	52
	F 1		57
2057	GF	S	52
	F 1		57
2058	GF	E	50
	F 1		58
2058	GF	W	57
	F 1		60
2059	GF	E	51
	F 1		59
2059	GF	W	57
	F 1		60
2061	GF	E	52
	F 1		60
2061	GF	W	58
	F 1		61
2062	GF	E	52
	F 1		60
2062	GF	W	58
	F 1		61
2063	GF	E	52
	F 1		59
2063	GF	W	56
	F 1		59
2064	GF	W	55
	F 1		59
2064	GF	E	52
	F 1		58
2065	GF	S	52
	F 1		58

Receiver	Floor	Facade	L10(18h) dB(A)
2065	GF	N	54
	F 1		58
2066	GF	N	51
	F 1		57
2066	GF	S	52
	F 1		56
2067	GF	N	51
	F 1		55
2067	GF	S	51
	F 1		55
2068	GF	S	51
	F 1		55
2068	GF	N	50
	F 1		54
2069	GF	S	50
	F 1		54
2069	GF	N	51
	F 1		55
2070	GF	N	50
	F 1		54
2070	GF	S	50
	F 1		54
2071	GF	S	50
	F 1		54
2071	GF	N	49
	F 1		54
2072	GF	N	49
	F 1		53
2072	GF	S	50
	F 1		53
2073	GF	S	50
	F 1		54
2073	GF	N	50
	F 1		54
2074	GF	S	52
	F 1		56
2074	GF	N	50
	F 1		56
2075	GF	S	52
	F 1		55
2075	GF	N	50
	F 1		55
2076	GF	S	52
	F 1		55
2076	GF	N	50
	F 1		55
2077	GF	N	49
	F 1		54
2077	GF	S	51
	F 1		55
2078	GF	N	49
	F 1		54
2078	GF	S	51
	F 1		54
2079	GF	N	49
	F 1		54
2079	GF	S	51
	F 1		54

Receiver	Floor	Facade	L10(18h) dB(A)
2080	GF	N	49
	F 1		54
2080	GF	S	51
	F 1		54
2081	GF	N	49
	F 1		54
2081	GF	S	51
	F 1		54
2082	GF	NW	51
	F 1		54
2082	GF	SE	50
	F 1		54
2083	GF	NW	50
	F 1		54
2083	GF	SE	50
	F 1		54
2084	GF	NW	50
	F 1		53
2084	GF	SE	49
	F 1		54
2085	GF	S	50
	F 1		53
2085	GF	N	48
	F 1		53
2086	GF	S	50
	F 1		53
2086	GF	N	47
	F 1		53
2087	GF	S	50
	F 1		53
2087	GF	N	48
	F 1		53
2088	GF	N	48
	F 1		53
2088	GF	S	50
	F 1		54
2089	GF	S	50
	F 1		54
2089	GF	N	48
	F 1		54
2090	GF	N	49
	F 1		55
2090	GF	S	51
	F 1		55
2091	GF	S	52
	F 1		56
2091	GF	N	50
	F 1		56
2092	GF	N	50
	F 1		56
2093	GF	S	53
	F 1		56
2093	GF	N	49
	F 1		55
2094	GF	N	49
	F 1		55
2094	GF	S	53
	F 1		55

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
2095	GF	S	52
	F 1		55
2095	GF	N	49
	F 1		55
2096	GF	S	52
	F 1		55
2096	GF	N	48
	F 1		54
2097	GF	N	48
	F 1		54
2097	GF	S	52
	F 1		55
2098	GF	N	48
	F 1		54
2098	GF	S	52
	F 1		55
2099	GF	S	52
	F 1		55
2099	GF	N	48
	F 1		54
2100	GF	N	48
	F 1		54
2100	GF	S	52
	F 1		54
2101	GF	N	47
	F 1		54
2101	GF	S	51
	F 1		54
2102	GF	N	47
	F 1		54
2102	GF	S	51
	F 1		54
2103	GF	N	47
	F 1		54
2103	GF	S	51
	F 1		54
2104	GF	N	47
	F 1		54
2104	GF	S	51
	F 1		54
2105	GF	N	47
	F 1		54
2105	GF	S	51
	F 1		54
2106	GF	N	47
	F 1		54
2106	GF	S	51
	F 1		54
2107	GF	N	48
	F 1		54
2107	GF	S	51
	F 1		55
2108	GF	N	48
	F 1		55
2108	GF	S	52
	F 1		55
2109	GF	N	49
	F 1		56

Receiver	Floor	Facade	L10(18h) dB(A)
2109	GF	S	52
	F 1		56
2110	GF	N	50
	F 1		57
2110	GF	S	55
	F 1		58
2111	GF	N	50
	F 1		57
2111	GF	S	54
	F 1		58
2112	GF	N	49
	F 1		56
2112	GF	S	53
	F 1		58
2113	GF	N	49
	F 1		56
2113	GF	S	53
	F 1		57
2114	GF	N	49
	F 1		55
2114	GF	S	53
	F 1		57
2115	GF	N	48
	F 1		55
2115	GF	S	52
	F 1		57
2116	GF	N	48
	F 1		55
2116	GF	S	53
	F 1		57
2117	GF	N	48
	F 1		56
2117	GF	S	53
	F 1		57
2118	GF	N	48
	F 1		55
2118	GF	S	52
	F 1		56
2119	GF	N	48
	F 1		57
2119	GF	S	57
	F 1		59
2120	GF	N	48
	F 1		57
2120	GF	S	57
	F 1		59
2121	GF	N	49
	F 1		57
2121	GF	S	57
	F 1		59
2122	GF	S	57
	F 1		59
2122	GF	N	49
	F 1		57
2123	GF	N	49
	F 1		57
2123	GF	S	57
	F 1		59

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
2124	GF	N	49
	F 1		58
2124	GF	S	57
	F 1		60
2125	GF	N	50
	F 1		58
2125	GF	S	57
	F 1		60
2126	GF	N	50
	F 1		58
2126	GF	S	58
	F 1		60
2127	GF	S	58
	F 1		60
2127	GF	N	51
	F 1		58
2128	GF	N	48
	F 1		57
2128	GF	S	56
	F 1		58
2129	GF	N	48
	F 1		56
2129	GF	S	56
	F 1		58
2130	GF	S	56
	F 1		58
2130	GF	N	48
	F 1		56
2131	GF	N	48
	F 1		56
2131	GF	S	56
	F 1		58
2132	GF	E	49
	F 1		56
2132	GF	W	53
	F 1		56
2133	GF	E	49
	F 1		56
2133	GF	W	52
	F 1		56
2134	GF	E	49
	F 1		55
2134	GF	W	52
	F 1		55
2135	GF	W	52
	F 1		55
2135	GF	E	49
	F 1		55
2136	GF	W	52
	F 1		54
2136	GF	E	48
	F 1		55
2137	GF	W	50
	F 1		54
2137	GF	E	48
	F 1		54
2138	GF	E	48
	F 1		54

Receiver	Floor	Facade	L10(18h) dB(A)
2138	GF	W	50
	F 1		54
2139	GF	E	49
	F 1		55
2139	GF	W	51
	F 1		55
2140	GF	E	49
	F 1		55
2140	GF	W	51
	F 1		55
2141	GF	W	52
	F 1		56
2141	GF	E	49
	F 1		56
2142	GF	W	51
	F 1		53
2142	GF	E	48
	F 1		53
2143	GF	E	48
	F 1		54
2143	GF	W	51
	F 1		54
2144	GF	W	51
	F 1		54
2144	GF	E	49
	F 1		54
2145	GF	W	51
	F 1		54
2145	GF	E	49
	F 1		54
2146	GF	W	52
	F 1		55
2146	GF	E	50
	F 1		55
2147	GF	E	51
	F 1		56
2147	GF	W	53
	F 1		56
2148	GF	W	52
	F 1		55
2148	GF	E	48
	F 1		55
2149	GF	N	48
	F 1		57
2149	GF	S	58
	F 1		60
2150	GF	N	47
	F 1		56
2150	GF	S	56
	F 1		59
2151	GF	N	47
	F 1		55
2151	GF	S	56
	F 1		58
2152	GF	W	50
	F 1		55
2152	GF	E	50
	F 1		55

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
No Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
2153	GF	E	50
	F 1		55
2153	GF	W	50
	F 1		55
2154	GF	W	49
	F 1		54
2154	GF	E	49
	F 1		54
2155	GF	E	49
	F 1		54
2155	GF	W	49
	F 1		54
2156	GF	E	49
	F 1		55
2156	GF	W	51
	F 1		55
2157	GF	N	47
	F 1		55
2157	GF	S	54
	F 1		56
2158	GF	S	54
	F 1		56
2158	GF	N	46
	F 1		54
2159	GF	N	47
	F 1		54
2159	GF	S	53
	F 1		55
2160	GF	N	47
	F 1		54
2160	GF	S	53
	F 1		55
2161	GF	S	53
	F 1		55
2161	GF	N	47
	F 1		54
2162	GF	W	50
	F 1		54
2162	GF	E	48
	F 1		54
2163	GF	W	51
	F 1		54
2163	GF	E	47
	F 1		54
2164	GF	N	47
	F 1		54
2164	GF	S	53
	F 1		55
2165	GF	N	46
	F 1		54
2165	GF	S	52
	F 1		54
2166	GF	N	46
	F 1		54
2166	GF	S	52
	F 1		54
2167	GF	N	46
	F 1		54

Receiver	Floor	Facade	L10(18h) dB(A)
2167	GF	S	52
	F 1		54

Greenbank Development
Freefield Noise Levels at Outdoor Living Areas, Year 2031
No Noise Mitigation Measures

Receiver	Floor	L10(18h) dB(A)
1001_Outdoor Living Area	GF	63
1002_Outdoor Living Area	GF	62
1003_Outdoor Living Area	GF	63
1004_Outdoor Living Area	GF	63
1005_Outdoor Living Area	GF	64
1006_Outdoor Living Area	GF	64
1007_Outdoor Living Area	GF	64
1008_Outdoor Living Area	GF	64
1009_Outdoor Living Area	GF	64
1010_Outdoor Living Area	GF	64
1011_Outdoor Living Area	GF	64
1012_Outdoor Living Area	GF	64
1013_Outdoor Living Area	GF	65
1014_Outdoor Living Area	GF	65
1015_Outdoor Living Area	GF	65
1016_Outdoor Living Area	GF	64
1017_Outdoor Living Area	GF	64
1018_Outdoor Living Area	GF	64
1019_Outdoor Living Area	GF	64
1020_Outdoor Living Area	GF	64
1021_Outdoor Living Area	GF	63
1022_Outdoor Living Area	GF	63
1023_Outdoor Living Area	GF	63
1024_Outdoor Living Area	GF	62
1026_Outdoor Living Area	GF	59
1027_Outdoor Living Area	GF	60
1028_Outdoor Living Area	GF	62
1029_Outdoor Living Area	GF	63
1030_Outdoor Living Area	GF	64
1031_Outdoor Living Area	GF	64
1032_Outdoor Living Area	GF	64
1033_Outdoor Living Area	GF	64
1034_Outdoor Living Area	GF	64
1035_Outdoor Living Area	GF	64
1115_Outdoor Living Area	GF	64
1116_Outdoor Living Area	GF	63
1117_Outdoor Living Area	GF	63
1118_Outdoor Living Area	GF	63
1119_Outdoor Living Area	GF	63
1120_Outdoor Living Area	GF	63
1121_Outdoor Living Area	GF	63
1122_Outdoor Living Area	GF	63
1335_Outdoor Living Area	GF	63
1336_Outdoor Living Area	GF	62
1336_Outdoor Living Area	GF	63
1337_Outdoor Living Area	GF	64
1337_Outdoor Living Area	GF	62
1338_Outdoor Living Area	GF	62

Greenbank Development
Freefield Noise Levels at Outdoor Living Areas, Year 2031
No Noise Mitigation Measures

Receiver	Floor	L10(18h) dB(A)
1338_Outdoor Living Area	GF	64
1339_Outdoor Living Area	GF	61
1340_Outdoor Living Area	GF	61
1341_Outdoor Living Area	GF	61
1342_Outdoor Living Area	GF	60
1343_Outdoor Living Area	GF	60
2001_Outdoor Living Area	GF	65
2002_Outdoor Living Area	GF	65
2003_Outdoor Living Area	GF	64
2004_Outdoor Living Area	GF	65
2005_Outdoor Living Area	GF	65
2006_Outdoor Living Area	GF	64
2007_Outdoor Living Area	GF	64
2008_Outdoor Living Area	GF	64
2009_Outdoor Living Area	GF	64
2010_Outdoor Living Area	GF	64
2011_Outdoor Living Area	GF	64
2012_Outdoor Living Area	GF	64
2013_Outdoor Living Area	GF	64
2038_Outdoor Living Area	GF	64
2051_Outdoor Living Area	GF	63
2052_Outdoor Living Area	GF	64
2053_Outdoor Living Area	GF	64

Appendix H – Traffic Noise Levels - No Noise Control Measures - SoundPLAN Noise Grid Map

FIGURE 1

Traffic Noise Levels, Year 2031
Height: 1.8m AGL
No Noise Control Measures

$L_{A10,18hr}$ at 1.8m AGL
in dB(A), Free-field

	<= 50
50 <	<= 52
52 <	<= 54
54 <	<= 56
56 <	<= 58
58 <	<= 60
60 <	<= 62
62 <	<= 64
64 <	<= 66
66 <	<= 68
68 <	<= 70
70 <	<= 72
72 <	<= 74
74 <	<= 76
76 <	

Legend

- Road emission line
- Road surface
- Building
- Point receiver

Traffic noise criterion

- 60dB(A) free-field, 63dB(A) facade-adjusted

ATP CONSULTING ENGINEERS

ATP150814
Proposed Subdivision, Greenbank
Client: MWH

Grid Spacing: 5m
Project Engineer: Sam Fraser
Created: 4/11/2016
Processed with SoundPLAN 7.2

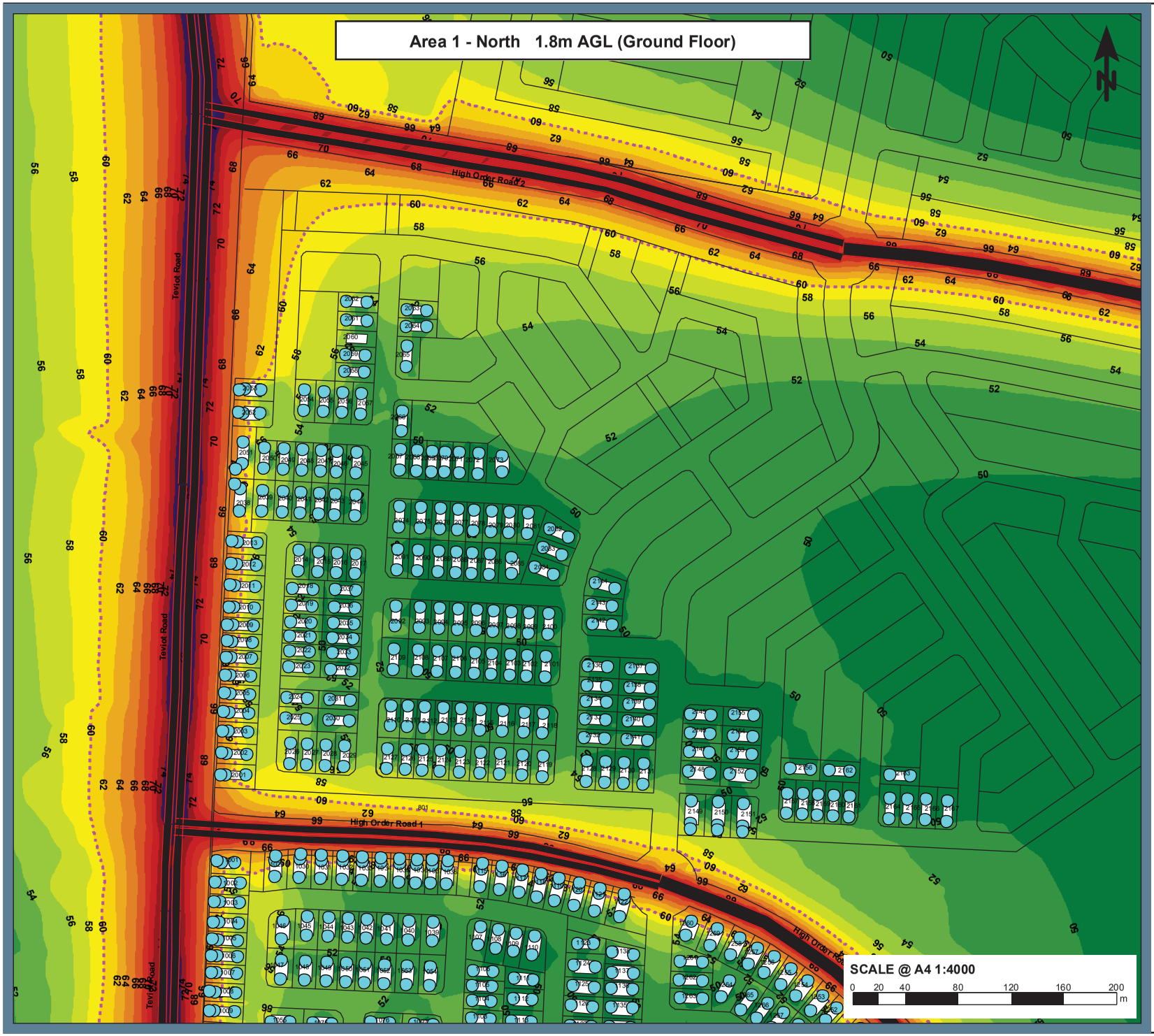


FIGURE 2

Traffic Noise Levels, Year 2031
Height: 1.8m AGL
No Noise Control Measures

$L_{A10,18hr}$ at 1.8m AGL
in dB(A), Free-field

	<= 50
50 <	<= 52
52 <	<= 54
54 <	<= 56
56 <	<= 58
58 <	<= 60
60 <	<= 62
62 <	<= 64
64 <	<= 66
66 <	<= 68
68 <	<= 70
70 <	<= 72
72 <	<= 74
74 <	<= 76
76 <	

Legend

- Road emission line
- Road surface
- Building
- Point receiver

Traffic noise criterion

- 60dB(A) free-field, 63dB(A) facade-adjusted

ATP CONSULTING ENGINEERS

ATP150814
Proposed Subdivision, Greenbank
Client: MWH

Grid Spacing: 5m
Project Engineer: Sam Fraser
Created: 4/11/2016
Processed with SoundPLAN 7.2

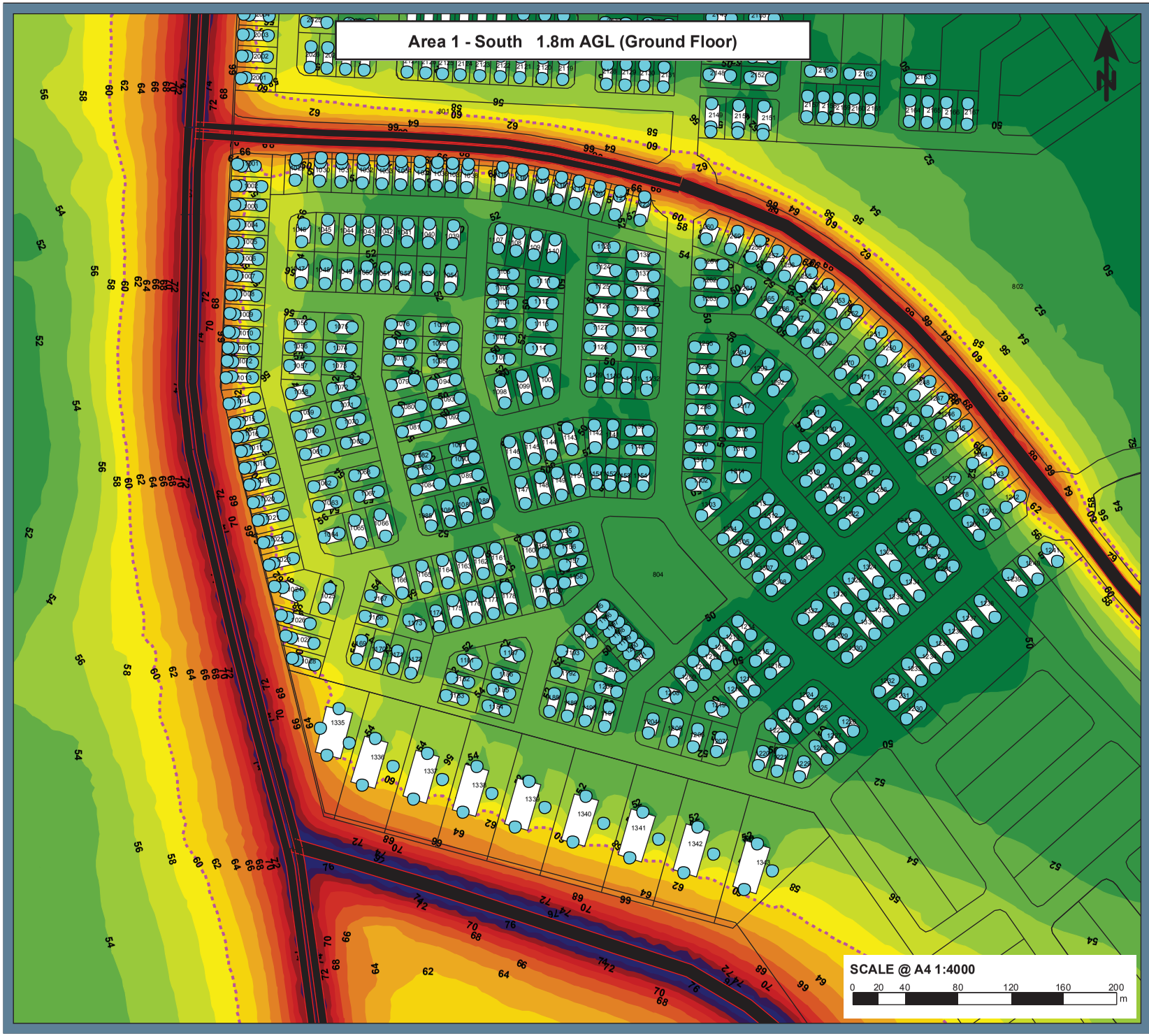


FIGURE 3

Traffic Noise Levels, Year 2031
Height: 1.8m AGL
No Noise Control Measures

$L_{A10,18hr}$ at 1.8m AGL
in dB(A), Free-field

	<= 50
50 <	<= 52
52 <	<= 54
54 <	<= 56
56 <	<= 58
58 <	<= 60
60 <	<= 62
62 <	<= 64
64 <	<= 66
66 <	<= 68
68 <	<= 70
70 <	<= 72
72 <	<= 74
74 <	<= 76
76 <	

Legend

- Road emission line
- Road surface
- Building
- Point receiver

Traffic noise criterion

- 60dB(A) free-field, 63dB(A) facade-adjusted

ATP CONSULTING ENGINEERS

ATP150814
Proposed Subdivision, Greenbank
Client: MWH

Grid Spacing: 5m
Project Engineer: Sam Fraser
Created: 4/11/2016
Processed with SoundPLAN 7.2

FIGURE 4

Traffic Noise Levels, Year 2031
Height: 4.6m AGL
No Noise Control Measures

$L_{A10,18hr}$ at 4.6m AGL
in dB(A), Free-field

	<= 50
50 <	<= 52
52 <	<= 54
54 <	<= 56
56 <	<= 58
58 <	<= 60
60 <	<= 62
62 <	<= 64
64 <	<= 66
66 <	<= 68
68 <	<= 70
70 <	<= 72
72 <	<= 74
74 <	<= 76
76 <	

Legend

- Road emission line
- Road surface
- Building
- Point receiver

Traffic noise criterion

- 60dB(A) free-field, 63dB(A) facade-adjusted

ATP CONSULTING ENGINEERS

ATP150814
Proposed Subdivision, Greenbank
Client: MWH

Grid Spacing: 5m
Project Engineer: Sam Fraser
Created: 4/11/2016
Processed with SoundPLAN 7.2

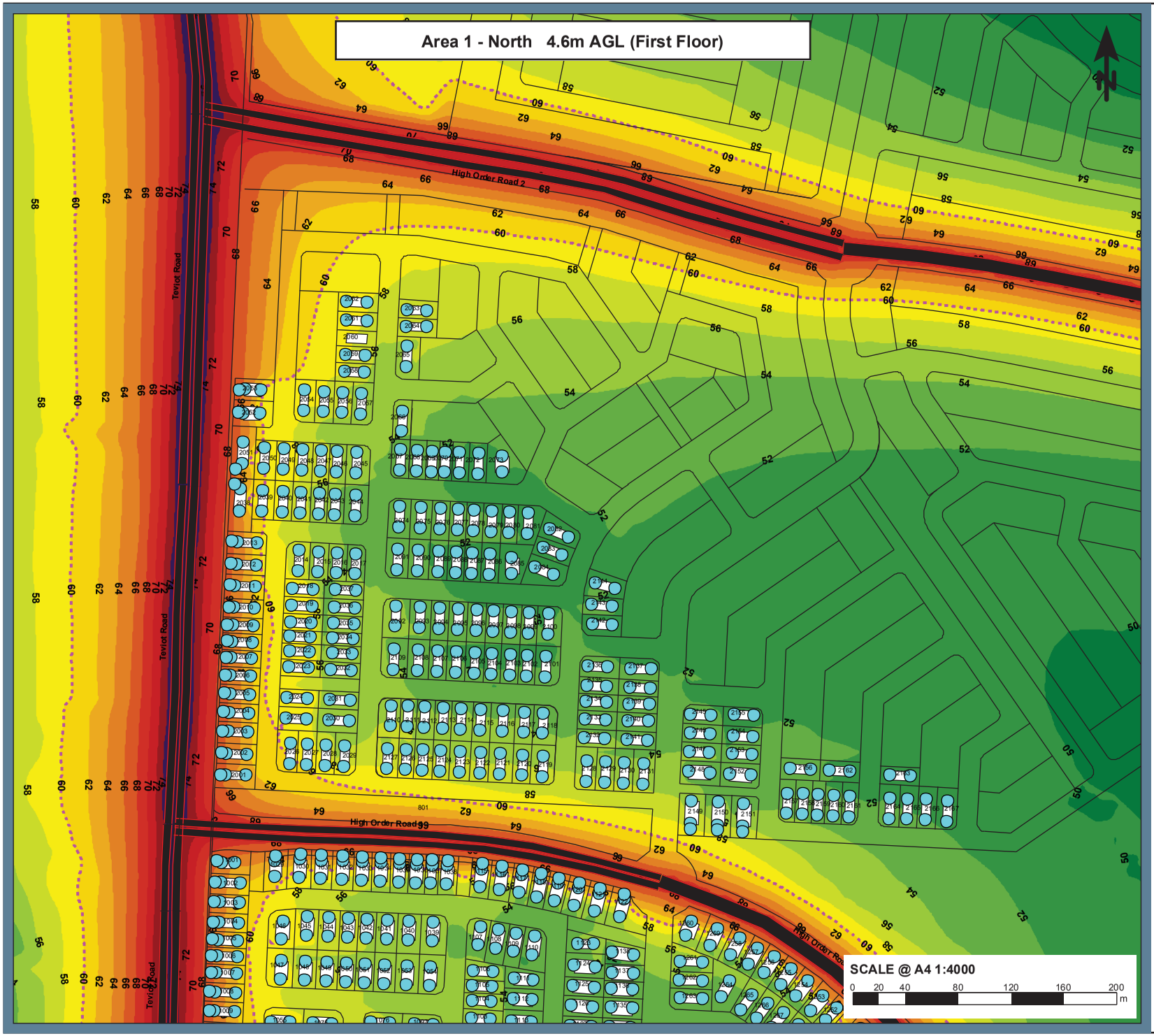


FIGURE 5

Traffic Noise Levels, Year 2031
Height: 4.6m AGL
No Noise Control Measures

$L_{A10,18hr}$ at 4.6m AGL
in dB(A), Free-field

	<= 50
50 <	<= 52
52 <	<= 54
54 <	<= 56
56 <	<= 58
58 <	<= 60
60 <	<= 62
62 <	<= 64
64 <	<= 66
66 <	<= 68
68 <	<= 70
70 <	<= 72
72 <	<= 74
74 <	<= 76
76 <	

Legend

- Road emission line
- Road surface
- Building
- Point receiver

Traffic noise criterion

- 60dB(A) free-field, 63dB(A) facade-adjusted

ATP CONSULTING ENGINEERS

ATP150814
Proposed Subdivision, Greenbank
Client: MWH

Grid Spacing: 5m
Project Engineer: Sam Fraser
Created: 4/11/2016
Processed with SoundPLAN 7.2

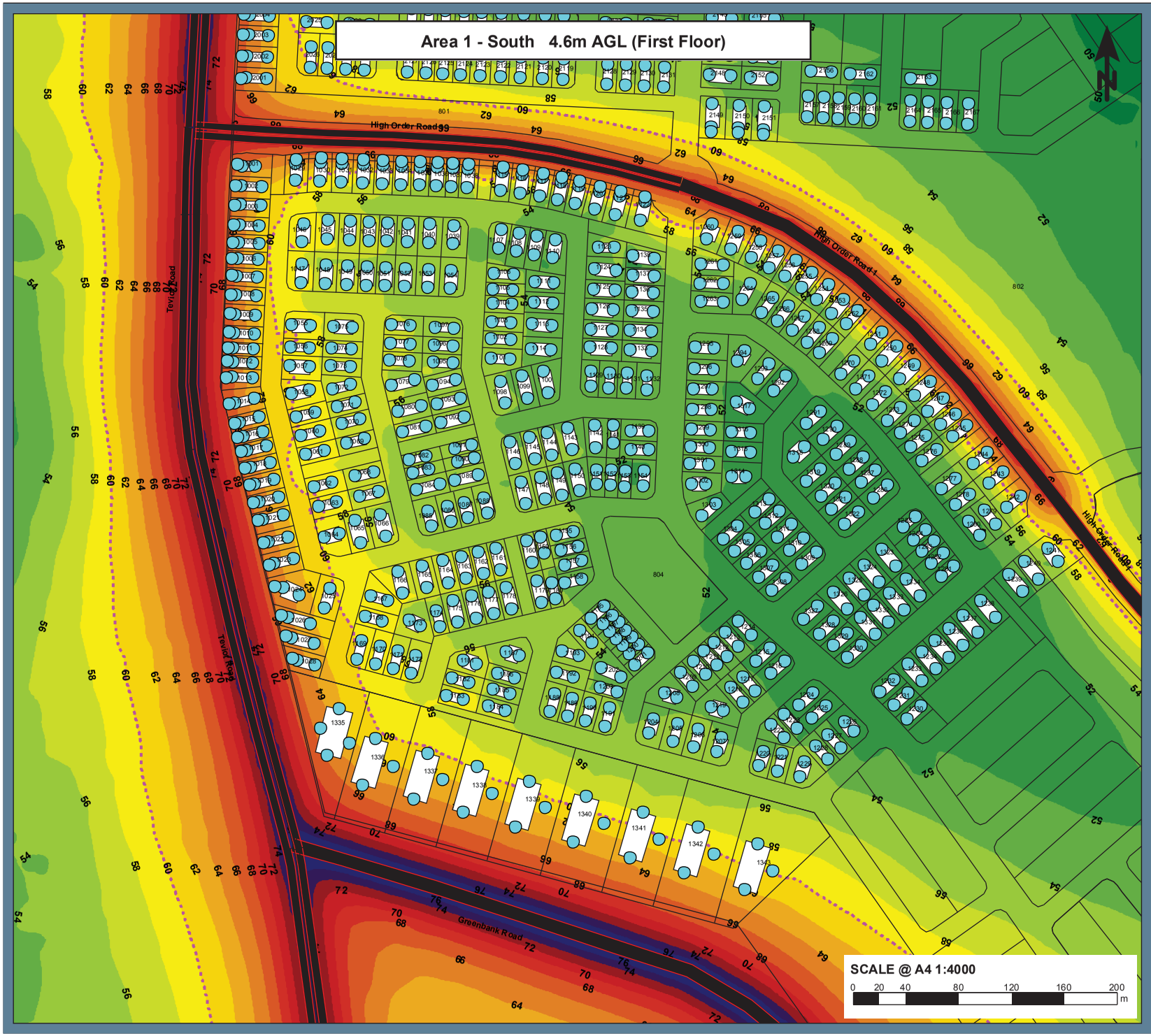


FIGURE 6

Traffic Noise Levels, Year 2031
Height: 4.6m AGL
No Noise Control Measures

$L_{A10,18hr}$ at 4.6m AGL
in dB(A), Free-field

	<= 50
50 <	<= 52
52 <	<= 54
54 <	<= 56
56 <	<= 58
58 <	<= 60
60 <	<= 62
62 <	<= 64
64 <	<= 66
66 <	<= 68
68 <	<= 70
70 <	<= 72
72 <	<= 74
74 <	<= 76
76 <	

Legend

- Road emission line
- Road surface
- Building
- Point receiver

Traffic noise criterion

- 60dB(A) free-field, 63dB(A) facade-adjusted

ATP CONSULTING ENGINEERS

ATP150814
Proposed Subdivision, Greenbank
Client: MWH

Grid Spacing: 5m
Project Engineer: Sam Fraser
Created: 4/11/2016
Processed with SoundPLAN 7.2

Appendix I – Traffic Noise Levels - With Noise Control Measures - SoundPLAN Table

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
With Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
1001	GF	E	55
	F 1		66
1001	GF	W	58
	F 1		66
1002	GF	E	54
	F 1		63
1002	GF	W	58
	F 1		65
1003	GF	E	54
	F 1		63
1003	GF	W	58
	F 1		66
1004	GF	E	53
	F 1		63
1004	GF	W	59
	F 1		66
1005	GF	E	54
	F 1		63
1005	GF	W	60
	F 1		66
1006	GF	W	60
	F 1		67
1006	GF	E	53
	F 1		63
1007	GF	E	53
	F 1		63
1007	GF	W	61
	F 1		67
1008	GF	E	53
	F 1		64
1008	GF	W	61
	F 1		67
1009	GF	E	53
	F 1		64
1009	GF	W	61
	F 1		68
1010	GF	E	53
	F 1		64
1010	GF	W	61
	F 1		68
1011	GF	E	53
	F 1		65
1011	GF	W	62
	F 1		68
1012	GF	E	53
	F 1		65
1012	GF	W	62
	F 1		68
1013	GF	E	53
	F 1		65

Receiver	Floor	Facade	L10(18h) dB(A)
1013	GF	W	61
	F 1		68
1014	GF	W	62
	F 1		68
1014	GF	E	52
	F 1		65
1015	GF	E	52
	F 1		65
1015	GF	W	62
	F 1		68
1016	GF	E	52
	F 1		65
1016	GF	W	63
	F 1		68
1017	GF	E	52
	F 1		64
1017	GF	W	62
	F 1		67
1018	GF	E	52
	F 1		64
1018	GF	W	63
	F 1		67
1019	GF	E	52
	F 1		65
1019	GF	W	63
	F 1		67
1020	GF	E	53
	F 1		65
1020	GF	W	63
	F 1		67
1021	GF	E	53
	F 1		65
1021	GF	W	62
	F 1		67
1022	GF	E	53
	F 1		65
1022	GF	W	61
	F 1		67
1023	GF	E	53
	F 1		65
1023	GF	W	61
	F 1		67
1024	GF	SE	55
	F 1		65
1024	GF	NW	59
	F 1		66
1025	GF	S	57
	F 1		63
1025	GF	N	54
	F 1		62

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
With Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
1026	GF	W	57
	F 1		65
1026	GF	E	54
	F 1		64
1027	GF	W	57
	F 1		65
1027	GF	E	55
	F 1		64
1028	GF	W	58
	F 1		66
1028	GF	E	56
	F 1		65
1029	GF	N	60
	F 1		65
1029	GF	S	54
	F 1		62
1030	GF	N	60
	F 1		65
1030	GF	S	53
	F 1		61
1031	GF	N	59
	F 1		64
1031	GF	S	52
	F 1		59
1032	GF	N	59
	F 1		64
1032	GF	S	52
	F 1		59
1033	GF	N	59
	F 1		64
1033	GF	S	51
	F 1		58
1034	GF	N	59
	F 1		64
1034	GF	S	51
	F 1		58
1035	GF	N	59
	F 1		64
1035	GF	S	51
	F 1		57
1036	GF	N	57
	F 1		63
1036	GF	S	50
	F 1		56
1037	GF	N	58
	F 1		63
1037	GF	S	50
	F 1		56
1038	GF	N	58
	F 1		63

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
With Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
1038	GF	S	50
	F 1		56
1039	GF	S	51
	F 1		56
1039	GF	N	51
	F 1		56
1040	GF	S	51
	F 1		57
1040	GF	N	51
	F 1		57
1041	GF	N	51
	F 1		57
1041	GF	S	52
	F 1		57
1042	GF	S	52
	F 1		58
1042	GF	N	52
	F 1		57
1043	GF	S	53
	F 1		58
1043	GF	N	52
	F 1		58
1044	GF	S	54
	F 1		59
1044	GF	N	53
	F 1		59
1045	GF	S	54
	F 1		60
1045	GF	N	54
	F 1		59
1046	GF	N	55
	F 1		61
1046	GF	S	57
	F 1		62
1047	GF	S	57
	F 1		61
1047	GF	N	53
	F 1		60
1048	GF	N	51
	F 1		58
1048	GF	S	54
	F 1		59
1049	GF	S	55
	F 1		59
1049	GF	N	50
	F 1		58
1050	GF	S	54
	F 1		58
1050	GF	N	50
	F 1		58

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
With Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
1051	GF	N	50
	F 1		58
1051	GF	S	54
	F 1		58
1052	GF	S	54
	F 1		58
1052	GF	N	50
	F 1		57
1053	GF	S	53
	F 1		57
1053	GF	N	50
	F 1		57
1054	GF	S	54
	F 1		57
1054	GF	N	50
	F 1		57
1055	GF	E	53
	F 1		61
1055	GF	W	58
	F 1		62
1056	GF	E	52
	F 1		61
1056	GF	W	58
	F 1		62
1057	GF	W	58
	F 1		62
1057	GF	E	52
	F 1		61
1058	GF	E	51
	F 1		61
1058	GF	W	58
	F 1		62
1059	GF	W	58
	F 1		62
1059	GF	E	51
	F 1		61
1060	GF	E	51
	F 1		61
1060	GF	W	58
	F 1		62
1061	GF	W	58
	F 1		62
1061	GF	E	51
	F 1		61
1062	GF	E	51
	F 1		61
1062	GF	W	58
	F 1		62
1063	GF	W	58
	F 1		62

Receiver	Floor	Facade	L10(18h) dB(A)
1063	GF	E	51
	F 1		61
1064	GF	W	57
	F 1		61
1064	GF	E	52
	F 1		61
1065	GF	N	53
	F 1		59
1065	GF	S	55
	F 1		60
1066	GF	N	52
	F 1		58
1066	GF	S	54
	F 1		58
1067	GF	E	49
	F 1		58
1067	GF	W	54
	F 1		58
1068	GF	E	49
	F 1		58
1068	GF	W	55
	F 1		59
1069	GF	E	50
	F 1		59
1069	GF	W	55
	F 1		59
1070	GF	E	50
	F 1		59
1070	GF	W	54
	F 1		59
1071	GF	E	50
	F 1		59
1071	GF	W	55
	F 1		59
1072	GF	E	51
	F 1		59
1072	GF	W	55
	F 1		60
1073	GF	E	52
	F 1		59
1073	GF	W	54
	F 1		59
1074	GF	E	52
	F 1		59
1074	GF	W	54
	F 1		59
1075	GF	W	54
	F 1		59
1075	GF	E	52
	F 1		59

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
With Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
1076	GF	W	55
	F 1		58
1076	GF	E	50
	F 1		58
1077	GF	W	55
	F 1		58
1077	GF	E	50
	F 1		58
1078	GF	W	54
	F 1		58
1078	GF	E	50
	F 1		58
1079	GF	E	49
	F 1		58
1079	GF	W	54
	F 1		58
1080	GF	E	51
	F 1		58
1080	GF	W	54
	F 1		58
1081	GF	E	50
	F 1		58
1081	GF	W	55
	F 1		58
1082	GF	E	49
	F 1		58
1082	GF	W	55
	F 1		58
1083	GF	E	48
	F 1		58
1083	GF	W	54
	F 1		58
1084	GF	E	48
	F 1		57
1084	GF	W	54
	F 1		58
1085	GF	N	51
	F 1		57
1085	GF	S	52
	F 1		57
1086	GF	N	51
	F 1		57
1086	GF	S	52
	F 1		57
1087	GF	N	51
	F 1		57
1087	GF	S	52
	F 1		57
1088	GF	N	51
	F 1		57

Receiver	Floor	Facade	L10(18h) dB(A)
1088	GF	S	53
	F 1		57
1089	GF	E	47
	F 1		56
1089	GF	W	51
	F 1		56
1090	GF	E	48
	F 1		56
1090	GF	W	52
	F 1		57
1091	GF	E	49
	F 1		57
1091	GF	W	53
	F 1		57
1092	GF	E	49
	F 1		57
1092	GF	W	53
	F 1		57
1093	GF	E	50
	F 1		57
1093	GF	W	54
	F 1		58
1094	GF	E	51
	F 1		57
1094	GF	W	55
	F 1		58
1095	GF	W	55
	F 1		58
1095	GF	E	52
	F 1		58
1096	GF	W	55
	F 1		58
1096	GF	E	52
	F 1		58
1097	GF	E	52
	F 1		58
1097	GF	W	55
	F 1		58
1098	GF	N	49
	F 1		56
1098	GF	S	53
	F 1		57
1099	GF	N	48
	F 1		55
1099	GF	S	52
	F 1		56
1100	GF	N	48
	F 1		55
1100	GF	S	52
	F 1		55

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
With Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
1101	GF	W	53
	F 1		57
1101	GF	E	51
	F 1		56
1102	GF	E	52
	F 1		57
1102	GF	W	54
	F 1		57
1103	GF	E	52
	F 1		57
1103	GF	W	54
	F 1		57
1104	GF	W	54
	F 1		57
1104	GF	E	52
	F 1		57
1105	GF	W	53
	F 1		57
1105	GF	E	51
	F 1		57
1106	GF	W	53
	F 1		56
1106	GF	E	50
	F 1		56
1107	GF	S	50
	F 1		56
1107	GF	N	51
	F 1		56
1108	GF	S	50
	F 1		55
1108	GF	N	51
	F 1		55
1109	GF	N	51
	F 1		55
1109	GF	S	50
	F 1		55
1110	GF	N	50
	F 1		54
1110	GF	S	49
	F 1		54
1111	GF	E	50
	F 1		54
1111	GF	W	50
	F 1		54
1112	GF	W	50
	F 1		55
1112	GF	E	50
	F 1		55
1113	GF	E	51
	F 1		56

Receiver	Floor	Facade	L10(18h) dB(A)
1113	GF	W	51
	F 1		55
1114	GF	E	50
	F 1		55
1114	GF	W	51
	F 1		55
1115	GF	N	59
	F 1		63
1115	GF	S	50
	F 1		56
1116	GF	N	58
	F 1		63
1116	GF	S	50
	F 1		56
1117	GF	N	56
	F 1		61
1117	GF	S	50
	F 1		55
1118	GF	N	55
	F 1		60
1118	GF	S	50
	F 1		55
1119	GF	N	55
	F 1		60
1119	GF	S	50
	F 1		55
1120	GF	N	55
	F 1		60
1120	GF	S	50
	F 1		55
1121	GF	N	55
	F 1		61
1121	GF	S	49
	F 1		55
1122	GF	N	56
	F 1		63
1122	GF	S	49
	F 1		55
1123	GF	E	51
	F 1		56
1123	GF	W	51
	F 1		55
1124	GF	W	51
	F 1		54
1124	GF	E	50
	F 1		55
1125	GF	E	50
	F 1		55
1125	GF	W	52
	F 1		55

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
With Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
1126	GF	W	52
	F 1		55
1126	GF	E	51
	F 1		55
1127	GF	E	51
	F 1		56
1127	GF	W	53
	F 1		56
1128	GF	W	52
	F 1		55
1128	GF	E	50
	F 1		55
1129	GF	N	47
	F 1		55
1129	GF	S	52
	F 1		55
1130	GF	N	47
	F 1		55
1130	GF	S	52
	F 1		55
1131	GF	N	47
	F 1		54
1131	GF	S	52
	F 1		55
1132	GF	S	52
	F 1		54
1132	GF	N	47
	F 1		54
1133	GF	W	50
	F 1		54
1133	GF	E	50
	F 1		55
1134	GF	E	50
	F 1		55
1134	GF	W	50
	F 1		54
1135	GF	W	50
	F 1		54
1135	GF	E	51
	F 1		55
1136	GF	W	49
	F 1		54
1136	GF	E	51
	F 1		55
1137	GF	W	49
	F 1		54
1137	GF	E	52
	F 1		55
1138	GF	W	49
	F 1		54

Receiver	Floor	Facade	L10(18h) dB(A)
1138	GF	E	52
	F 1		55
1139	GF	E	49
	F 1		54
1139	GF	W	51
	F 1		54
1140	GF	W	51
	F 1		54
1140	GF	E	49
	F 1		55
1141	GF	S	53
	F 1		55
1141	GF	N	48
	F 1		55
1142	GF	N	49
	F 1		55
1142	GF	S	54
	F 1		56
1143	GF	N	50
	F 1		56
1143	GF	S	54
	F 1		56
1144	GF	N	50
	F 1		56
1144	GF	S	53
	F 1		56
1145	GF	S	53
	F 1		57
1145	GF	N	50
	F 1		56
1146	GF	N	49
	F 1		56
1146	GF	S	52
	F 1		56
1147	GF	S	52
	F 1		56
1147	GF	N	50
	F 1		56
1148	GF	S	52
	F 1		56
1148	GF	N	50
	F 1		56
1149	GF	N	49
	F 1		56
1149	GF	S	53
	F 1		56
1150	GF	N	49
	F 1		55
1150	GF	S	53
	F 1		56

Receiver	Floor	Facade	L10(18h) dB(A)
1151	GF	N	47
	F 1		55
1151	GF	S	52
	F 1		55
1152	GF	N	47
	F 1		54
1152	GF	S	52
	F 1		55
1153	GF	N	46
	F 1		54
1153	GF	S	52
	F 1		54
1154	GF	N	46
	F 1		54
1154	GF	S	52
	F 1		54
1155	GF	W	52
	F 1		56
1155	GF	E	49
	F 1		56
1156	GF	E	49
	F 1		56
1156	GF	W	52
	F 1		56
1157	GF	E	49
	F 1		56
1157	GF	W	52
	F 1		56
1158	GF	W	51
	F 1		56
1158	GF	E	48
	F 1		55
1159	GF	N	51
	F 1		57
1159	GF	S	54
	F 1		58
1160	GF	S	55
	F 1		58
1160	GF	N	52
	F 1		57
1161	GF	S	55
	F 1		58
1161	GF	N	52
	F 1		58
1162	GF	S	55
	F 1		59
1162	GF	N	52
	F 1		58
1163	GF	N	53
	F 1		59

Receiver	Floor	Facade	L10(18h) dB(A)
1163	GF	S	55
	F 1		59
1164	GF	S	56
	F 1		59
1164	GF	N	53
	F 1		59
1165	GF	N	53
	F 1		59
1165	GF	S	56
	F 1		60
1166	GF	S	56
	F 1		60
1166	GF	N	54
	F 1		60
1167	GF	W	57
	F 1		61
1167	GF	E	55
	F 1		61
1168	GF	W	57
	F 1		61
1168	GF	E	55
	F 1		61
1169	GF	N	53
	F 1		61
1169	GF	S	58
	F 1		62
1170	GF	N	52
	F 1		60
1170	GF	S	57
	F 1		61
1171	GF	N	51
	F 1		60
1171	GF	S	57
	F 1		61
1172	GF	N	51
	F 1		59
1172	GF	S	56
	F 1		60
1173	GF	SE	52
	F 1		58
1173	GF	NW	52
	F 1		58
1174	GF	S	54
	F 1		58
1174	GF	N	50
	F 1		58
1175	GF	N	49
	F 1		57
1175	GF	S	54
	F 1		58

Receiver	Floor	Facade	L10(18h) dB(A)
1176	GF	S	54
	F 1		58
1176	GF	N	49
	F 1		57
1177	GF	S	54
	F 1		57
1177	GF	N	49
	F 1		57
1178	GF	S	54
	F 1		57
1178	GF	N	49
	F 1		57
1179	GF	S	54
	F 1		57
1179	GF	N	49
	F 1		56
1180	GF	N	48
	F 1		56
1180	GF	S	53
	F 1		57
1181	GF	W	54
	F 1		59
1181	GF	E	53
	F 1		59
1182	GF	W	55
	F 1		60
1182	GF	E	54
	F 1		60
1183	GF	E	54
	F 1		60
1183	GF	W	56
	F 1		60
1184	GF	W	53
	F 1		58
1184	GF	E	53
	F 1		58
1185	GF	W	53
	F 1		58
1185	GF	E	53
	F 1		58
1186	GF	W	53
	F 1		58
1186	GF	E	53
	F 1		58
1187	GF	E	52
	F 1		58
1187	GF	W	53
	F 1		58
1188	GF	N	49
	F 1		57

Receiver	Floor	Facade	L10(18h) dB(A)
1188	GF	S	55
	F 1		58
1189	GF	S	55
	F 1		57
1189	GF	N	49
	F 1		57
1190	GF	S	54
	F 1		57
1190	GF	N	49
	F 1		57
1191	GF	S	54
	F 1		57
1191	GF	N	49
	F 1		56
1192	GF	W	54
	F 1		58
1192	GF	E	52
	F 1		58
1193	GF	W	53
	F 1		57
1193	GF	E	52
	F 1		58
1194	GF	NW	52
	F 1		57
1194	GF	SE	53
	F 1		57
1195	GF	NE	47
	F 1		56
1195	GF	SW	52
	F 1		56
1196	GF	NE	47
	F 1		56
1196	GF	SW	53
	F 1		56
1197	GF	SW	53
	F 1		55
1197	GF	NE	47
	F 1		55
1198	GF	SW	53
	F 1		55
1198	GF	NE	47
	F 1		55
1199	GF	SW	53
	F 1		55
1199	GF	NE	47
	F 1		55
1200	GF	SW	53
	F 1		55
1200	GF	NE	47
	F 1		55

Receiver	Floor	Facade	L10(18h) dB(A)
1201	GF	SW	53
	F 1		55
1201	GF	NE	47
	F 1		55
1202	GF	SE	51
	F 1		56
1202	GF	NW	51
	F 1		55
1203	GF	E	50
	F 1		56
1203	GF	W	51
	F 1		56
1204	GF	S	54
	F 1		56
1204	GF	N	49
	F 1		56
1205	GF	N	49
	F 1		56
1205	GF	S	54
	F 1		57
1206	GF	S	54
	F 1		57
1206	GF	N	49
	F 1		56
1207	GF	N	49
	F 1		56
1207	GF	S	54
	F 1		56
1208	GF	E	49
	F 1		56
1208	GF	W	52
	F 1		56
1209	GF	SE	51
	F 1		55
1209	GF	NW	51
	F 1		55
1210	GF	SE	51
	F 1		55
1210	GF	NW	50
	F 1		55
1211	GF	NW	50
	F 1		55
1211	GF	SE	51
	F 1		55
1212	GF	SE	50
	F 1		54
1212	GF	NW	50
	F 1		54
1213	GF	NW	50
	F 1		54

Receiver	Floor	Facade	L10(18h) dB(A)
1213	GF	SE	50
	F 1		54
1214	GF	NW	50
	F 1		54
1214	GF	SE	50
	F 1		54
1215	GF	SW	51
	F 1		54
1215	GF	NE	47
	F 1		54
1216	GF	NE	47
	F 1		54
1216	GF	SW	51
	F 1		54
1217	GF	NW	50
	F 1		54
1217	GF	SE	50
	F 1		54
1218	GF	NW	51
	F 1		55
1218	GF	SE	51
	F 1		55
1219	GF	W	52
	F 1		55
1219	GF	E	50
	F 1		56
1220	GF	S	54
	F 1		56
1220	GF	N	49
	F 1		56
1221	GF	S	55
	F 1		58
1221	GF	N	50
	F 1		57
1222	GF	NW	51
	F 1		54
1222	GF	SE	49
	F 1		54
1223	GF	NW	50
	F 1		54
1223	GF	SE	49
	F 1		54
1224	GF	NE	47
	F 1		53
1224	GF	SW	50
	F 1		54
1225	GF	NE	47
	F 1		53
1225	GF	SW	50
	F 1		53

Receiver	Floor	Facade	L10(18h) dB(A)
1226	GF	SE	49
	F 1		53
1226	GF	NW	50
	F 1		53
1227	GF	NW	51
	F 1		54
1227	GF	SE	51
	F 1		54
1228	GF	SE	51
	F 1		55
1228	GF	NW	51
	F 1		55
1229	GF	N	49
	F 1		57
1229	GF	S	54
	F 1		57
1230	GF	NE	47
	F 1		53
1230	GF	SW	51
	F 1		53
1231	GF	NE	47
	F 1		53
1231	GF	SW	51
	F 1		53
1232	GF	SW	51
	F 1		53
1232	GF	NE	46
	F 1		53
1233	GF	SE	48
	F 1		52
1233	GF	NW	50
	F 1		53
1234	GF	SE	48
	F 1		52
1234	GF	NW	50
	F 1		52
1235	GF	SE	48
	F 1		52
1235	GF	NW	50
	F 1		52
1236	GF	SE	48
	F 1		52
1236	GF	NW	50
	F 1		52
1237	GF	SE	48
	F 1		52
1237	GF	NW	50
	F 1		52
1238	GF	SE	49
	F 1		53

Receiver	Floor	Facade	L10(18h) dB(A)
1238	GF	NW	50
	F 1		53
1239	GF	NW	51
	F 1		54
1239	GF	SE	50
	F 1		53
1240	GF	SE	51
	F 1		55
1240	GF	NW	53
	F 1		55
1241	GF	SE	53
	F 1		57
1241	GF	NW	55
	F 1		58
1242	GF	SW	49
	F 1		56
1242	GF	NE	63
	F 1		65
1243	GF	SW	50
	F 1		56
1243	GF	NE	63
	F 1		65
1244	GF	SW	50
	F 1		56
1244	GF	NE	63
	F 1		65
1245	GF	SW	50
	F 1		56
1245	GF	NE	63
	F 1		65
1246	GF	SW	50
	F 1		55
1246	GF	NE	63
	F 1		65
1247	GF	NE	63
	F 1		65
1247	GF	SW	49
	F 1		55
1248	GF	SW	49
	F 1		55
1248	GF	NE	63
	F 1		65
1249	GF	SW	49
	F 1		55
1249	GF	NE	63
	F 1		65
1250	GF	SW	49
	F 1		55
1250	GF	NE	63
	F 1		65

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
With Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
1251	GF	SW	49
	F 1		56
1251	GF	NE	63
	F 1		65
1252	GF	SW	49
	F 1		56
1252	GF	NE	63
	F 1		65
1253	GF	SW	49
	F 1		54
1253	GF	NE	63
	F 1		65
1254	GF	SW	49
	F 1		55
1254	GF	NE	64
	F 1		65
1255	GF	SW	49
	F 1		54
1255	GF	NE	64
	F 1		66
1256	GF	NE	64
	F 1		66
1256	GF	SW	49
	F 1		54
1257	GF	SW	49
	F 1		54
1257	GF	NE	64
	F 1		65
1258	GF	NE	64
	F 1		66
1258	GF	SW	48
	F 1		55
1259	GF	NE	64
	F 1		65
1259	GF	SW	48
	F 1		55
1260	GF	N	63
	F 1		65
1260	GF	S	49
	F 1		56
1261	GF	W	53
	F 1		56
1261	GF	E	51
	F 1		56
1262	GF	W	53
	F 1		56
1262	GF	E	51
	F 1		56
1263	GF	E	50
	F 1		55

Receiver	Floor	Facade	L10(18h) dB(A)
1263	GF	W	52
	F 1		55
1264	GF	NE	52
	F 1		56
1264	GF	SW	50
	F 1		54
1265	GF	NE	51
	F 1		55
1265	GF	SW	50
	F 1		54
1266	GF	NE	51
	F 1		55
1266	GF	SW	50
	F 1		54
1267	GF	SW	51
	F 1		54
1267	GF	NE	51
	F 1		55
1268	GF	SW	51
	F 1		54
1268	GF	NE	51
	F 1		55
1269	GF	SW	51
	F 1		54
1269	GF	NE	53
	F 1		56
1270	GF	SW	51
	F 1		54
1270	GF	NE	52
	F 1		56
1271	GF	NE	51
	F 1		55
1271	GF	SW	51
	F 1		54
1272	GF	NE	50
	F 1		55
1272	GF	SW	51
	F 1		54
1273	GF	NE	49
	F 1		54
1273	GF	SW	50
	F 1		54
1274	GF	SW	50
	F 1		53
1274	GF	NE	49
	F 1		54
1275	GF	NE	50
	F 1		54
1275	GF	SW	50
	F 1		54

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
With Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
1276	GF	SW	50
	F 1		53
1276	GF	NE	51
	F 1		55
1277	GF	NE	52
	F 1		55
1277	GF	SW	50
	F 1		53
1278	GF	NE	52
	F 1		55
1278	GF	SW	50
	F 1		54
1279	GF	NW	51
	F 1		55
1279	GF	SE	52
	F 1		55
1280	GF	NW	50
	F 1		53
1280	GF	SE	50
	F 1		54
1281	GF	NE	48
	F 1		53
1281	GF	SW	49
	F 1		52
1282	GF	NE	48
	F 1		52
1282	GF	SW	49
	F 1		52
1283	GF	NE	48
	F 1		53
1283	GF	SW	50
	F 1		52
1284	GF	NE	48
	F 1		53
1284	GF	SW	49
	F 1		52
1285	GF	NE	48
	F 1		53
1285	GF	SW	50
	F 1		53
1286	GF	SW	50
	F 1		52
1286	GF	NE	47
	F 1		52
1287	GF	NE	47
	F 1		53
1287	GF	SW	51
	F 1		53
1288	GF	NE	48
	F 1		53

Receiver	Floor	Facade	L10(18h) dB(A)
1288	GF	SW	51
	F 1		53
1289	GF	NE	48
	F 1		53
1289	GF	SW	51
	F 1		53
1290	GF	SW	51
	F 1		53
1290	GF	NE	48
	F 1		53
1291	GF	NE	48
	F 1		54
1291	GF	SW	51
	F 1		54
1292	GF	SW	51
	F 1		54
1292	GF	NE	48
	F 1		53
1293	GF	SW	52
	F 1		54
1293	GF	NE	48
	F 1		54
1294	GF	SW	51
	F 1		54
1294	GF	NE	48
	F 1		54
1295	GF	E	50
	F 1		55
1295	GF	W	52
	F 1		55
1296	GF	E	50
	F 1		55
1296	GF	W	52
	F 1		55
1297	GF	E	49
	F 1		54
1297	GF	W	52
	F 1		55
1298	GF	E	49
	F 1		54
1298	GF	W	52
	F 1		55
1299	GF	E	49
	F 1		54
1299	GF	W	52
	F 1		55
1300	GF	E	49
	F 1		54
1300	GF	W	52
	F 1		55

Greenbank Development
Calculated Facade Traffic Noise Levels, Year 2031
With Noise Mitigation Measures

Receiver	Floor	Facade	L10(18h) dB(A)
1301	GF	E	49
	F 1		55
1301	GF	W	52
	F 1		55
1302	GF	E	48
	F 1		54
1302	GF	W	52
	F 1		54
1302	GF	SW	51
	F 1		53
1302	GF	NE	46
	F 1		52
1303	GF	SW	52
	F 1		54
1303	GF	NE	46
	F 1		54
1304	GF	SW	52
	F 1		54
1304	GF	NE	46
	F 1		54
1305	GF	SW	52
	F 1		54
1305	GF	NE	46
	F 1		54
1306	GF	SW	52
	F 1		54
1306	GF	NE	46
	F 1		53
1307	GF	SW	52
	F 1		53
1307	GF	NE	46
	F 1		53
1308	GF	NE	46
	F 1		53
1308	GF	SW	51
	F 1		53
1309	GF	SW	50
	F 1		53
1309	GF	NE	46
	F 1		53
1310	GF	SW	50
	F 1		53
1310	GF	NE	46
	F 1		53
1311	GF	SW	51
	F 1		53
1311	GF	NE	46
	F 1		53
1312	GF	NE	46
	F 1		53

Receiver	Floor	Facade	L10(18h) dB(A)
1312	GF	SW	51
	F 1		53
1313	GF	NE	46
	F 1		53
1313	GF	SW	51
	F 1		53
1314	GF	W	50
	F 1		53
1314	GF	E	48
	F 1		54
1315	GF	W	50
	F 1		53
1315	GF	E	48
	F 1		53
1316	GF	W	49
	F 1		53
1316	GF	E	48
	F 1		53
1317	GF	NW	47
	F 1		53
1317	GF	SE	49
	F 1		53
1318	GF	NE	46
	F 1		53
1318	GF	SW	51
	F 1		53
1319	GF	NE	46
	F 1		53
1319	GF	SW	51
	F 1		53
1321	GF	NE	46
	F 1		52
1321	GF	SW	50
	F 1		52
1322	GF	NE	46
	F 1		52
1322	GF	SW	50
	F 1		52
1323	GF	SE	49
	F 1		52
1323	GF	NW	49
	F 1		52
1324	GF	NW	49
	F 1		52
1324	GF	SE	49
	F 1		52
1325	GF	SE	49
	F 1		53
1325	GF	NW	49
	F 1		52

Receiver	Floor	Facade	L10(18h) dB(A)
1326	GF	NW	49
	F 1		53
1326	GF	SE	48
	F 1		53
1327	GF	NE	46
	F 1		53
1327	GF	SW	51
	F 1		53
1328	GF	SW	51
	F 1		53
1328	GF	NE	46
	F 1		53
1329	GF	SW	51
	F 1		53
1329	GF	NE	47
	F 1		53
1330	GF	SW	51
	F 1		53
1330	GF	NE	46
	F 1		53
1331	GF	SE	48
	F 1		52
1331	GF	NW	48
	F 1		52
1332	GF	SE	49
	F 1		52
1332	GF	NW	48
	F 1		52
1333	GF	SE	49
	F 1		52
1333	GF	NW	48
	F 1		52
1334	GF	SE	48
	F 1		52
1334	GF	NW	48
	F 1		52
1335	GF	W	61
	F 1		67
1335	GF	N	56
	F 1		64
1335	GF	S	65
	F 1		68
1336	GF	N	53
	F 1		63
1336	GF	S	64
	F 1		67
1337	GF	N	54
	F 1		63
1337	GF	S	64
	F 1		67

Receiver	Floor	Facade	L10(18h) dB(A)
1338	GF	N	53
	F 1		63
1338	GF	S	64
	F 1		66
1339	GF	N	52
	F 1		62
1339	GF	S	63
	F 1		66
1340	GF	N	52
	F 1		62
1340	GF	S	63
	F 1		65
1341	GF	N	52
	F 1		62
1341	GF	S	62
	F 1		65
1342	GF	N	51
	F 1		62
1342	GF	S	62
	F 1		65
1343	GF	S	61
	F 1		64
1343	GF	N	51
	F 1		61
2001	GF	W	60
	F 1		67
2001	GF	E	54
	F 1		65
2002	GF	W	61
	F 1		67
2002	GF	E	54
	F 1		65
2003	GF	W	61
	F 1		67
2003	GF	E	53
	F 1		65
2004	GF	W	62
	F 1		67
2004	GF	E	52
	F 1		64
2005	GF	W	62
	F 1		67
2005	GF	E	52
	F 1		64
2006	GF	W	62
	F 1		67
2006	GF	E	52
	F 1		64
2007	GF	W	61
	F 1		67

Receiver	Floor	Facade	L10(18h) dB(A)
2007	GF	E	52
	F 1		64
2008	GF	W	61
	F 1		66
2008	GF	E	51
	F 1		63
2009	GF	W	60
	F 1		66
2009	GF	E	52
	F 1		63
2010	GF	W	60
	F 1		66
2010	GF	E	52
	F 1		63
2011	GF	W	60
	F 1		66
2011	GF	E	52
	F 1		63
2012	GF	W	59
	F 1		66
2012	GF	E	51
	F 1		63
2013	GF	W	59
	F 1		66
2013	GF	E	51
	F 1		62
2014	GF	N	53
	F 1		58
2014	GF	S	54
	F 1		59
2015	GF	S	52
	F 1		56
2015	GF	N	52
	F 1		56
2016	GF	N	51
	F 1		55
2016	GF	S	51
	F 1		56
2017	GF	S	51
	F 1		55
2017	GF	N	50
	F 1		55
2018	GF	W	57
	F 1		60
2018	GF	E	52
	F 1		60
2019	GF	W	58
	F 1		61
2019	GF	E	51
	F 1		60

Greenbank Development
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Receiver	Floor	Facade	L10(18h) dB(A)
2020	GF	W	57
	F 1		61
2020	GF	E	52
	F 1		60
2021	GF	E	51
	F 1		60
2021	GF	W	58
	F 1		61
2022	GF	W	57
	F 1		61
2022	GF	E	51
	F 1		60
2023	GF	W	57
	F 1		61
2023	GF	E	51
	F 1		60
2024	GF	W	58
	F 1		61
2024	GF	E	51
	F 1		61
2025	GF	E	51
	F 1		61
2025	GF	W	58
	F 1		62
2026	GF	S	59
	F 1		62
2026	GF	N	55
	F 1		61
2027	GF	N	54
	F 1		60
2027	GF	S	58
	F 1		61
2028	GF	N	53
	F 1		59
2028	GF	S	58
	F 1		61
2029	GF	S	57
	F 1		59
2029	GF	N	51
	F 1		57
2030	GF	E	51
	F 1		57
2030	GF	W	52
	F 1		57
2031	GF	E	50
	F 1		57
2031	GF	W	52
	F 1		57
2032	GF	E	50
	F 1		57

Receiver	Floor	Facade	L10(18h) dB(A)
2032	GF	W	53
	F 1		57
2033	GF	W	52
	F 1		56
2033	GF	E	50
	F 1		57
2034	GF	W	52
	F 1		56
2034	GF	E	50
	F 1		57
2035	GF	E	50
	F 1		57
2035	GF	W	51
	F 1		56
2036	GF	W	51
	F 1		56
2036	GF	E	51
	F 1		56
2037	GF	E	50
	F 1		56
2037	GF	W	51
	F 1		55
2038	GF	S	57
	F 1		66
2038	GF	N	56
	F 1		66
2039	GF	N	55
	F 1		61
2039	GF	S	55
	F 1		61
2040	GF	N	54
	F 1		60
2040	GF	S	54
	F 1		59
2041	GF	N	53
	F 1		58
2041	GF	S	54
	F 1		58
2042	GF	S	52
	F 1		57
2042	GF	N	52
	F 1		57
2043	GF	N	51
	F 1		56
2043	GF	S	52
	F 1		56
2044	GF	N	50
	F 1		55
2044	GF	S	52
	F 1		55

Receiver	Floor	Facade	L10(18h) dB(A)
2045	GF	S	52
	F 1		56
2045	GF	N	51
	F 1		56
2046	GF	N	52
	F 1		57
2046	GF	S	53
	F 1		57
2047	GF	S	53
	F 1		58
2047	GF	N	52
	F 1		58
2048	GF	S	53
	F 1		59
2048	GF	N	54
	F 1		59
2049	GF	N	54
	F 1		60
2049	GF	S	54
	F 1		60
2050	GF	N	54
	F 1		61
2050	GF	S	55
	F 1		61
2051	GF	N	56
	F 1		65
2051	GF	S	56
	F 1		65
2052	GF	W	58
	F 1		65
2052	GF	E	51
	F 1		62
2053	GF	W	58
	F 1		65
2053	GF	E	51
	F 1		62
2054	GF	N	55
	F 1		59
2054	GF	S	53
	F 1		59
2055	GF	S	53
	F 1		58
2055	GF	N	54
	F 1		58
2056	GF	N	53
	F 1		58
2056	GF	S	52
	F 1		58
2057	GF	N	51
	F 1		56

Receiver	Floor	Facade	L10(18h) dB(A)
2057	GF	S	52
	F 1		57
2058	GF	E	50
	F 1		57
2058	GF	W	57
	F 1		59
2059	GF	E	50
	F 1		58
2059	GF	W	57
	F 1		59
2061	GF	E	51
	F 1		59
2061	GF	W	57
	F 1		60
2062	GF	E	52
	F 1		59
2062	GF	W	58
	F 1		60
2063	GF	E	51
	F 1		58
2063	GF	W	56
	F 1		58
2064	GF	E	51
	F 1		58
2064	GF	W	55
	F 1		58
2065	GF	S	52
	F 1		57
2065	GF	N	53
	F 1		57
2066	GF	S	52
	F 1		56
2066	GF	N	51
	F 1		56
2067	GF	N	50
	F 1		54
2067	GF	S	51
	F 1		55
2068	GF	S	51
	F 1		54
2068	GF	N	50
	F 1		54
2069	GF	S	50
	F 1		54
2069	GF	N	49
	F 1		54
2070	GF	S	50
	F 1		53
2070	GF	N	49
	F 1		53

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Receiver	Floor	Facade	L10(18h) dB(A)
2071	GF	N	49
	F 1		53
2071	GF	S	50
	F 1		53
2072	GF	N	48
	F 1		53
2072	GF	S	50
	F 1		53
2073	GF	S	49
	F 1		53
2073	GF	N	48
	F 1		53
2074	GF	S	52
	F 1		55
2074	GF	N	50
	F 1		55
2075	GF	S	51
	F 1		55
2075	GF	N	49
	F 1		54
2076	GF	S	51
	F 1		54
2076	GF	N	49
	F 1		54
2077	GF	N	49
	F 1		54
2077	GF	S	51
	F 1		54
2078	GF	N	49
	F 1		53
2078	GF	S	51
	F 1		54
2079	GF	N	49
	F 1		53
2079	GF	S	51
	F 1		54
2080	GF	N	49
	F 1		53
2080	GF	S	51
	F 1		54
2081	GF	N	49
	F 1		53
2081	GF	S	51
	F 1		53
2082	GF	NW	50
	F 1		53
2082	GF	SE	49
	F 1		54
2083	GF	SE	49
	F 1		53

Receiver	Floor	Facade	L10(18h) dB(A)
2083	GF	NW	50
	F 1		53
2084	GF	NW	49
	F 1		53
2084	GF	SE	49
	F 1		53
2085	GF	S	49
	F 1		53
2085	GF	N	47
	F 1		53
2086	GF	S	49
	F 1		53
2086	GF	N	47
	F 1		53
2087	GF	S	50
	F 1		53
2087	GF	N	47
	F 1		53
2088	GF	S	50
	F 1		53
2088	GF	N	48
	F 1		53
2089	GF	N	48
	F 1		53
2089	GF	S	50
	F 1		54
2090	GF	S	51
	F 1		54
2090	GF	N	49
	F 1		54
2091	GF	S	51
	F 1		55
2091	GF	N	50
	F 1		55
2092	GF	S	54
	F 1		57
2092	GF	N	50
	F 1		56
2093	GF	N	49
	F 1		55
2093	GF	S	53
	F 1		56
2094	GF	S	52
	F 1		55
2094	GF	N	49
	F 1		54
2095	GF	S	52
	F 1		55
2095	GF	N	48
	F 1		54

Receiver	Floor	Facade	L10(18h) dB(A)
2096	GF	S	52
	F 1		55
2096	GF	N	48
	F 1		54
2097	GF	N	48
	F 1		54
2097	GF	S	52
	F 1		54
2098	GF	N	48
	F 1		54
2098	GF	S	52
	F 1		54
2099	GF	N	48
	F 1		54
2099	GF	S	52
	F 1		54
2100	GF	N	48
	F 1		53
2100	GF	S	51
	F 1		54
2101	GF	N	47
	F 1		53
2101	GF	S	51
	F 1		54
2102	GF	N	47
	F 1		53
2102	GF	S	50
	F 1		54
2103	GF	N	47
	F 1		53
2103	GF	S	50
	F 1		54
2104	GF	N	47
	F 1		53
2104	GF	S	50
	F 1		54
2105	GF	N	47
	F 1		53
2105	GF	S	50
	F 1		54
2106	GF	N	47
	F 1		53
2106	GF	S	51
	F 1		54
2107	GF	N	47
	F 1		54
2107	GF	S	51
	F 1		55
2108	GF	N	48
	F 1		54

Receiver	Floor	Facade	L10(18h) dB(A)
2108	GF	S	52
	F 1		55
2109	GF	N	49
	F 1		55
2109	GF	S	52
	F 1		56
2110	GF	N	50
	F 1		57
2110	GF	S	54
	F 1		58
2111	GF	N	50
	F 1		56
2111	GF	S	54
	F 1		57
2112	GF	N	49
	F 1		56
2112	GF	S	53
	F 1		57
2113	GF	N	49
	F 1		55
2113	GF	S	52
	F 1		56
2114	GF	N	48
	F 1		55
2114	GF	S	52
	F 1		56
2115	GF	N	48
	F 1		55
2115	GF	S	52
	F 1		56
2116	GF	N	48
	F 1		55
2116	GF	S	52
	F 1		56
2117	GF	N	48
	F 1		55
2117	GF	S	52
	F 1		56
2118	GF	N	48
	F 1		54
2118	GF	S	52
	F 1		55
2119	GF	N	48
	F 1		56
2119	GF	S	56
	F 1		58
2120	GF	N	48
	F 1		56
2120	GF	S	56
	F 1		58

Receiver	Floor	Facade	L10(18h) dB(A)
2121	GF	S	56
	F 1		58
2121	GF	N	48
	F 1		56
2122	GF	N	48
	F 1		56
2122	GF	S	56
	F 1		58
2123	GF	N	49
	F 1		57
2123	GF	S	56
	F 1		58
2124	GF	N	49
	F 1		57
2124	GF	S	56
	F 1		59
2125	GF	S	57
	F 1		59
2125	GF	N	49
	F 1		57
2126	GF	N	50
	F 1		57
2126	GF	S	57
	F 1		59
2127	GF	S	57
	F 1		59
2127	GF	N	50
	F 1		58
2128	GF	N	47
	F 1		56
2128	GF	S	56
	F 1		58
2129	GF	N	47
	F 1		56
2129	GF	S	56
	F 1		57
2130	GF	S	56
	F 1		57
2130	GF	N	47
	F 1		55
2131	GF	N	47
	F 1		56
2131	GF	S	55
	F 1		57
2132	GF	W	52
	F 1		56
2132	GF	E	48
	F 1		56
2133	GF	W	52
	F 1		55

Receiver	Floor	Facade	L10(18h) dB(A)
2133	GF	E	48
	F 1		55
2134	GF	E	48
	F 1		54
2134	GF	W	52
	F 1		54
2135	GF	W	52
	F 1		54
2135	GF	E	48
	F 1		54
2136	GF	E	48
	F 1		54
2136	GF	W	51
	F 1		54
2137	GF	E	48
	F 1		54
2137	GF	W	50
	F 1		54
2138	GF	W	50
	F 1		54
2138	GF	E	48
	F 1		54
2139	GF	E	48
	F 1		54
2139	GF	W	50
	F 1		54
2140	GF	E	49
	F 1		55
2140	GF	W	51
	F 1		55
2141	GF	W	51
	F 1		55
2141	GF	E	49
	F 1		55
2142	GF	W	50
	F 1		53
2142	GF	E	48
	F 1		53
2143	GF	W	51
	F 1		54
2143	GF	E	48
	F 1		54
2144	GF	E	49
	F 1		54
2144	GF	W	51
	F 1		53
2145	GF	W	50
	F 1		53
2145	GF	E	48
	F 1		54

Receiver	Floor	Facade	L10(18h) dB(A)
2146	GF	W	52
	F 1		55
2146	GF	E	50
	F 1		55
2147	GF	W	52
	F 1		55
2147	GF	E	50
	F 1		55
2148	GF	W	51
	F 1		54
2148	GF	E	47
	F 1		55
2149	GF	S	56
	F 1		59
2149	GF	N	47
	F 1		56
2150	GF	N	47
	F 1		55
2150	GF	S	56
	F 1		58
2151	GF	N	47
	F 1		54
2151	GF	S	55
	F 1		57
2152	GF	E	50
	F 1		55
2152	GF	W	50
	F 1		55
2153	GF	E	49
	F 1		54
2153	GF	W	49
	F 1		54
2154	GF	E	49
	F 1		54
2154	GF	W	49
	F 1		53
2155	GF	W	49
	F 1		53
2155	GF	E	48
	F 1		53
2156	GF	W	51
	F 1		54
2156	GF	E	48
	F 1		54
2157	GF	S	53
	F 1		55
2157	GF	N	47
	F 1		54
2158	GF	S	53
	F 1		55

Receiver	Floor	Facade	L10(18h) dB(A)
2158	GF	N	46
	F 1		54
2159	GF	N	46
	F 1		54
2159	GF	S	53
	F 1		55
2160	GF	N	46
	F 1		54
2160	GF	S	53
	F 1		55
2161	GF	S	53
	F 1		54
2161	GF	N	46
	F 1		53
2162	GF	W	49
	F 1		53
2162	GF	E	48
	F 1		53
2163	GF	W	50
	F 1		53
2163	GF	E	46
	F 1		53
2164	GF	N	46
	F 1		53
2164	GF	S	52
	F 1		54
2165	GF	N	46
	F 1		53
2165	GF	S	52
	F 1		54
2166	GF	N	46
	F 1		53
2166	GF	S	52
	F 1		53
2167	GF	N	46
	F 1		53
2167	GF	S	52
	F 1		53

Greenbank Development
Freefield Noise Levels at Outdoor Living Areas, Year 2031
With Noise Mitigation Measures

Receiver	Floor	L10(18h) dB(A)
1001_Outdoor Living Area	GF	56
1002_Outdoor Living Area	GF	55
1003_Outdoor Living Area	GF	56
1004_Outdoor Living Area	GF	57
1005_Outdoor Living Area	GF	57
1006_Outdoor Living Area	GF	58
1007_Outdoor Living Area	GF	58
1008_Outdoor Living Area	GF	59
1009_Outdoor Living Area	GF	59
1010_Outdoor Living Area	GF	58
1011_Outdoor Living Area	GF	59
1012_Outdoor Living Area	GF	59
1013_Outdoor Living Area	GF	58
1014_Outdoor Living Area	GF	58
1015_Outdoor Living Area	GF	59
1016_Outdoor Living Area	GF	59
1017_Outdoor Living Area	GF	59
1018_Outdoor Living Area	GF	59
1019_Outdoor Living Area	GF	59
1020_Outdoor Living Area	GF	59
1021_Outdoor Living Area	GF	59
1022_Outdoor Living Area	GF	58
1023_Outdoor Living Area	GF	58
1024_Outdoor Living Area	GF	57
1026_Outdoor Living Area	GF	55
1027_Outdoor Living Area	GF	55
1028_Outdoor Living Area	GF	56
1029_Outdoor Living Area	GF	58
1030_Outdoor Living Area	GF	58
1031_Outdoor Living Area	GF	58
1032_Outdoor Living Area	GF	58
1033_Outdoor Living Area	GF	58
1034_Outdoor Living Area	GF	59
1035_Outdoor Living Area	GF	59
1115_Outdoor Living Area	GF	59
1116_Outdoor Living Area	GF	58
1117_Outdoor Living Area	GF	55
1118_Outdoor Living Area	GF	55
1119_Outdoor Living Area	GF	54
1120_Outdoor Living Area	GF	54
1121_Outdoor Living Area	GF	54
1122_Outdoor Living Area	GF	54

Greenbank Development
Freefield Noise Levels at Outdoor Living Areas, Year 2031
With Noise Mitigation Measures

Receiver	Floor	L10(18h) dB(A)
1335_Outdoor Living Area	GF	57
1336_Outdoor Living Area	GF	58
1336_Outdoor Living Area	GF	56
1337_Outdoor Living Area	GF	58
1337_Outdoor Living Area	GF	57
1338_Outdoor Living Area	GF	58
1338_Outdoor Living Area	GF	57
1339_Outdoor Living Area	GF	57
1340_Outdoor Living Area	GF	57
1341_Outdoor Living Area	GF	56
1342_Outdoor Living Area	GF	56
1343_Outdoor Living Area	GF	56
2001_Outdoor Living Area	GF	57
2002_Outdoor Living Area	GF	58
2003_Outdoor Living Area	GF	58
2004_Outdoor Living Area	GF	59
2005_Outdoor Living Area	GF	58
2006_Outdoor Living Area	GF	59
2007_Outdoor Living Area	GF	58
2008_Outdoor Living Area	GF	57
2009_Outdoor Living Area	GF	57
2010_Outdoor Living Area	GF	57
2011_Outdoor Living Area	GF	57
2012_Outdoor Living Area	GF	56
2013_Outdoor Living Area	GF	56
2038_Outdoor Living Area	GF	56
2051_Outdoor Living Area	GF	56
2052_Outdoor Living Area	GF	56
2053_Outdoor Living Area	GF	56
2149_Outdoor Living Area	GF	55
2150_Outdoor Living Area	GF	54
2151_Outdoor Living Area	GF	53

Appendix J – Traffic Noise Levels - With Noise Control Measures - SoundPLAN Noise Grid Map

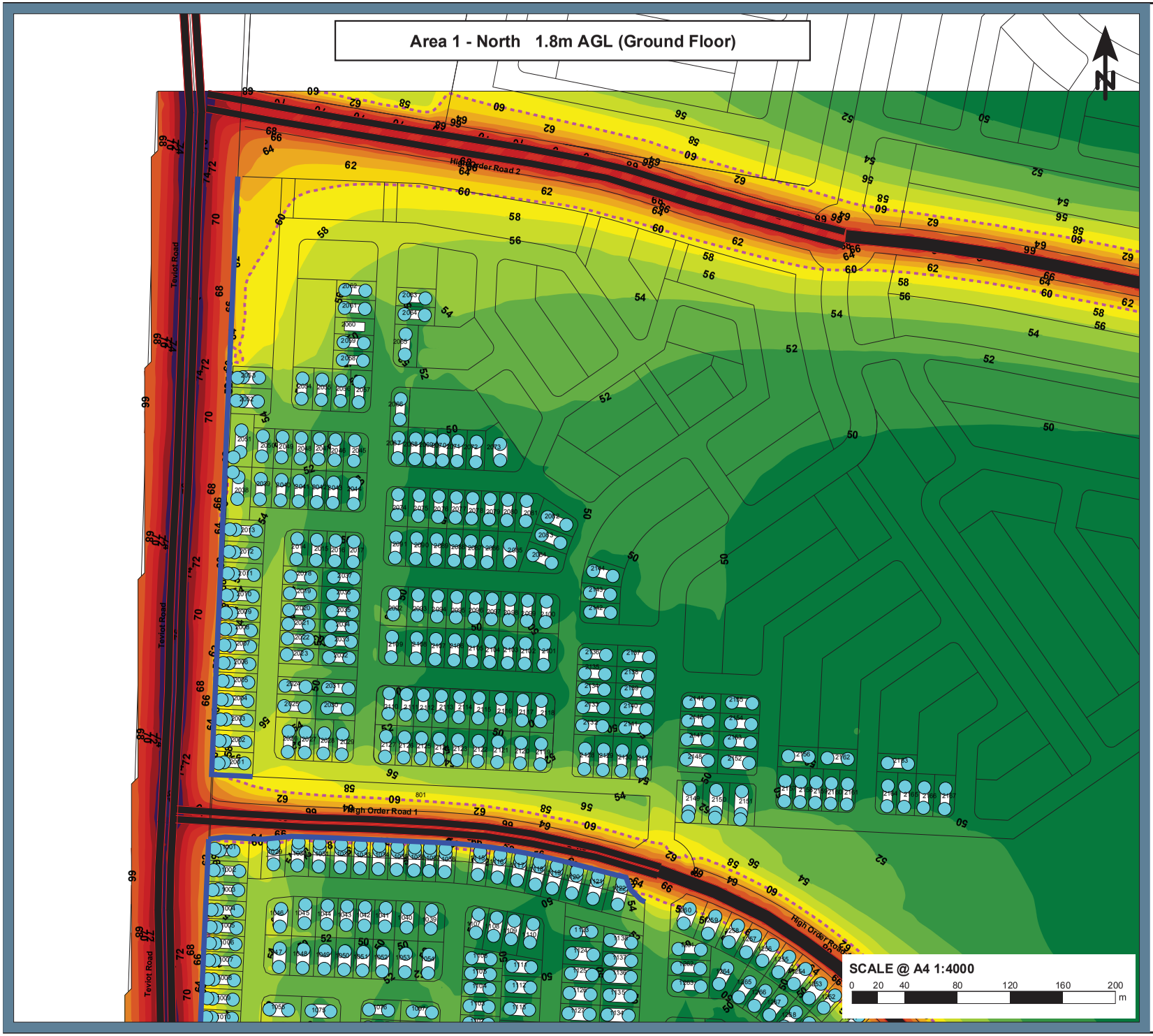


FIGURE 1

Traffic Noise Levels, Year 2031
Calculation Height: 1.8m AGL
Noise Control Measures

$L_{A10,18hr}$ at 1.8m AGL
in dB(A), Free-field

	<= 50
50 <	<= 52
52 <	<= 54
54 <	<= 56
56 <	<= 58
58 <	<= 60
60 <	<= 62
62 <	<= 64
64 <	<= 66
66 <	<= 68
68 <	<= 70
70 <	<= 72
72 <	<= 74
74 <	<= 76
76 <	

Legend

- Road emission line
- Road surface
- Building
- Acoustic fence
- Point receiver

Traffic noise criterion

- 60dB(A) free-field, 63dB(A) facade-adjusted

ATP CONSULTING ENGINEERS

ATP150814
Proposed Subdivision, Greenbank
Client: MWH

Grid Spacing: 5m
Project Engineer: Sam Fraser
Created: 18/11/2016
Processed with SoundPLAN 7.2

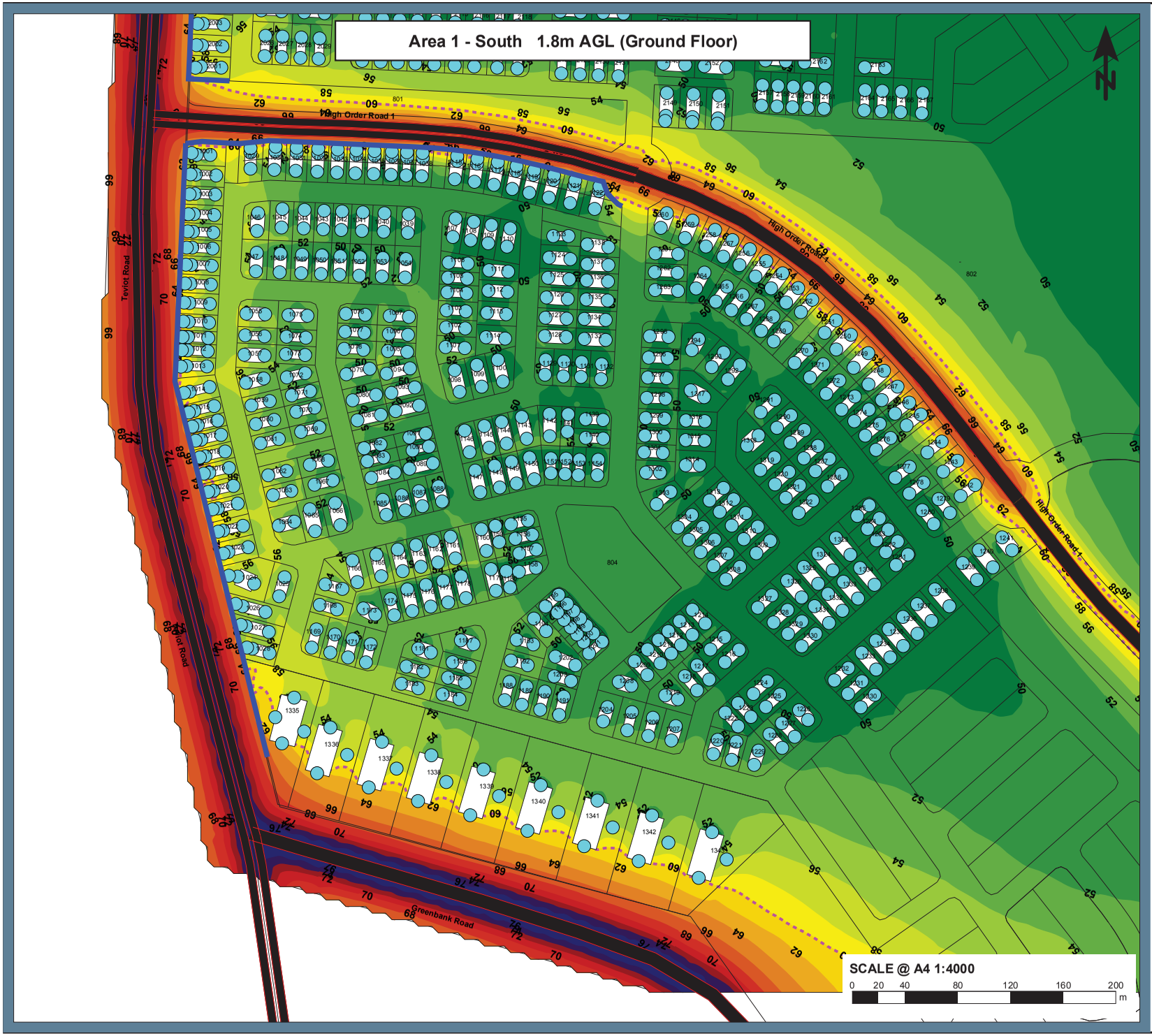


FIGURE 2

Traffic Noise Levels, Year 2031
Calculation Height: 1.8m AGL
Noise Control Measures

$L_{A10,18hr}$ at 1.8m AGL
in dB(A), Free-field

	<= 50
50 <	<= 52
52 <	<= 54
54 <	<= 56
56 <	<= 58
58 <	<= 60
60 <	<= 62
62 <	<= 64
64 <	<= 66
66 <	<= 68
68 <	<= 70
70 <	<= 72
72 <	<= 74
74 <	<= 76
76 <	

Legend

- Road emission line
- Road surface
- Building
- Acoustic fence
- Point receiver

Traffic noise criterion
- 60dB(A) free-field, 63dB(A) facade-adjusted

ATP CONSULTING ENGINEERS

ATP150814
Proposed Subdivision, Greenbank
Client: MWH

Grid Spacing: 5m
Project Engineer: Sam Fraser
Created: 18/11/2016
Processed with SoundPLAN 7.2

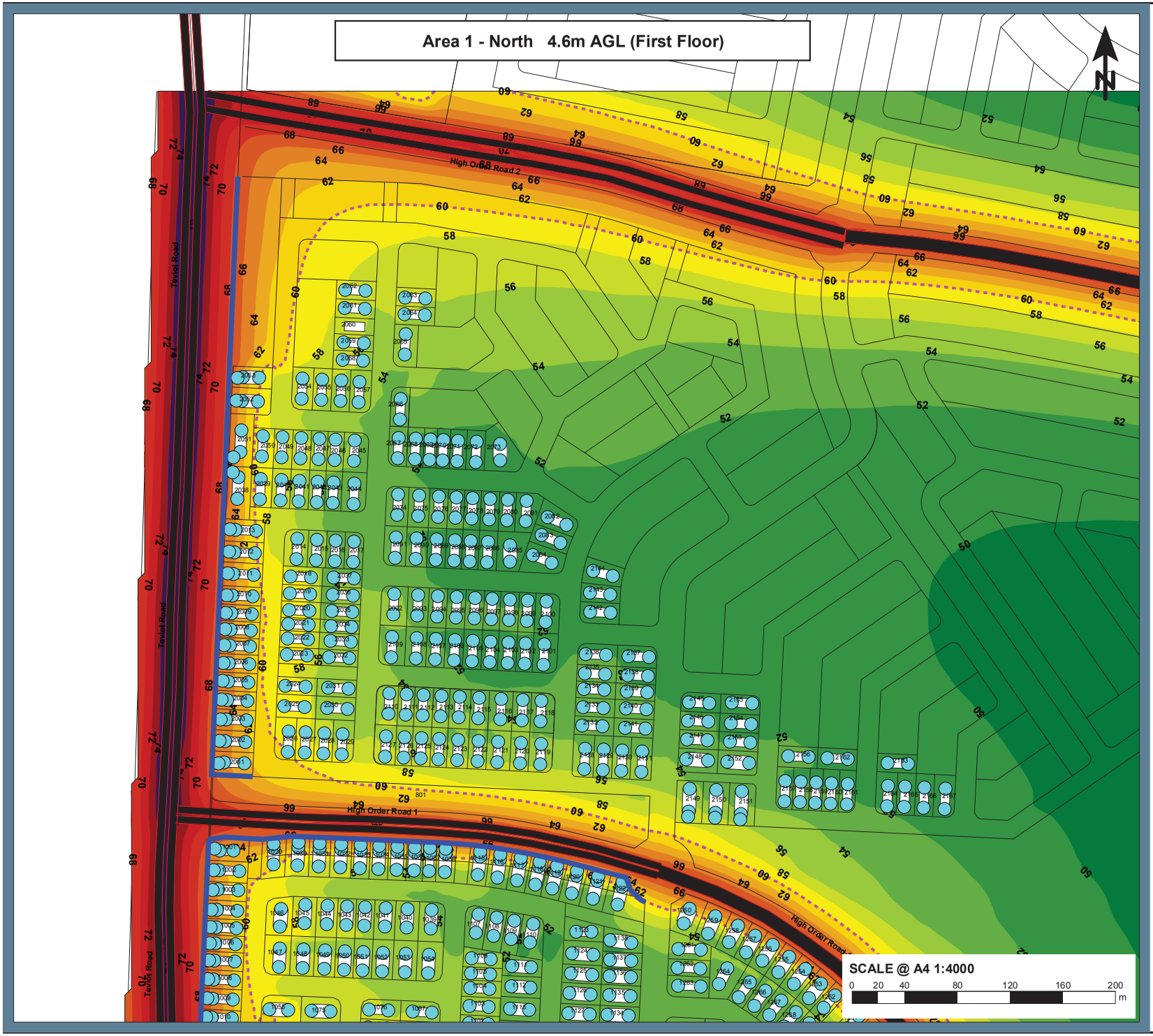


FIGURE 3

Traffic Noise Levels, Year 2031
Calculation Height: 4.6m AGL
Noise Control Measures

$L_{A10,18hr}$ at 4.6m AGL
in dB(A), Free-field

	<= 50
50 <	<= 52
52 <	<= 54
54 <	<= 56
56 <	<= 58
58 <	<= 60
60 <	<= 62
62 <	<= 64
64 <	<= 66
66 <	<= 68
68 <	<= 70
70 <	<= 72
72 <	<= 74
74 <	<= 76
76 <	

Legend

- Road emission line
- Road surface
- Building
- Acoustic fence
- Point receiver

Traffic noise criterion

- 60dB(A) free-field, 63dB(A) facade-adjusted

ATP CONSULTING ENGINEERS

ATP150814
Proposed Subdivision, Greenbank
Client: MWH

Grid Spacing: 5m
Project Engineer: Sam Fraser
Created: 18/11/2016
Processed with SoundPLAN 7.2

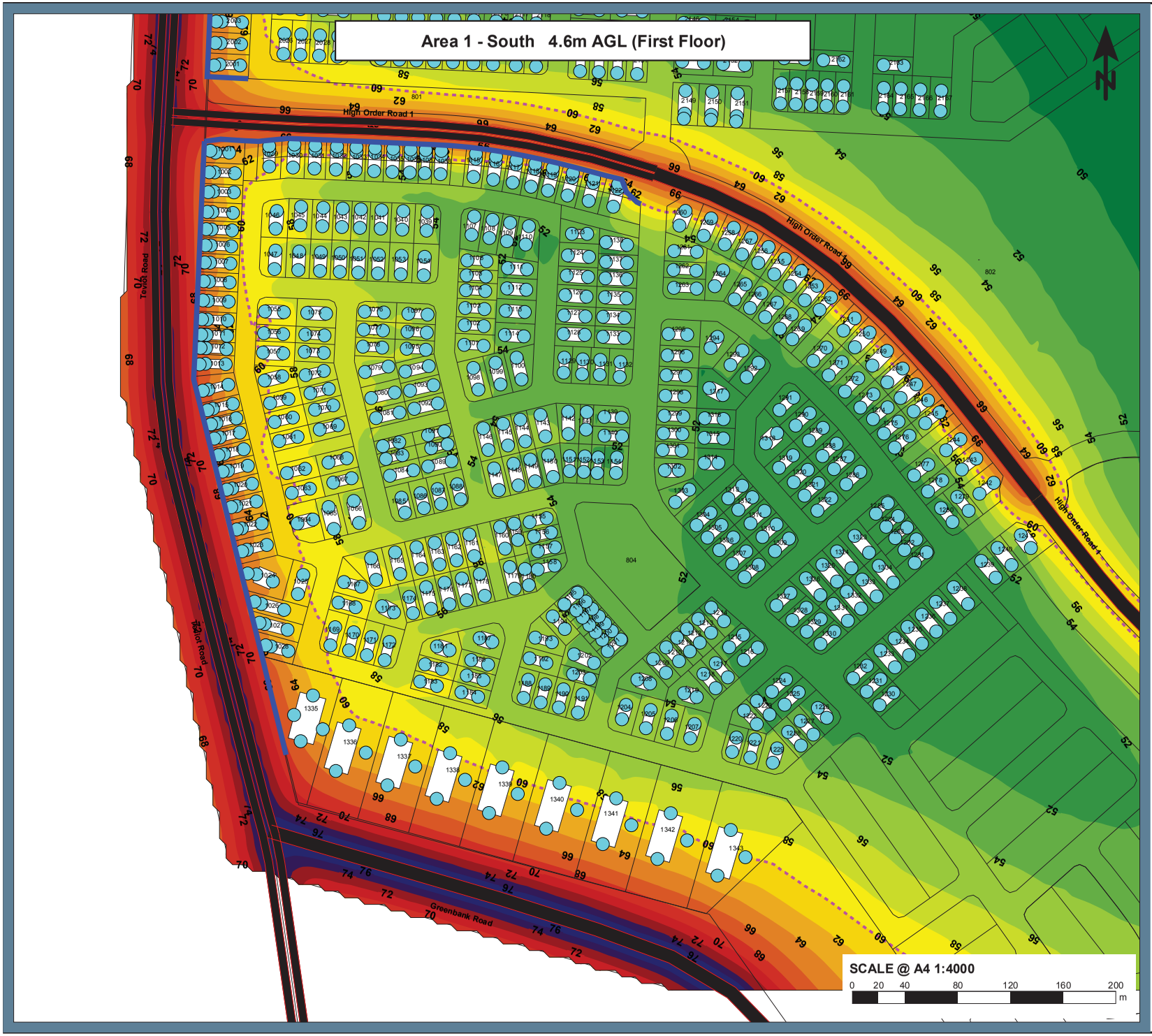


FIGURE 4

Traffic Noise Levels, Year 2031
Calculation Height: 4.6m AGL
Noise Control Measures

$L_{A10,18hr}$ at 4.6m AGL
in dB(A), Free-field

	<= 50
50 <	<= 52
52 <	<= 54
54 <	<= 56
56 <	<= 58
58 <	<= 60
60 <	<= 62
62 <	<= 64
64 <	<= 66
66 <	<= 68
68 <	<= 70
70 <	<= 72
72 <	<= 74
74 <	<= 76
76 <	

Legend

- Road emission line
- Road surface
- Building
- Acoustic fence
- Point receiver

Traffic noise criterion

- 60dB(A) free-field, 63dB(A) facade-adjusted

ATP CONSULTING ENGINEERS

ATP150814
Proposed Subdivision, Greenbank
Client: MWH

Grid Spacing: 5m
Project Engineer: Sam Fraser
Created: 18/11/2016
Processed with SoundPLAN 7.2

Appendix K – Earth Mound – Height and Alignment

Proposed Earth Mound – Height and Alignment

Point No.	Height, m (top of mound)	Relative to existing levels (m)
001	**70.27**	+2.0
002	**73.68**	+2.0
003	**73.56**	+2.0
004	**73.98**	+2.0
005	**73.12**	+2.0
006	**73.29**	+2.0
007	**73.42**	+2.0
008	**73.90**	+2.0
009	**73.32**	+2.0
010	**72.30**	+2.0
011	**71.68**	+2.0
012	**70.74**	+2.0
013	**70.55**	+2.5
014	**70.14**	+2.5
015	**69.84**	+2.5
016	**70.25**	+3.0
017	**70.61**	+3.0
018	**71.02**	+3.0
019	**71.49**	+2.5
020	**68.66**	+2.0

Proposed Earth Mound – Height and Alignment

Point No.	Height, m (top of mound)	Relative to existing levels (m)
001	**70.27**	+2.0
002	**73.68**	+2.0
003	**73.56**	+2.0
004	**73.98**	+2.0
005	**73.12**	+2.0
006	**73.29**	+2.0
007	**73.42**	+2.0
008	**73.90**	+2.0
009	**73.32**	+2.0
010	**72.30**	+2.0
011	**71.68**	+2.0
012	**70.74**	+2.0
013	**70.55**	+2.5
014	**70.14**	+2.5
015	**69.84**	+2.5
016	**70.25**	+3.0
017	**70.61**	+3.0
018	**71.02**	+3.0
019	**71.49**	+2.5
020	**68.66**	+2.0

Proposed Earth Mound – Height and Alignment

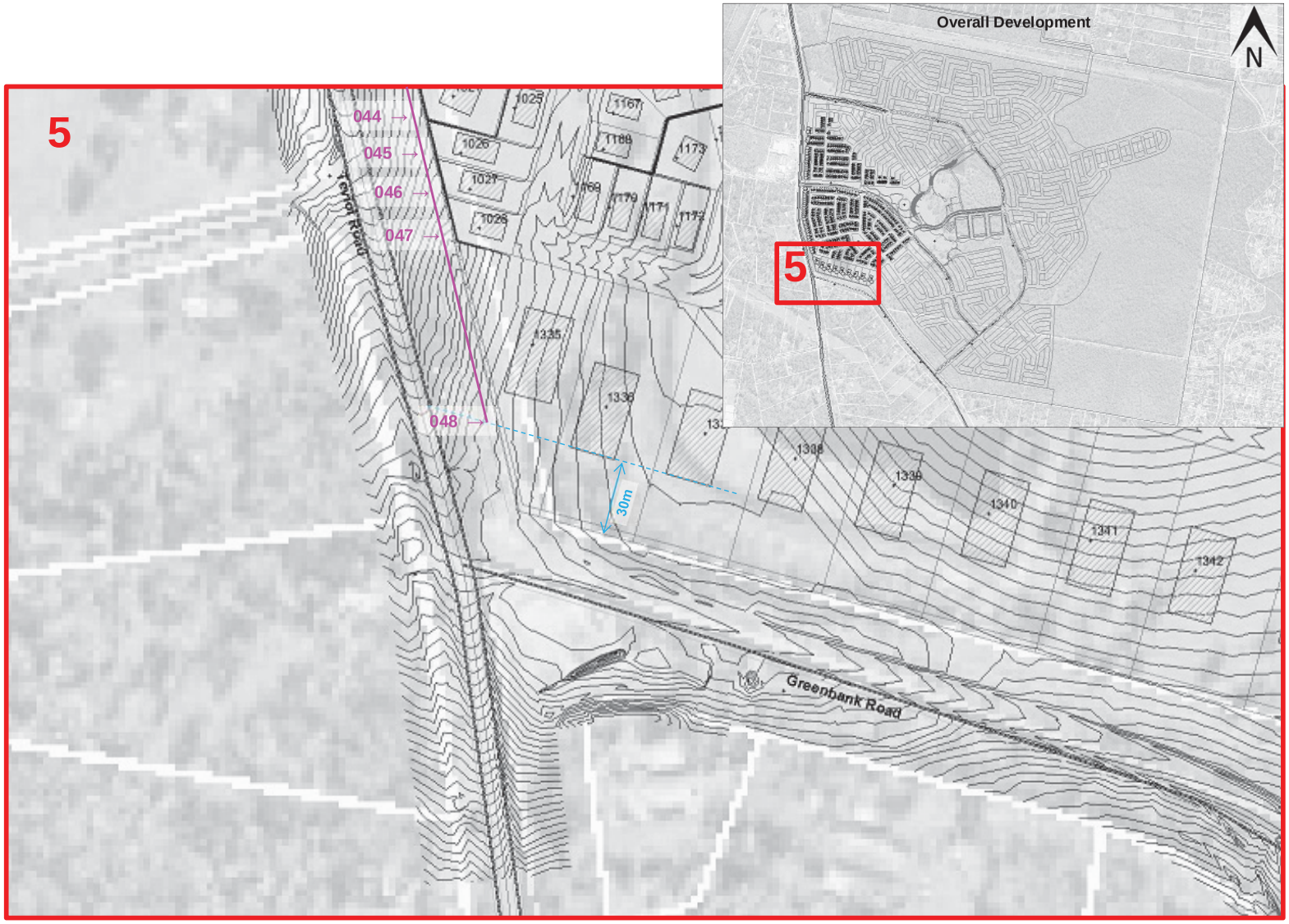
Point No.	Height, m (top of mound)	Relative to existing levels (m)
021	**72.00**	+2.0
022	**71.75**	+2.0
023	**70.82**	+2.0
024	**70.17**	+2.0
025	**69.41**	+2.0
026	**68.59**	+2.0
027	**68.04**	+2.0
028	**67.33**	+2.0
029	**66.82**	+2.0
030	**66.35**	+2.0
031	**66.18**	+2.0
032	**65.73**	+2.0
033	**64.97**	+2.0
034	**63.90**	+2.0
035	**63.36**	+2.0
036	**62.86**	+2.0
037	**62.39**	+2.0
038	**62.19**	+2.0
039	**62.11**	+2.0
040	**62.04**	+2.0
041	**62.06**	+2.0
042	**62.22**	+2.0
043	**62.22**	+2.0
044	**61.91**	+2.0
045	**61.49**	+2.0
046	**60.91**	+2.0
047	**59.92**	+2.0
048	**57.69**	+2.0

Proposed Earth Mound – Height and Alignment

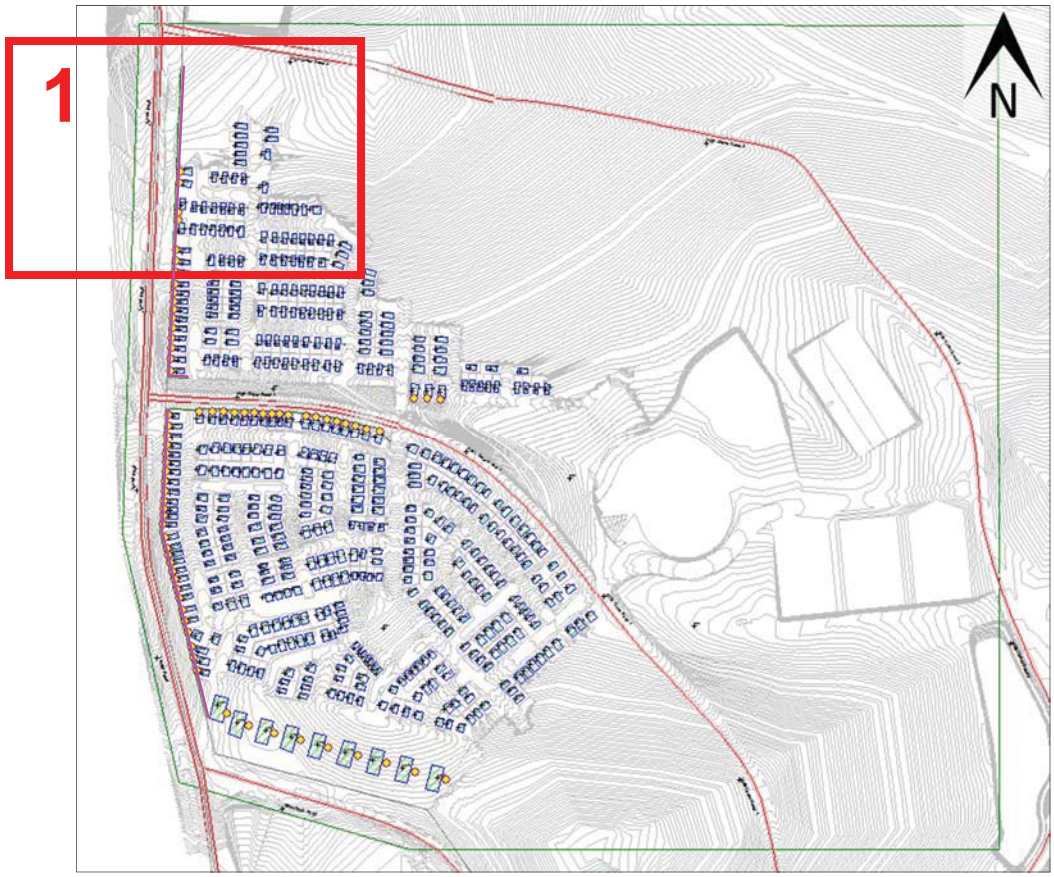
Point No.	Height, m (top of mound)	Relative to existing levels (m)
021	**72.00**	+2.0
022	**71.75**	+2.0
023	**70.82**	+2.0
024	**70.17**	+2.0
025	**69.41**	+2.0
026	**68.59**	+2.0
027	**68.04**	+2.0
028	**67.33**	+2.0
029	**66.82**	+2.0
030	**66.35**	+2.0
031	**66.18**	+2.0
032	**65.73**	+2.0
033	**64.97**	+2.0
034	**63.90**	+2.0
035	**63.36**	+2.0
036	**62.86**	+2.0
037	**62.39**	+2.0
038	**62.19**	+2.0
039	**62.11**	+2.0
040	**62.04**	+2.0
041	**62.06**	+2.0
042	**62.22**	+2.0
043	**62.22**	+2.0
044	**61.91**	+2.0
045	**61.49**	+2.0
046	**60.91**	+2.0
047	**59.92**	+2.0
048	**57.69**	+2.0

Proposed Earth Mound – Height and Alignment

Point No.	Height, m (top of mound)	Relative to existing levels (m)
021	**72.00**	+2.0
022	**71.75**	+2.0
023	**70.82**	+2.0
024	**70.17**	+2.0
025	**69.41**	+2.0
026	**68.59**	+2.0
027	**68.04**	+2.0
028	**67.33**	+2.0
029	**66.82**	+2.0
030	**66.35**	+2.0
031	**66.18**	+2.0
032	**65.73**	+2.0
033	**64.97**	+2.0
034	**63.90**	+2.0
035	**63.36**	+2.0
036	**62.86**	+2.0
037	**62.39**	+2.0
038	**62.19**	+2.0
039	**62.11**	+2.0
040	**62.04**	+2.0
041	**62.06**	+2.0
042	**62.22**	+2.0
043	**62.22**	+2.0
044	**61.91**	+2.0
045	**61.49**	+2.0
046	**60.91**	+2.0
047	**59.92**	+2.0
048	**57.69**	+2.0



Appendix L – Acoustic Fence – Height and Alignment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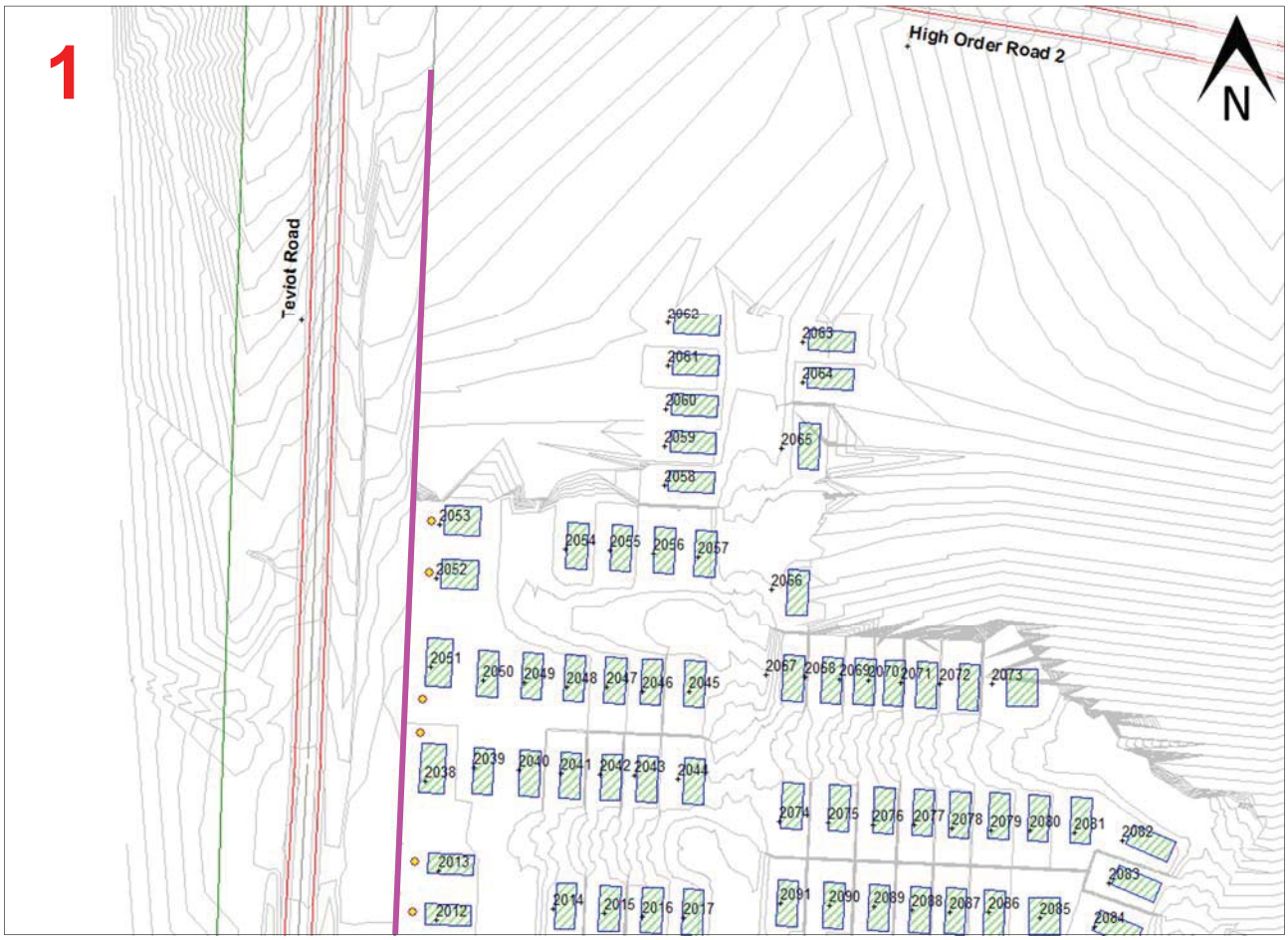
1
High Order Road 2
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Teviot Road
2062
2063
2061
2064
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2059
2065
2058
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2054
2055
2056
2057
2052
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2077
2078
2079
2080
2081
2082
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2013
2012
2014
2015
2016
2017
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2086
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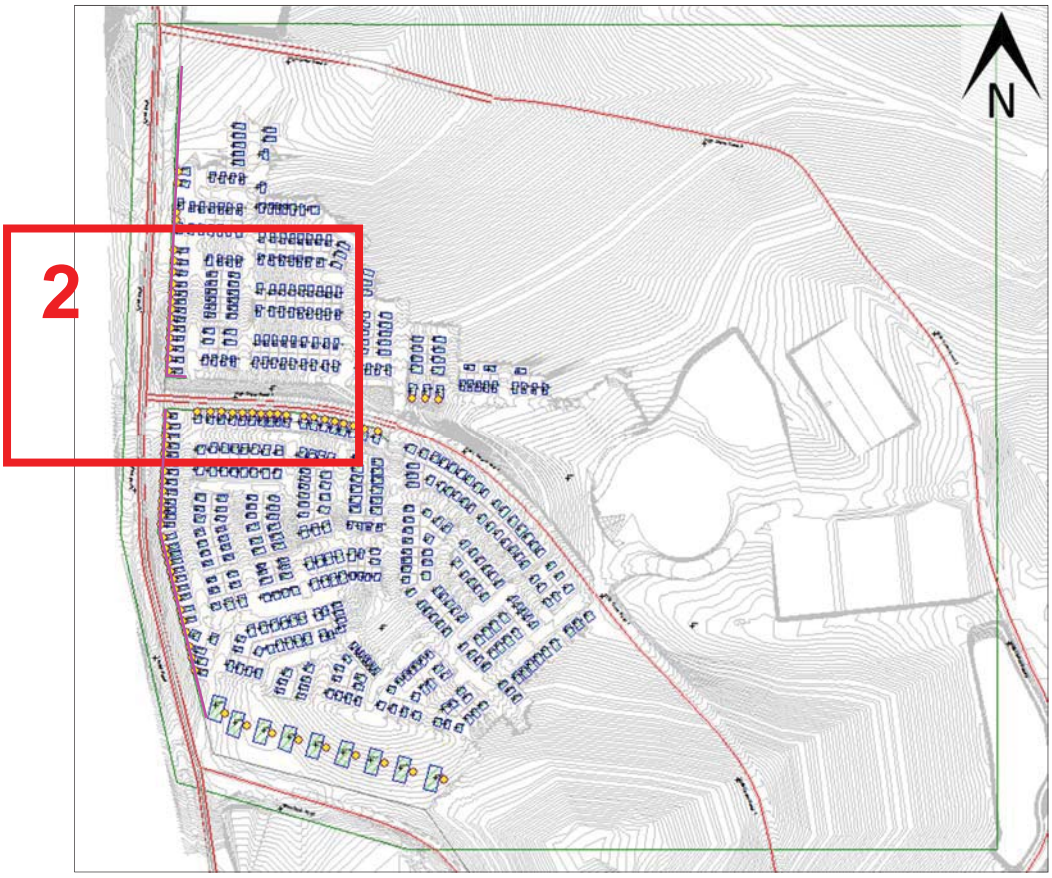
2084


2
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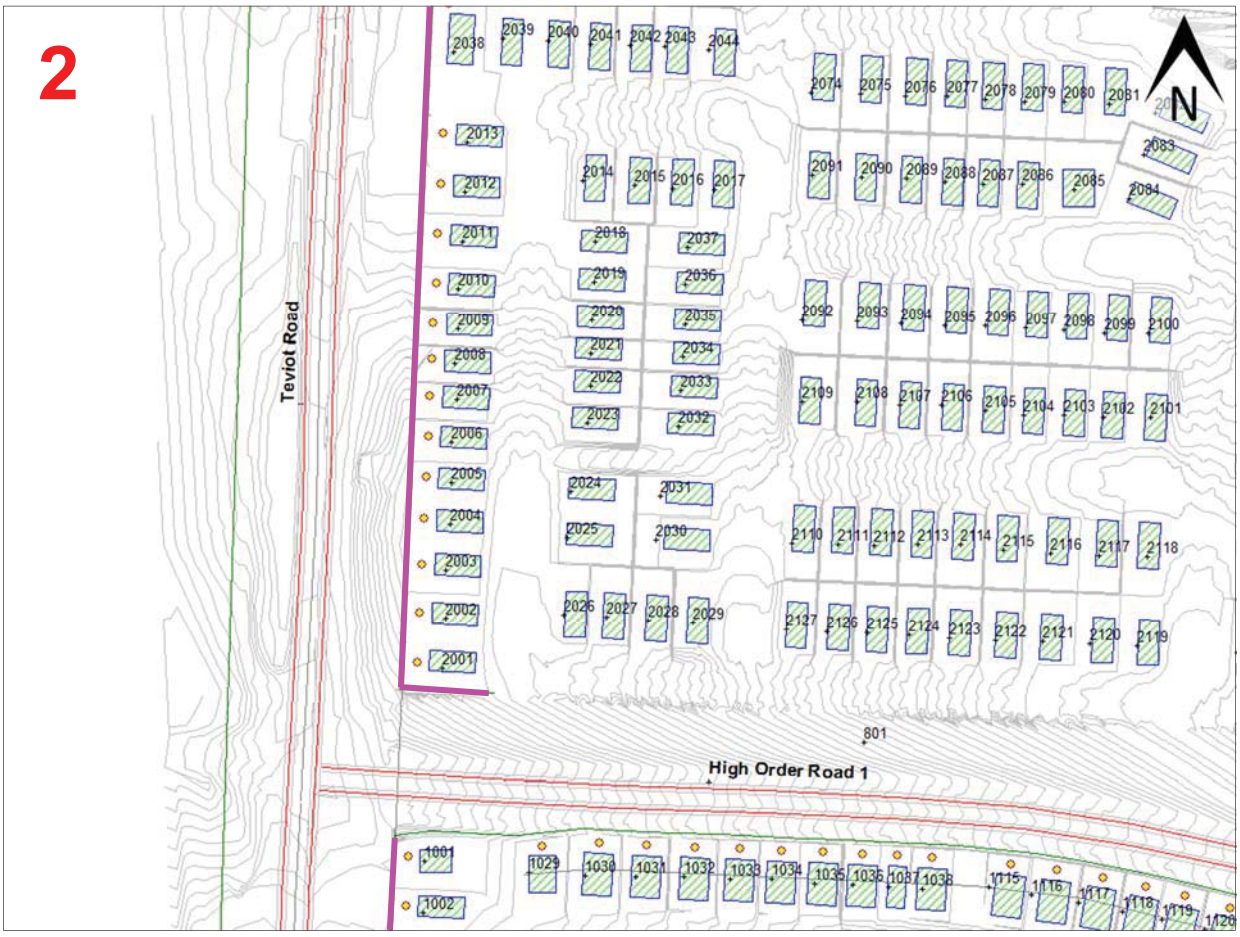
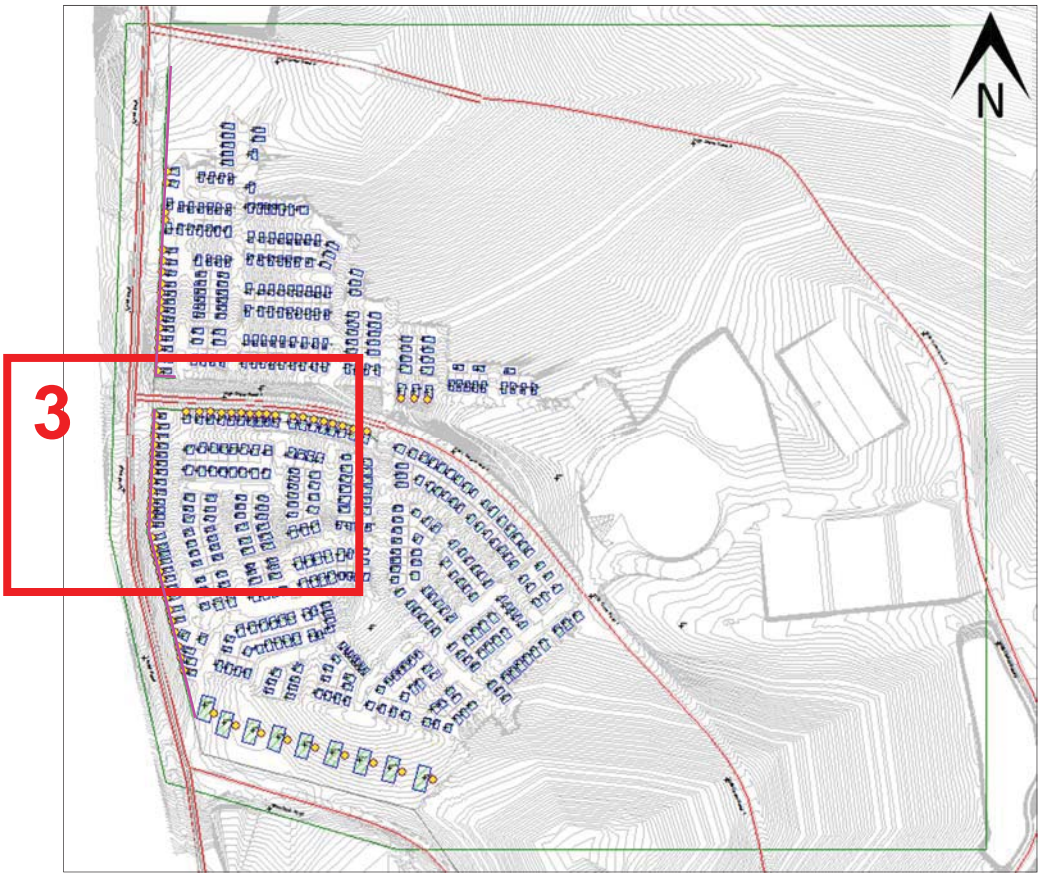
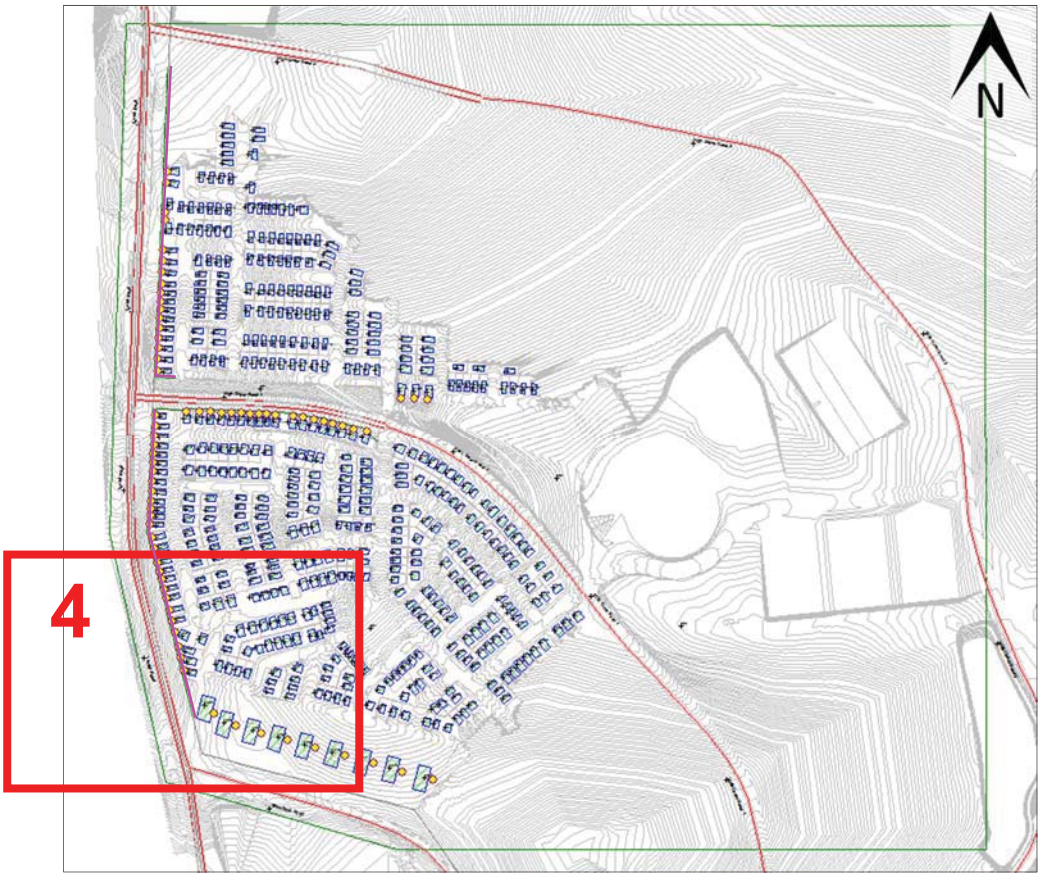

2
N
Teviot Road
High Order Road 1
801


3
N


3
801
High Order Road 1
N
Teviot Road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4


4
N
Teviot Road

Assumed Heights of Acoustic Fence

Lot	Height of base of Fence, m (Height to Top of retaining wall, with retaining wall built to max height of adjoining terrain)	Recommended Height of Fence, m	Height to top of fence, m
Area 1: North			
2001	68.14	1.80	69.94
2002	67.85	1.80	69.65
2003	67.42	2.40	69.82
2004	67.06	2.40	69.46
2005	67.40	2.40	69.80
2006	67.84	1.80	69.64
2007	68.67	1.80	70.47
2008	69.59	1.80	71.39
2009	70.43	1.80	72.23
2010	71.25	1.80	73.05
2011	71.82	1.80	73.62
2012	72.12	1.80	73.92
2013	72.12	1.80	73.92
2038	72.00	1.80	73.80
2051	72.00	1.80	73.80
2052	72.00	1.80	73.80
2053	71.80	1.80	73.60
To 25m north of 2053	71.80	1.80	73.60
To 50m north of 2053	71.48	1.80	73.28
To 75m north of 2053	70.84	1.80	72.64
To 100m north of 2053	70.23	1.80	72.03
To 125m north of 2053	69.55	1.80	71.35
To 150m north of 2053	68.89	1.80	70.69
Area 1: South			
1001	69.93	1.80	71.73
1002	69.93	1.80	71.73
1003	69.50	1.80	71.30
1004	68.74	1.80	70.54
1005	67.84	1.80	69.64
1006	67.25	1.80	69.05
1007	66.48	1.80	68.28
1008	65.60	1.80	67.40
1009	64.94	1.80	66.74
1010	64.51	1.80	66.31
1011	63.96	1.80	65.76
1012	63.61	1.80	65.41
1013	63.11	1.80	64.91
1014	62.55	1.80	64.35
1015	61.43	1.80	63.23
1016	60.94	1.80	62.74

1017	60.45	1.80	62.25
1018	59.82	1.80	61.62
1019	59.78	1.80	61.58
1020	59.57	1.80	61.37
1021	59.76	1.80	61.56
1022	59.76	1.80	61.56
1023	59.63	1.80	61.43
1024	59.67	1.80	61.47
1026	59.41	1.80	61.21
1027	59.02	1.80	60.82
1028	58.40	1.80	60.20
To 28m south of 1028	57.75	1.80	59.55
To 60m south of 1028	56.65	1.80	58.45