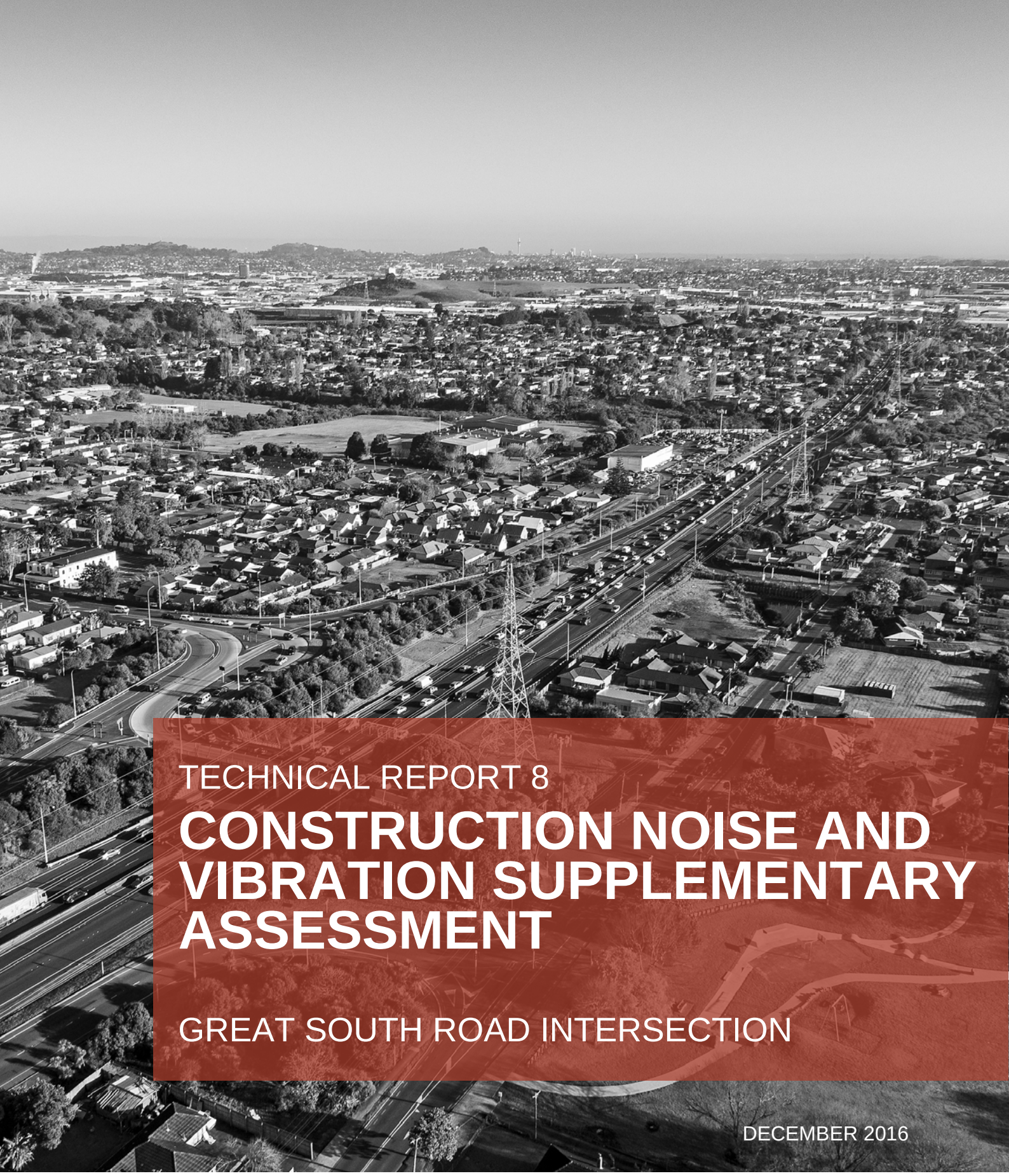

TECHNICAL REPORT 8

CONSTRUCTION NOISE AND VIBRATION SUPPLEMENTARY ASSESSMENT

GREAT SOUTH ROAD INTERSECTION

DECEMBER 2016

NZ TRANSPORT AGENCY WAKA KOTAHI | East West Link

MARSHALL DAY Acoustics

Quality Assurance Statement	
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Approved for release	 Patrick Kelly (EWL Alliance Manager)

Revision schedule					
Rev. Nº	**Date**	**Description**	**Prepared by**	**Reviewed by**	**Approved by**
0	December 2016	Final for Lodgement	Peter Ibbotson	Siiri Wilkening	Patrick Kelly

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Contents

Appendices

1 Introduction

1.1 Purpose and scope of supplementary assessment

The purpose of this Technical Report 8 – Construction Noise and Vibration Supplementary Assessment is to assess the construction noise and vibration effects associated with the revised design of the East West Link (EWL)/Great South Road/Sylvia Park Road intersection.

The original Technical Report 8 – Construction Noise and Vibration was completed in November 2016. Engagement with stakeholders and the wider community has continued in parallel, including design review in response to matters raised.

As a progression of the work to date, the design of the EWL/Great South Road/Sylvia Park Road intersection has been revised from the at grade design originally proposed, to a grade separated design. Grade separation of the east west through movements at this intersection will provide improved reliability and future resilience.

This supplementary assessment describes the potential and actual construction noise and vibration effects associated with construction of the revised intersection design at Great South Road. The assessment considers whether the type or scale of effects on the existing environment have changed as a result of the revised design and where necessary recommends additional management and mitigation measures.

This supplementary assessment should be read in conjunction with Technical Report 8. Where this assessment supersedes and/or updates information in Technical Report 8, this has been expressly noted.

This supplementary assessment forms part of the suite of technical reports that inform the Assessment of Effects on the Environment (AEE) and supports the Notice of Requirement for a new designation, alteration to an existing designation, and resource consent applications for the Project.

1.2 Project description

The revised intersection design at Great South Road is described in Section 6 of the AEE. Key features of the revised intersection design include:

- Extending the Anns Creek viaduct by about 330m over Great South Road. The viaduct would grade down to Sylvia Park Road, approximately 200m east of Great South Road.
- Altered through movements and connections to local roads at the intersection –
  - Through movements on EWL would occur on the elevated structure above Great South Road
  - Movements to and from EWL to Sylvia Park Road and Great South Road would be at grade providing connectivity to the local street network
  - North and south movements on Great South Road would remain unchanged, passing under the elevated EWL structure.
- A grade separated pedestrian and cycle crossing for east west movements on the southern side of the Anns Creek viaduct.
- Changes to the EWL/Hugo Johnston Drive intersection.
- Associated urban design and landscape treatments.

The revised intersection design is hereafter referred to in this supplementary assessment as "the revised intersection design at Great South Road", or "the revised design". The previously proposed layout (as assessed in Technical Report 8) is referred to as the "at grade intersection design at Great South Road", or "the at grade design".

The geographical extent of the Project assessed in this supplementary assessment report is from Hugo Johnston to Mt Wellington Highway.

2 Assessment Methodology and Existing Environment

2.1 Assessment Methodology

The assessment methodology for the Great South Road grade separated intersection has followed the same methodology as set out in Chapter 3.2 of Technical Report 8: Construction Noise and Vibration. The only Project sectors affected by the revised intersection design are Sectors 3 and 4.

The construction activities required to complete these works will be similar to those required elsewhere for the East West Link Project (and have previously been described in the assessment of works within Sectors 3 and 4). No alterations to the assessment methodology are required as a result of the revised intersection design. Site visits or noise measurements in addition to those already undertaken for the Project are not considered to be required as part of this supplementary assessment as the existing noise environment and character of the area has already been established during the assessment of the overall Project.

The following assumptions have been made in preparing the assessment of construction noise and vibration effects from the revised Great South Road intersection:

- Permanent bridge piles will be constructed using a bored piling method;
- Driven piles using a hammer or vibration method may be required west of Great South Road as part of the temporary staged works. These piles are understood to be required to establish a base for construction due to soil conditions and/or ecology constraints in these areas;
- Construction duration would be 24 months;
- Night works would likely be required due to safety or other constraints. This is advantageous as all surrounding sites contain businesses and are therefore unlikely to be occupied at night;
- All other works will be similar in methodology as outlined in our previous report for Sectors 3 and 4 (Refer to Table 6-1 of Technical Report 8). That assessment allowed for earthwork fills and cuts, sealing and driven/bored piling works as shown in Drawing Set 11: Construction Activities. The works proposed as part of the revised Great South Road intersection have been assumed to generate similar activity noise levels as previously assessed, but in some areas, construction activities may be closer to nearby commercial buildings, for example on Vestey Drive and Pacific Rise.

2.2 Existing Environment

The existing environment to be assessed is consistent with that outlined in Technical Report 8 – Construction Noise and Vibration. The revised intersection design will be constructed in an industrial / commercial area. No noise level survey was undertaken in the area under consideration. This is because the Project noise limits that apply in industrial or commercial areas do not depend on the level of background or ambient noise. No further measurements to consider the existing environment are therefore required.

3 Assessment of Noise and Vibration Effects

The revised intersection design has been assessed against the existing environment. The intersection is located within Sector 3 although there are minor amendments along Sylvia Park Road which are located within Sector 4. For ease of reference, the noise assessment for Sectors 1 to 4: Commercial Area in Section 6.5.1 of Technical Report 8 has been updated to reflect the necessary changes and the updated assessment is set out in full at Section 4.1 below. Changes to the assessment resulting from the revised intersection design have been highlighted in bold in Table 4.2 of this report.

The vibration risk assessment in Section 7.2 of Technical Report 8 remains largely unchanged. The vibration risk for a small number of buildings is different to that described in Technical Report 8 as a result of the revised intersection design. These buildings are shown on the figure in Appendix B of this Report. The figures in Appendix B which show the vibration risk zones in the vicinity of Great South Road should be referred to instead of the earlier revision of those figures which was included in Appendix F of Technical Report 8.

4 Sectors 1-4 – Revised Assessment of Effects

4.1 Construction Noise Risk Assessment

Sectors 1 to 4 contain mainly commercial and industrial buildings. In these sectors, the zoning of properties is generally Business 4, 6 or Open Space in the operative District Plan. Areas of Mixed Use also occur to the north of the Onehunga Interchange. The PAUP also zones these areas predominantly for “business” activities. Therefore, Project criteria for commercial and industrial areas apply in this area.

Many buildings are likely to be exposed to noise levels in excess of 70 dB L_{Aeq} during the daytime. Night time works within those sectors also risk breaching the 75 dB L_{Aeq} noise criterion at times. The individual properties where breaches of the noise criterion are likely are shown in Appenidx E of Technical Report 8. For the area surrounding the Great South Road intersection, Appendix A of this report shows the sites where the noise criteria may be exceeded. These figures should be referred to instead of the earlier revision of those figures which were included in Appendix E of Technical Report 8.

The effects of noise on commercial activities will vary significantly. Noise insensitive activities such as electricity generation, stevedoring and industrial fabrication or manufacturing are unlikely to be appreciably affected by noise levels of above 75 dB L_{Aeq}, irrespective of whether this occurs during the daytime or night time.

Activity such as retail, sales, office administration or tourist services may be affected to a greater extent where noise levels are in excess of 70 dB L_{Aeq} during the daytime. The primary effect is likely to be an interference with communication as well as general annoyance where concentration is interrupted.

In general, night time construction within the commercial or industrial area will result in low risk of annoyance. However, the specific effects of construction noise occurring in these commercial areas should be considered on a case-by-case basis prior to these works, through site specific construction and noise vibration management schedules (refer to Section 5). It is noted that where the effects of night time construction could be significant such as at hotels (e.g. 8 Onehunga Harbour Road), specific noise mitigation measures may be required, such as temporary hiring of the most affected rooms of the hotel.

Table 4-1 summarises the number and approximate location of commercial buildings that are likely to receive noise levels in excess of the Project criteria.

Table 4-1: Approximate number of commercial buildings likely to receive noise levels in excess of the Project criteria

Location	Approx. number of commercial buildings where the "Daytime" noise limit (70 dB L_{Aeq}) is likely to be exceeded	Approx. number of commercial buildings where the "Night time" noise limit (75 dB L_{Aeq})[1] is likely to be exceeded (if night time works occur)
Sector 1	73	53
Sector 2	8	4
Sector 3	15	13
Sector 4	16	5
Sector 5	15	14
Sector 6	36	29

Table 4-2 summarises the addresses where these noise effects are likely to occur. Changes to the table as presented in Technical Report 8 are marked in bold (Vestey Drive and Pacific Rise) although it is noted that overall the total number of affected properties remains the same with the revised intersection design.

Table 4-2: Addresses of commercial buildings likely to receive noise levels in excess of the Project criteria

Addresses of commercial buildings likely to receive noise levels exceeding the "Daytime" noise limit (70 dB L_{Aeq})	Addresses of commercial buildings likely to receive noise levels exceeding the "Night time" noise limit (75 dB L_{Aeq})[1] (if night time works occur)
1 Princes Street	1,3 Wharangi Street
5-7,9 Wharangi Street	2-4 Hill Street
6,8 Hill Street	1,3,5,8 Gloucester Park Road
1-2/3,3-5 Hill Street	27-31 Princes Street
39-39A, 41 Neilson Street	31-33,37 Neilson Street
11A-D Selwyn Street	31-31A,33-33A,35,35A,37A-M,1-20/39,41,45-47 Onehunga Mall
6-10 Selwyn Street	40,42,44,44A,46-48,48,50,51-55,54,56,58,60 Onehunga Mall Road
10,18,20 Gloucester Park Road	55 Onehunga Harbour Road
4-6 Alfred Street	1-25/2, 8 Onehunga Road
1048-1050 Great South Road	57,59,61,63,65,67,69,71-73,72,75-89, 76,80,82,84,84,94,96,98, 100,91-105,101-103 Onehunga Road
10,12-14 Lockhart Place	10A,19,34 Galway Street
30A-30L,32,40,42,44 Vestey Drive	100 Neilson Street
8A-8E Sylvia Park Road	2 Alfred Street

[1] Note that night time activity is not proposed at all locations and noise levels would not exceed 75 dB L_{Aeq} at all buildings in the table

Addresses of commercial buildings likely to receive noise levels exceeding the "Daytime" noise limit (70 dB L_{Aeq})	Addresses of commercial buildings likely to receive noise levels exceeding the "Night time" noise limit (75 dB L_{Aeq})[1] (if night time works occur)
34,36,38 Vestey Drive	69 Captain Springs Road
7 Clemow Drive	35,59 Miami Parade
28 Pukemiro Street	108-136,120,124,164-220 Hugo Johnston Drive
29-33 Miami Parade	741-779, 781,1012,1016A-F Great South Road
	20A-Q Sylvia Park Road
	8 Lockhart Place
	1A, 9 Pacific Rise
	3 Clemow Drive
	99A,113 Carbine Road
	4,5, 6,7-8 Monahan Road
	7,8 Hotunui Drive
	7 Carmont Place
	4 Te Apunga Place
	14 George Burke Road
	175-243 Neilson Street
	226, 230, 232A, 232,234,236,238,249,264 Neilson Street
	79,83-91,102,105 Captain Springs Road
	23 Pukemiro Street
	57,63 Angle Street
	3 Edinburgh Street

It is considered that the effects of noise on industrial and commercial receivers should be considered on a case-by-case basis where an activity is likely to receive noise levels in excess of the Project noise criterion.

Site specific noise management should be implemented to ensure that noise effects are avoided, remedied or mitigated wherever practicable. Such management should be documented in schedules attached to the Construction Noise and Vibration Management Plan (CNVMP). (Refer Technical Report 8, Sections 3.5 and 9)

4.2 Construction Vibration Risk Assessment

The vibration risk assessment presented in Section 7.2 of Technical Report 8 remains largely unchanged. The vibration risk for a small number of buildings is different to that described in Technical Report 8 as a result of the revised intersection design. These buildings are show on the figure in Appendix B of this report and are described below:

- One building (787 Great South Road) is predicted to be exposed to a "medium" construction vibration risk with the grade separated design (where vibration risk was "low" as described in Technical Report 8).
- Two buildings (1A Pacific Rise, 9 Pacific Rise) would be exposed to a "high" construction vibration risk with the grade separated design (where vibration risk was "medium" as described in Technical Report 8).

5 Recommended Mitigation

The overall conclusions of Technical Report 8 remain unchanged. Site specific management (a site or activity specific noise and/or vibration schedule attached to the CNVMP) should be implemented to ensure that noise and vibration effects are avoided, remedied or mitigated wherever practicable.

The buildings identified above in Table 4.2 of this report would need to be included in the specific noise and vibration schedules. Noise and vibration would need to be managed using the framework set out in Technical Report 8.

6 Conclusion

This report has assessed the construction noise and vibration effects due to the construction of a revised intersection design at Great South Road / Sylvia Park Road. This affects Sector 3 and, to a lesser degree, Sector 4 of the Project.

For Sectors 3 and 4, the assessment shows that effects remain similar to those described in Technical Report 8 except that a small number of buildings will experience different noise effects and three buildings will be exposed to an increased construction vibration risk. Where recommended Project limits may be exceeded, construction noise and vibration will need to be managed and mitigated as described in Technical Report 8, through the use of a CNVMP and site and/or activity specific schedules as required.

Noise and vibration would need to be managed at all receivers using the framework set out in Technical Report 8.

Appendix A

Noise Contours

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Legend

- 70 dB LAeq Contour (Com & Res Day)
- 75 dB LAeq Contour (Com Night)
- 60 dB LAeq Contour (Res Night)
- 60 dB LAeq Contour (Possible Res Night)
- Zone where properties contain buildings exposed to 75 dB LAeq +
- Zone where properties contain buildings exposed to 70 dB LAeq +
- Zone where properties contain buildings exposed to 60 dB LAeq +
- EWL Alignment

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East West Link

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Drawing Title: NOISE AND VIBRATION Construction Noise

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Legend

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- 75 dB LAeq Contour (Com Night)
- 60 dB LAeq Contour (Res Night)
- 60 dB LAeq Contour (Possible Res Night)
- Zone where properties contain buildings exposed to 75 dB LAeq +
- Zone where properties contain buildings exposed to 70 dB LAeq +
- Zone where properties contain buildings exposed to 60 dB LAeq +
- EWL Alignment

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Drawing Title: NOISE AND VIBRATION
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Drawing Number: **GIS-NV-AEE-009**

Rev No.: A

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- 75 dB LAeq Contour (Com Night)
- 60 dB LAeq Contour (Res Night)
- 60 dB LAeq Contour (Possible Res Night)
- Zone where properties contain buildings exposed to 75 dB LAeq +
- Zone where properties contain buildings exposed to 70 dB LAeq +
- Zone where properties contain buildings exposed to 60 dB LAeq +
- EWL Alignment

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Appendix B

Vibration Contours

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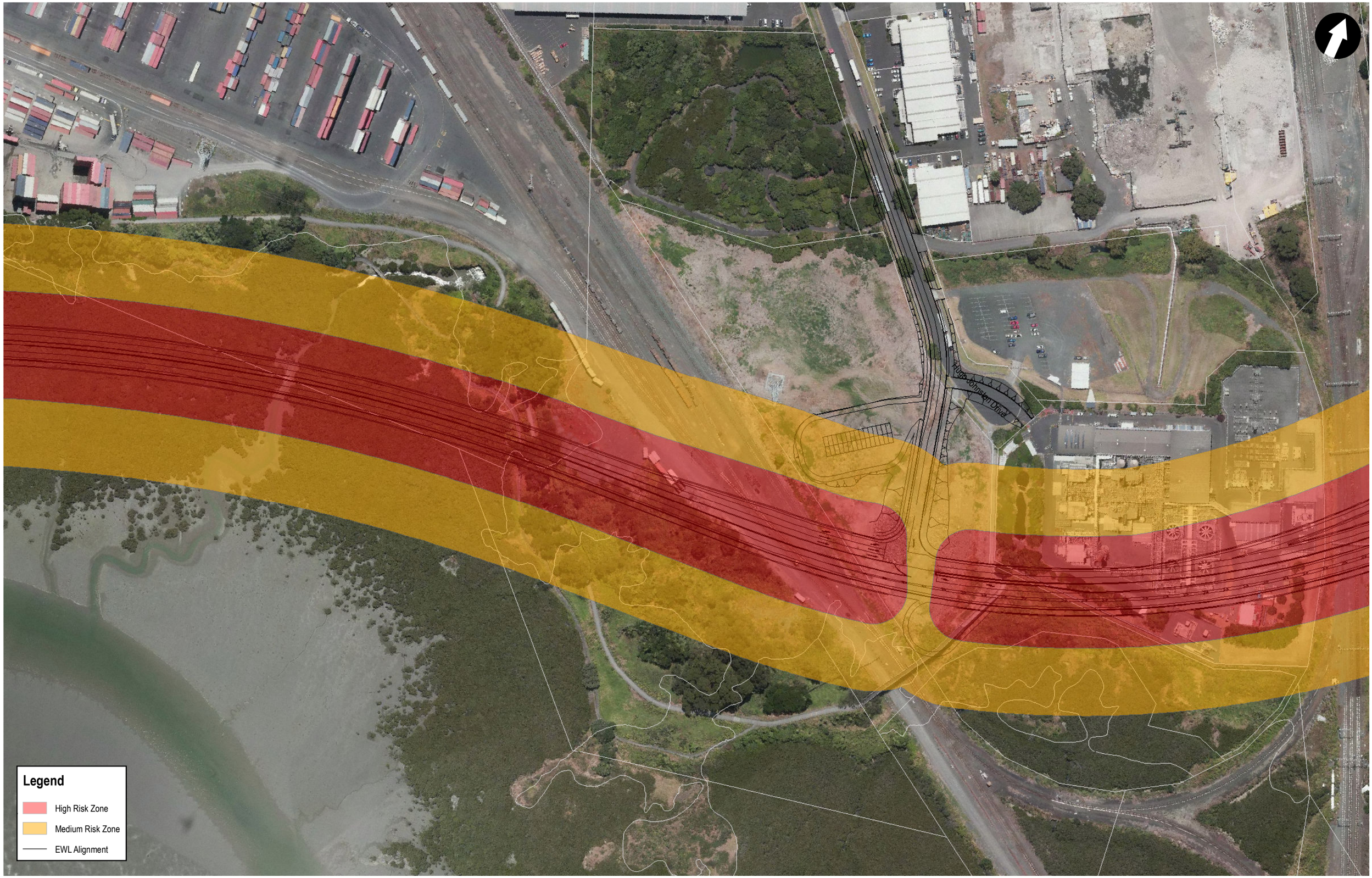

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Drawing Title: NOISE AND VIBRATION
Vibro and Impact Piling Risk Zones

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Drawing Title: NOISE AND VIBRATION
Vibro and Impact Piling Risk Zones

Drawing Number: **GIS-NV-AEE-026**

Rev No. A

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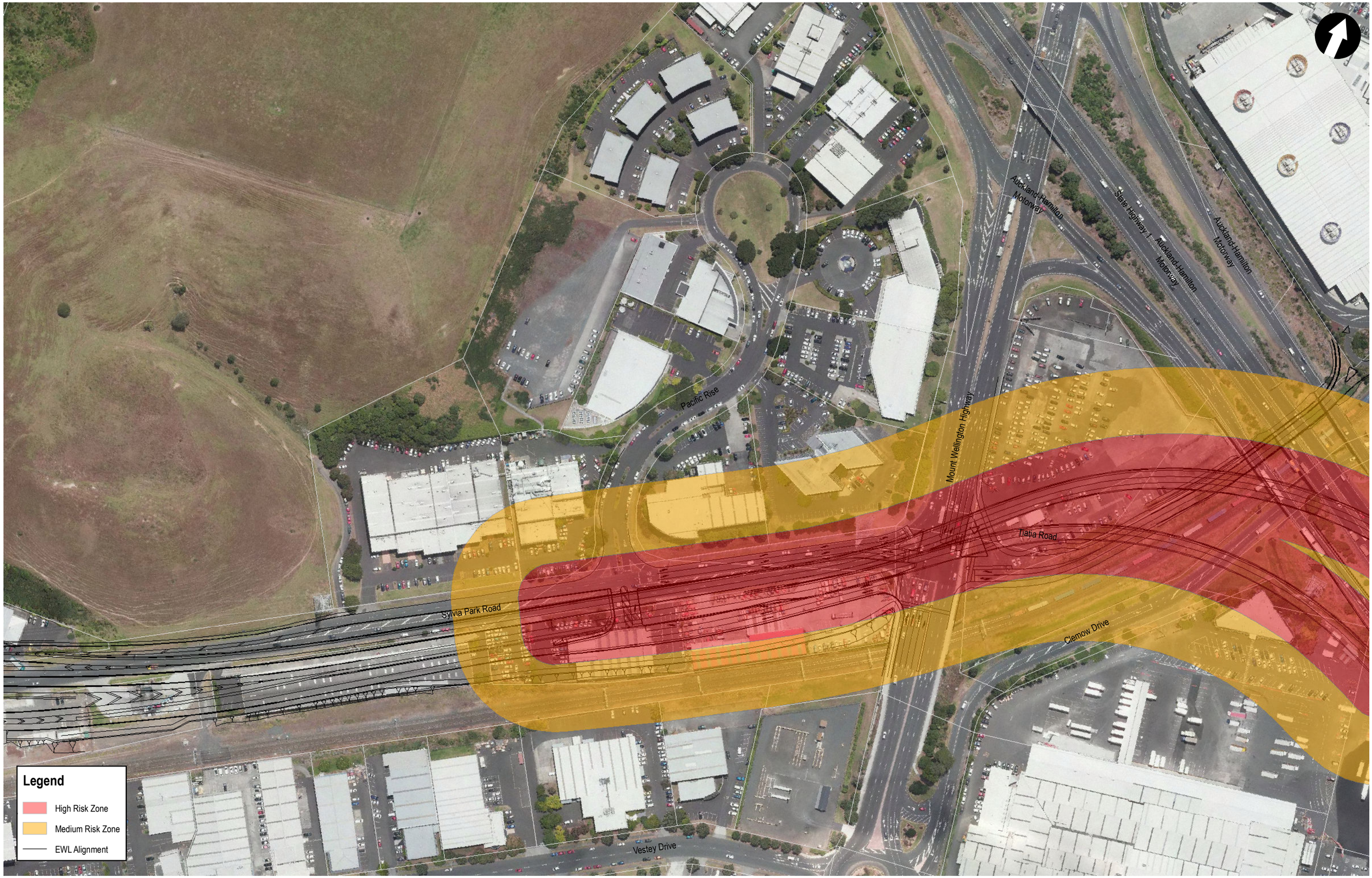

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Drawing Title: NOISE AND VIBRATION
Vibro and Impact Piling Risk Zones

Drawing Number: **GIS-NV-AEE-027**

Rev No. A

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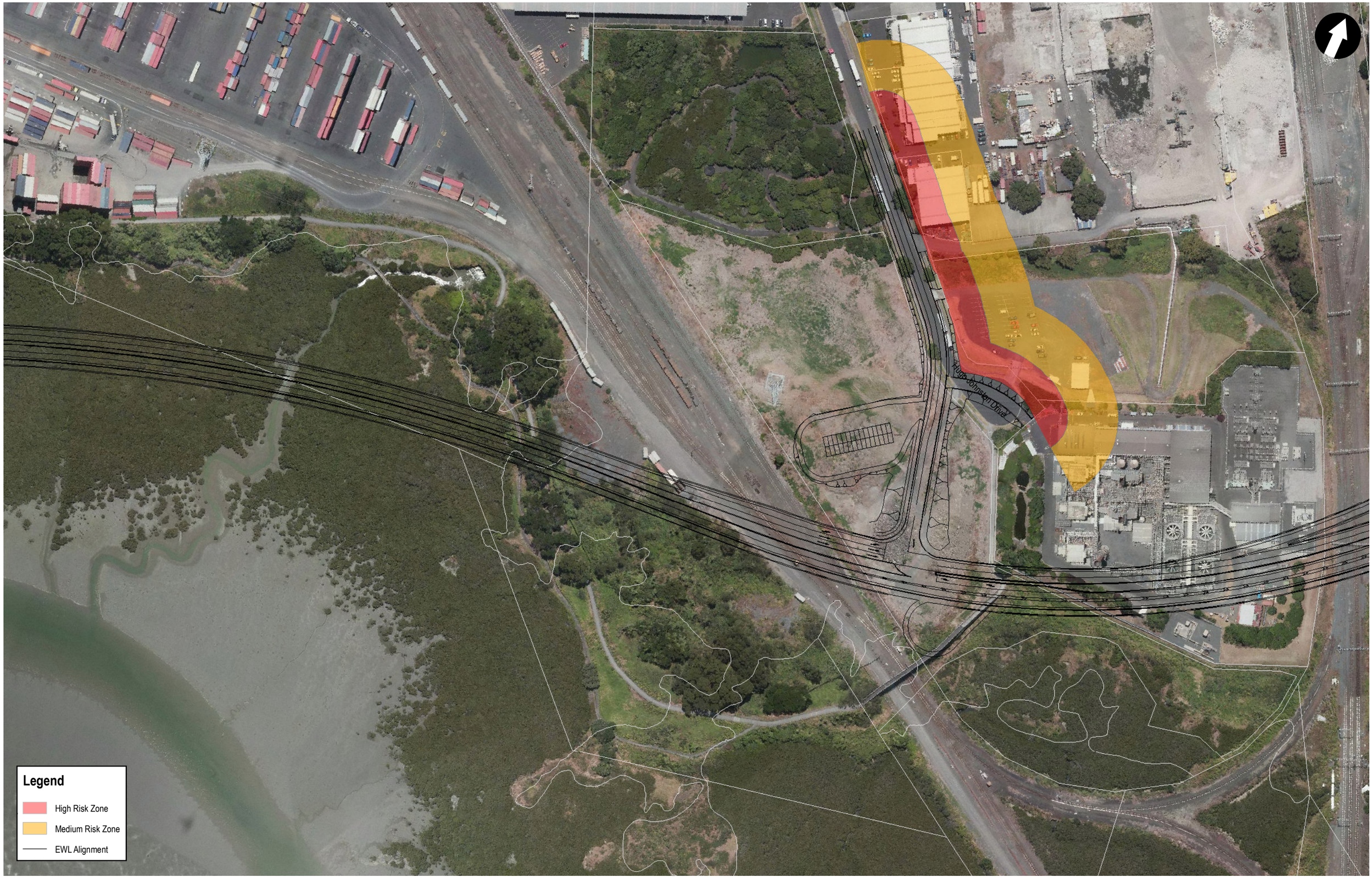

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Drawing Title: NOISE AND VIBRATION
Vibratory Rolling Risk Zones

Drawing Number: **GIS-NV-AEE-043**

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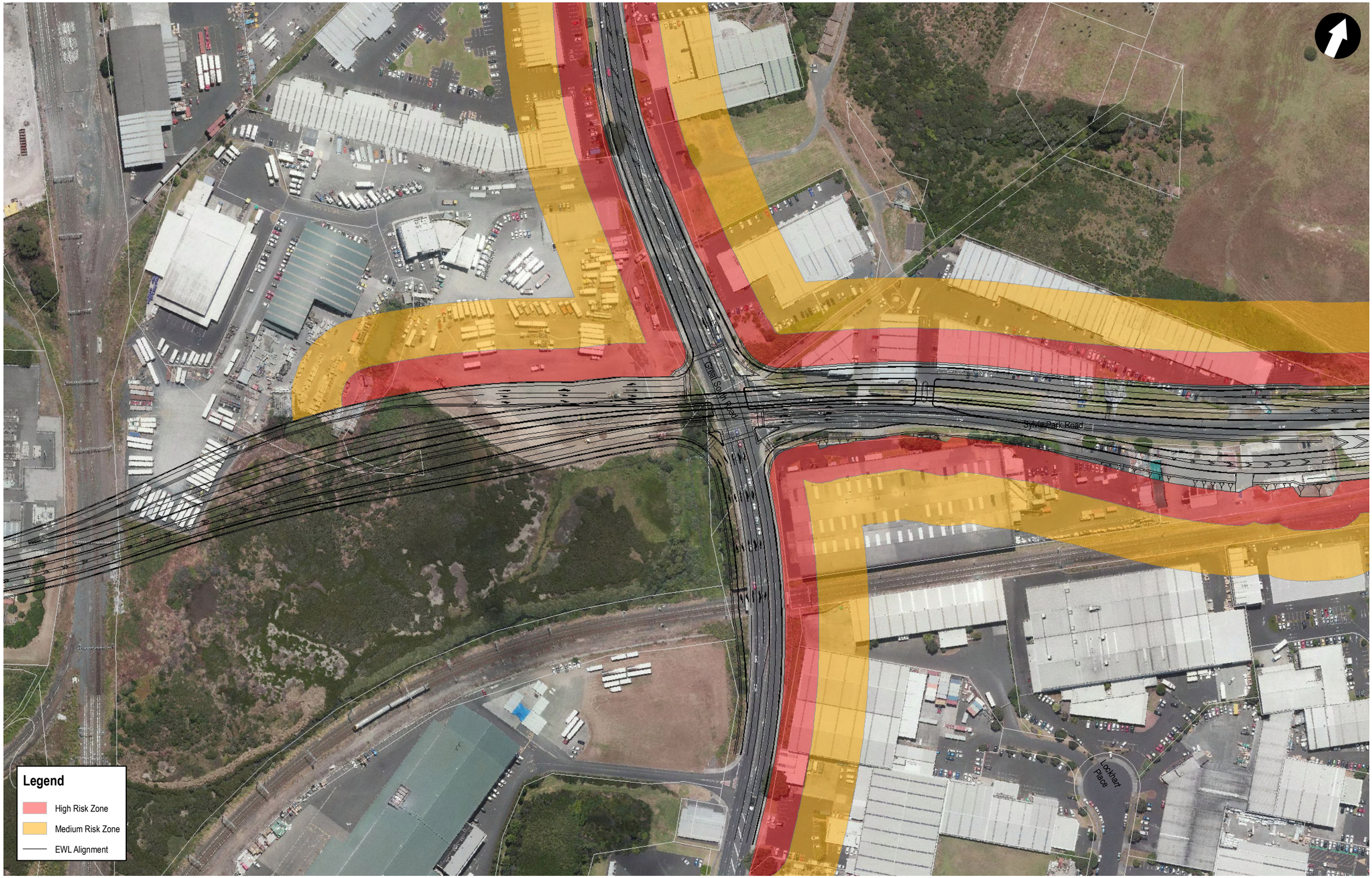

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Drawing Title: NOISE AND VIBRATION
Vibratory Rolling Risk Zones

Drawing Number: **GIS-NV-AEE-044** | Rev No. A

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Vibratory Rolling Risk Zones

Drawing Number: **GIS-NV-AEE-045**

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