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13-23 Gibbons St, Redfern NSW

Construction Noise & Vibration Management Plan

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Attention To	Richard Crookes Constructions Pty Ltd

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TABLE OF CONTENTS

1 INTRODUCTION

Acoustic Logic Consultancy has been engaged to prepare a Noise and Vibration Management Sub-Plan for the excavation and construction work for the proposed 18 storey student accommodation at 13-23 Gibbons Street, Redfern. The management plan has been prepared to satisfy consent conditions for SSD 9194 dated 06/10/2020. This report addresses conditions C16; D8 to D13.

The issues which will be addressed in this report are:

- Identification of the noise and vibration standards which will be applicable to this project.
- Identification of potentially impacted nearby development.
- Identify likely sources of noise and vibration generation and predicted noise levels at nearby development.
- Formulation of a strategy to comply with the standards identified and mitigation treatments in the event that compliance is not achievable.

2 SITE DESCRIPTION

We note that this report does not address early works or demolition which has already been completed on the site. This assessment applies only to the excavation and construction works associated with new student accommodation development. Refer to Figures 1 & 2 for detail.

Excavation and construction works anticipated are as follows:

- A Class plywood hoarding along northern boundary.
- B Class hoarding in location along Gibbons and Margaret Street.
- Vehicle delivery along eastern boundary.
- Demolition of Ground Floor and Basement by excavator with hydraulic hammer.
- Bored piling of foundations
- Bulk excavation of sand/soil with excavator to 350mm below the existing and no rock.
- Use of electric/mobile cranes;
- Erection of building structure (powered hand tools for formwork, concrete pump, vibrators)..
- Façade/roof construction (powered hand tools)
- Landscaping (front end loaders etc).
- Internal fit out, predominantly behind semi-enclosed facade.

DA approved construction hours are below:

D2. Construction, including the delivery of materials to and from the site, may only be carried out between the following hours:

(a) between 7.00 am and 6.00 pm, Mondays to Fridays inclusive; and

(b) between 7.30 am and 3.30 pm, Saturdays.

D3. No work may be carried out on Sundays or public holidays.
D4. Activities may be undertaken outside of these hours if required:

(a) by the Police or a public authority for the delivery of vehicles, plant or materials; or

(b) in an emergency to avoid the loss of life, damage to property or to prevent environmental harm.

D5. Notification of such activities must be given to affected residents before undertaking the activities or as soon as is practical afterwards.
D6. Rock breaking, rock hammering, sheet piling, pile driving and similar activities may only be carried out between the following hours:

(a) 9.00 am to 12.00 pm, Monday to Friday;

(b) 2.00 pm to 5.00 pm Monday to Friday; and

(c) 9.00 am to 12.00 pm, Saturday.

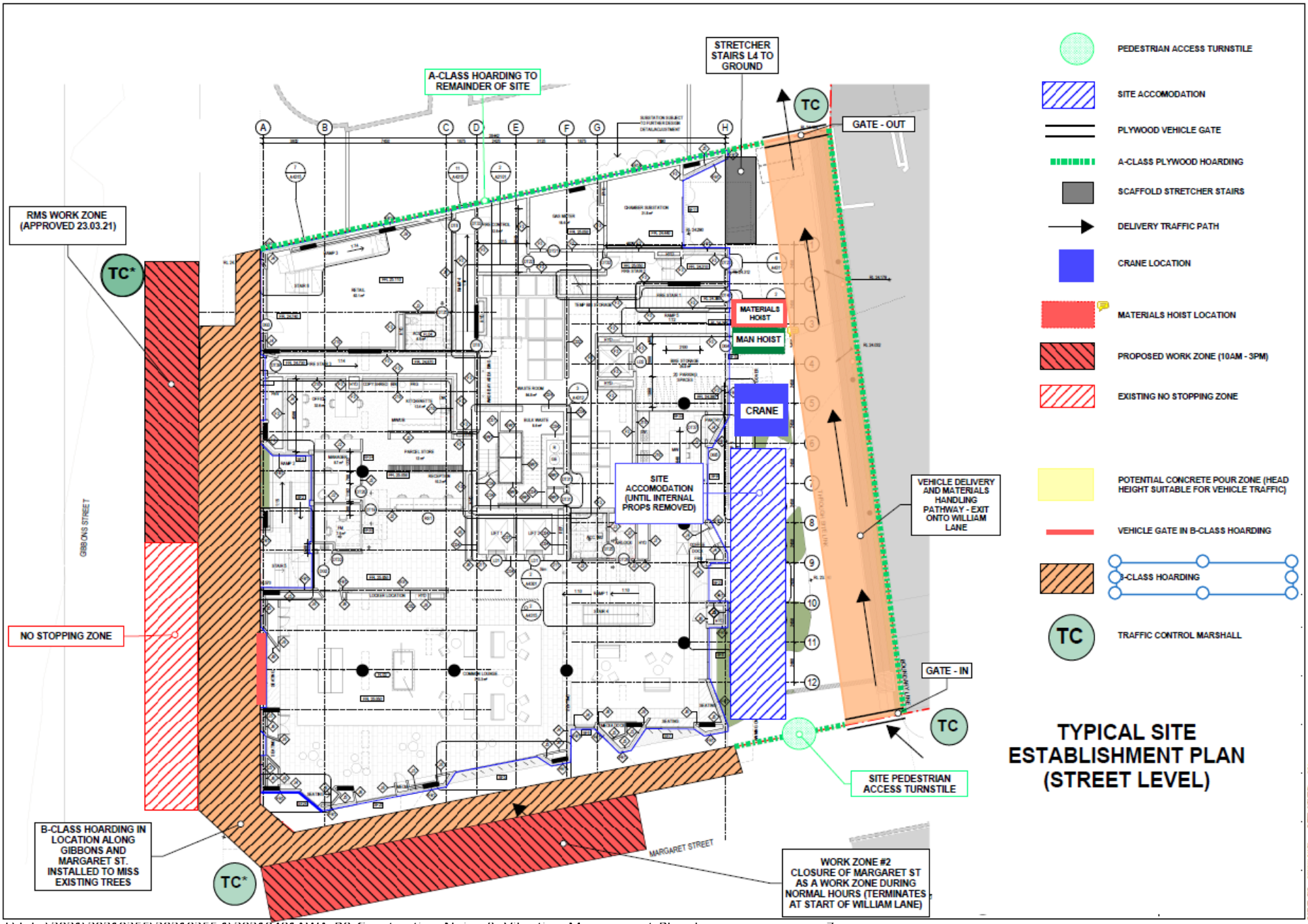
2.1 RECEIVER LOCATIONS

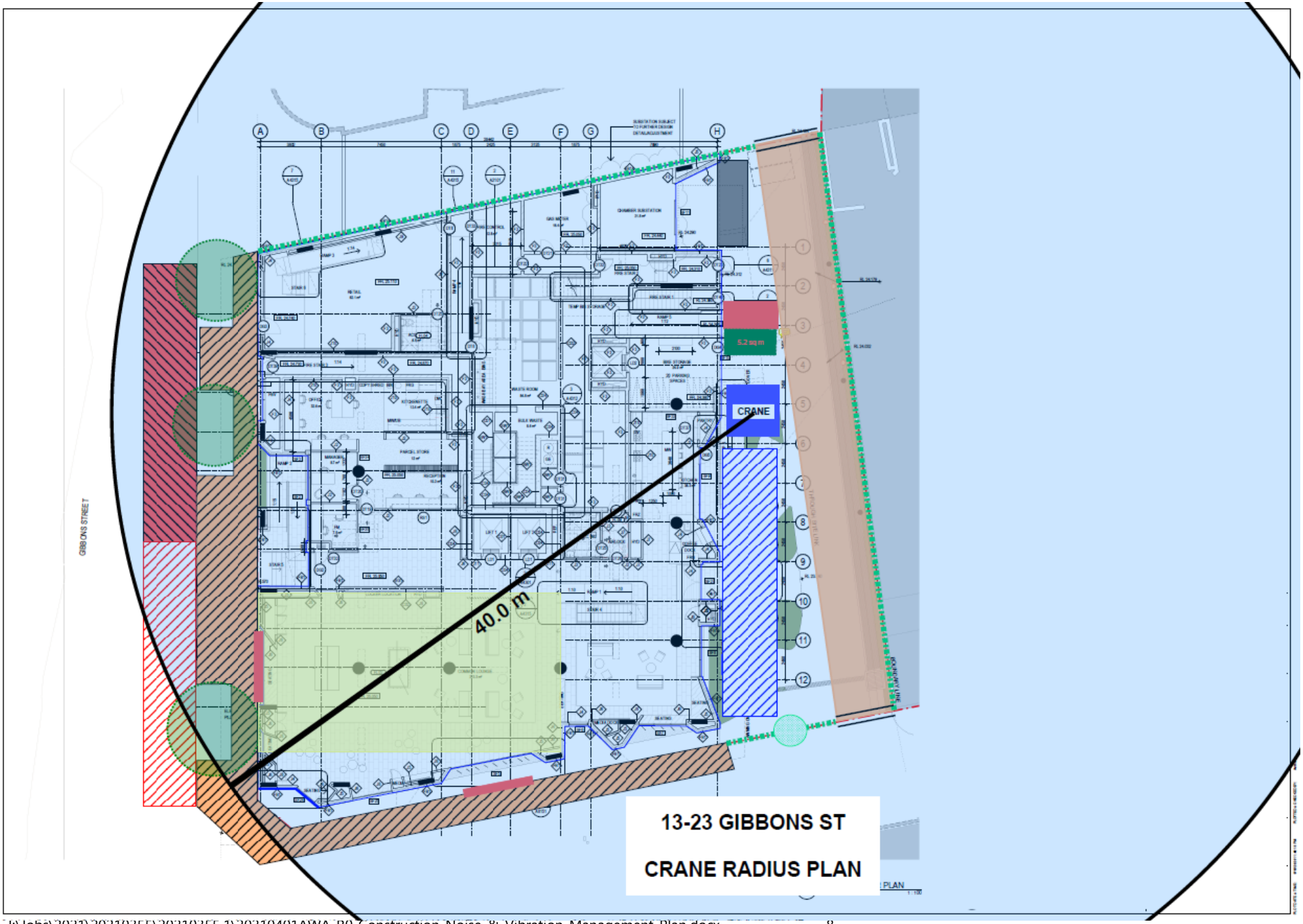
Acoustic investigation has been carried out and the nearest noise receivers are below:

- **R1**: Residential Receiver 1 – Multi storey residential development under construction at 11 Gibbons St.
- **R2**: Residential Receiver 2 – Existing multi storey residential building located across Gibbon St.
- **R3**: Residential Receiver 3 – Existing residential development located across Margaret Street.
- **R4**: Residential Receiver 4 – Existing residential development located along eastern side of Regent Street.

Detailed noise receiver locations have been marked in Figure 1 below.

Figure 1 – Project Site, Noise Receivers and Measurement


STRETCHER STAIRS L4 TO GROUND
A-CLASS HOARDING TO REMAINDER OF SITE
TC
GATE - OUT
RMS WORK ZONE (APPROVED 23.03.21)
TC*
MATERIALS HOIST
MAN HOIST
CRANE
SITE ACCOMODATION (UNTIL INTERNAL PROPS REMOVED)
VEHICLE DELIVERY AND MATERIALS HANDLING PATHWAY - EXIT ONTO WILLIAM LANE
GIBBONS STREET
NO STOPPING ZONE
GATE - IN
TC
SITE PEDESTRIAN ACCESS TURNSTILE
B-CLASS HOARDING IN LOCATION ALONG GIBBONS AND MARGARET ST. INSTALLED TO MISS EXISTING TREES
MARGARET STREET
TC*
WORK ZONE #2 CLOSURE OF MARGARET ST AS A WORK ZONE DURING NORMAL HOURS (TERMINATES AT START OF WILLIAM LANE)
PEDESTRIAN ACCESS TURNSTILE
SITE ACCOMODATION
PLYWOOD VEHICLE GATE
A-CLASS PLYWOOD HOARDING
SCAFFOLD STRETCHER STAIRS
DELIVERY TRAFFIC PATH
CRANE LOCATION
MATERIALS HOIST LOCATION
PROPOSED WORK ZONE (10AM - 3PM)
EXISTING NO STOPPING ZONE
POTENTIAL CONCRETE POUR ZONE (HEAD HEIGHT SUITABLE FOR VEHICLE TRAFFIC)
VEHICLE GATE IN B-CLASS HOARDING
B-CLASS HOARDING
TC
TRAFFIC CONTROL MARSHALL
TYPICAL SITE ESTABLISHMENT PLAN (STREET LEVEL)


CRANE
40.0 m
13-23 GIBBONS ST
CRANE RADIUS PLAN

3 BACKGROUND NOISE MEASUREMENT

Long term unattended background noise measurements were undertaken by Northrop along eastern boundary of the project site at project approval stage as part of the Acoustic Assessment for Development Application, document reference (SY181777-AUR01) Revision D dated 07/01/2019). Results of background noise monitoring are presented in the table below.

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Table 1 – Measured Background Noise Levels, dB(A) L_{90}

LOCATION	PERIOD/TIME	BACKGROUND NOISE LEVEL dB(A) L_{90}
Eastern boundary of project site	Day (7am to 6pm)	57

4 CONSENT CONDITIONS

4.1 DA CONDITION C16

*Prior to the commencement of any construction work (including demolition), a **Construction Noise and Vibration Management Plan** (**CNVMP**) prepared by a suitably qualified person shall be submitted to the Certifier. The **CNVMP** shall (but not be limited to):*

(a) be prepared in accordance with the EPA's Interim Construction Noise Guideline;

(b) identify nearby sensitive receivers and land uses;

(c) identify the noise management levels for the project;

(d) identify the construction methodology and equipment to be used and the key sources of noise and vibration;

(e) details of all reasonable and feasible management and mitigation measures to be implemented to minimise construction noise and vibration;

(f) be consistent with and incorporate all relevant recommendations and noise and vibration mitigation measures outlined in the Acoustic Report, prepared by Northrop, dated 7 January 2019;

(g) ensure all potentially impacted sensitive receivers are informed by letterbox drops prior to the commencement of construction of the nature of works to be carried out, the expected noise levels and duration, as well as contact details for a construction community liaison officer; and

(h) include a suitable proactive construction noise and vibration monitoring program which aims to ensure the construction noise and vibration criteria in this consent are not exceeded.

*Prior to the commencement of works, a copy of the **CNVMP** must be submitted to Council and the Planning Secretary*

4.2 CONDITION D8 TO D13

*D8. The development must be constructed with the aim of achieving the construction noise management levels detailed in the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009). All feasible and reasonable noise mitigation measures shall be implemented and any activities that could exceed the construction noise management levels shall be identified and managed in accordance with the **CEMP** and **CNVMP.***

D9. If the noise from a construction activity is substantially tonal or impulsive in nature (as described in Chapter 4 of the NSW Industrial Noise Policy), 5 dB(A) must be added to the measured construction noise level when comparing the measured noise with the construction noise management levels.

D10. Heavy vehicles and oversized vehicles must not queue or idle on Gibbons Street, Margaret Street or William Lane outside of construction zones awaiting access to the site.

D11. The Applicant must schedule intra-day 'respite periods' for construction activities predicted to result in noise levels in excess of the "highly noise affected" levels, including the addition of 5 dB to the predicted levels for those activities identified in the Interim Construction Noise Guideline as being particularly annoying to noise sensitive receivers.

*D12. Wherever practical, and where sensitive receivers may be affected, piling activities are completed using bored piles. If driven piles are required, they must only be installed where outlined in the **CEMP**.*

D13. Vibration caused by construction at any residence or structure outside the subject site must be limited to:

(a) for structural damage vibration to buildings (excluding heritage buildings), British Standard BS 7385 Part 2-1993 Evaluation and Measurement for Vibration in Buildings;

(b) for structural damage vibration to heritage buildings, German Standard DIN 4150 Part 3 Structural Vibration in Buildings Effects on Structure;

(c) for human exposure to vibration, the evaluation criteria presented in British Standard BS 6472- Guide to Evaluate Human Exposure to Vibration in Buildings (1Hz to 80 Hz) for low probability of adverse comment; and

*(d) these limits apply unless otherwise outlined in the **CEMP***

5 NOISE MANAGEMENT TRIGGER LEVEL

5.1.1 EPA Interim Construction Noise Guideline

The EPA Interim Construction Noise Guideline (ICNG) assessment requires:

- Determination of noise generation goals (based on ambient noise monitoring).
- Review of operational noise levels at nearby development.
- If necessary, recommendation of noise controls strategies in the event that compliance with noise emission goals is not possible.

EPA guidelines adopt differing strategies for noise control depending on the predicted noise level at the nearest residences:

- *"Noise affected" level*. Where construction noise is predicted to exceed the "noise effected" level at a nearby residence, the proponent should take reasonable/feasible work practices to ensure compliance with the "noise effected level". For residential properties, the "noise effected" level occurs when construction noise exceeds ambient levels by more than 10dB(A)$L_{eq(15min)}$.
- "*Highly noise affected level*". Where noise emissions are such that nearby properties are "highly noise effected", noise controls such as respite periods should be considered. For residential properties, the "highly noise effected" level occurs when construction noise exceeds 75dB(A)$L_{eq(15min)}$ at nearby residences.

A summary of relevant construction noise management trigger levels is presented below.

Table 2 – Noise Management Trigger Levels - Residential

Location	"Noise Affected" Level - dB(A)$L_{eq(15min)}$	"Highly Noise Affected" Level - dB(A)$L_{eq(15min)}$
Surrounding Residential Receivers	67	75

If noise levels exceed the criteria identified in the tables above, reasonable and feasible noise management techniques will be reviewed.

6 VIBRATION LIMIT

As required by consent conditions vibration caused by construction at any residence or structure outside the subject site will be assessed with reference to:

- For structural damage vibration, German Standard DIN 4150-3 *Structural Vibration: Effects of Vibration on Structures; and*
- For human exposure to vibration, the acceptable vibration values set out in the Environmental Noise Management Assessing Vibration: a technical guideline (DEC, 2006).

Vibration impact to rail tunnel has been addressed in a separate report and not repeat it in this section.

6.1 FOR RESIDENTIAL RECEIVERS

6.1.1 Structure Borne Vibrations (Building Damage Criteria)

German Standard DIN 4150-3 (1999-02) provides vibration velocity guideline levels for use in evaluating the effects of vibration on structures. The criteria presented in DIN 4150-3 (1999-02) are presented in Table 4.

It is noted that the peak velocity is the value of the maximum of any of the three orthogonal component particle velocities as measured at the foundation, and the maximum levels measured in the x- and y-horizontal directions in the plane of the floor of the uppermost storey.

Table 3 – DIN 4150-3 (1999-02) Safe Limits for Building Vibration

TYPE OF STRUCTURE		PEAK PARTICLE VELOCITY (mms^{-1})			
		At Foundation at a Frequency of			**Plane of Floor of Uppermost Storey**
		< 10Hz	**10Hz to 50Hz**	**50Hz to 100Hz**	**All Frequencies**
1	Buildings used in commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

The surrounding residential building would be considered a Type 2 structure.

6.1.2 Assessing Amenity

The NSW EPA document "*Assessing Vibration: A Technical Guideline*" provides procedures for assessing tactile vibration and regenerated noise within potentially affected buildings and is used in the assessment of vibration impact on amenity.

Relevant criteria are presented below.

Table 4 – EPA Recommended Vibration Criteria

		RMS acceleration (m/s^2)		RMS velocity (mm/s)		Peak velocity (mm/s)	
Place	Time	Preferred	Maximum	Preferred	Maximum	Preferred	Maximum
Continuous Vibration							
Residences	Daytime	0.01	0.02	0.2	0.4	0.28	0.56
Offices		0.02	0.04	0.4	0.8	0.56	1.1
Workshops		0.04	0.08	0.8	1.6	1.1	2.2
Impulsive Vibration							
Residences	Daytime	0.3	0.6	6.0	12.0	8.6	17.0
Offices		0.64	1.28	13.0	26.0	18.0	36.0
Workshops		0.64	1.28	13.0	26.0	18.0	36.0

7 ACTIVITIES TO BE CONDUCTED AND THE ASSOCIATED NOISE SOURCES

Typically, the most significant sources of noise or vibration generated during a construction project will be demolition, excavation, civil works (compaction, asphalting) and piling.

We note that demolition work and site establishment has largely been completed as part of an early works package and is not part of this assessment.

Table 5 - Sound Power Levels of the Proposed Equipment

Equipment /Process	Sound Power Level dB(A)*
Excavator with hydraulic hammering	120
CFA Bored Piling Rig	110
Concrete Pump	105
Mobile Crane	100
Trucks	100
Electric Tower Crane	95
Powered Hand Tools	95

The noise levels presented in the above table are derived from the following sources, namely:

- Table A1 of Australian Standard 2436-2010.
- Data held by this office from other similar studies.

*Noise levels take into account correction factors (for tonality, intermittency where necessary).

8 NOISE EMISISON PREDICTION

Noise emissions from the demolition/excavation/construction of the project site have been predicted at the receiver locations using SoundPlan™ modelling software implementing the ISO 9613-2:1996 *"Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation"* noise propagation Standard. Sound Power Level data used in the SoundPlan™ modelling is based on Table 5 of this report. The following weather conditions are included in the modelling based on the requirements of ISO9613:

- Wind speed of between 1m/s and 5m/s.
- 10 degrees with 70% relative humidity.

SoundPlan™ modelling has been carried out based on the following assumptions:

Demolition of Ground and Basement/ Excavation:

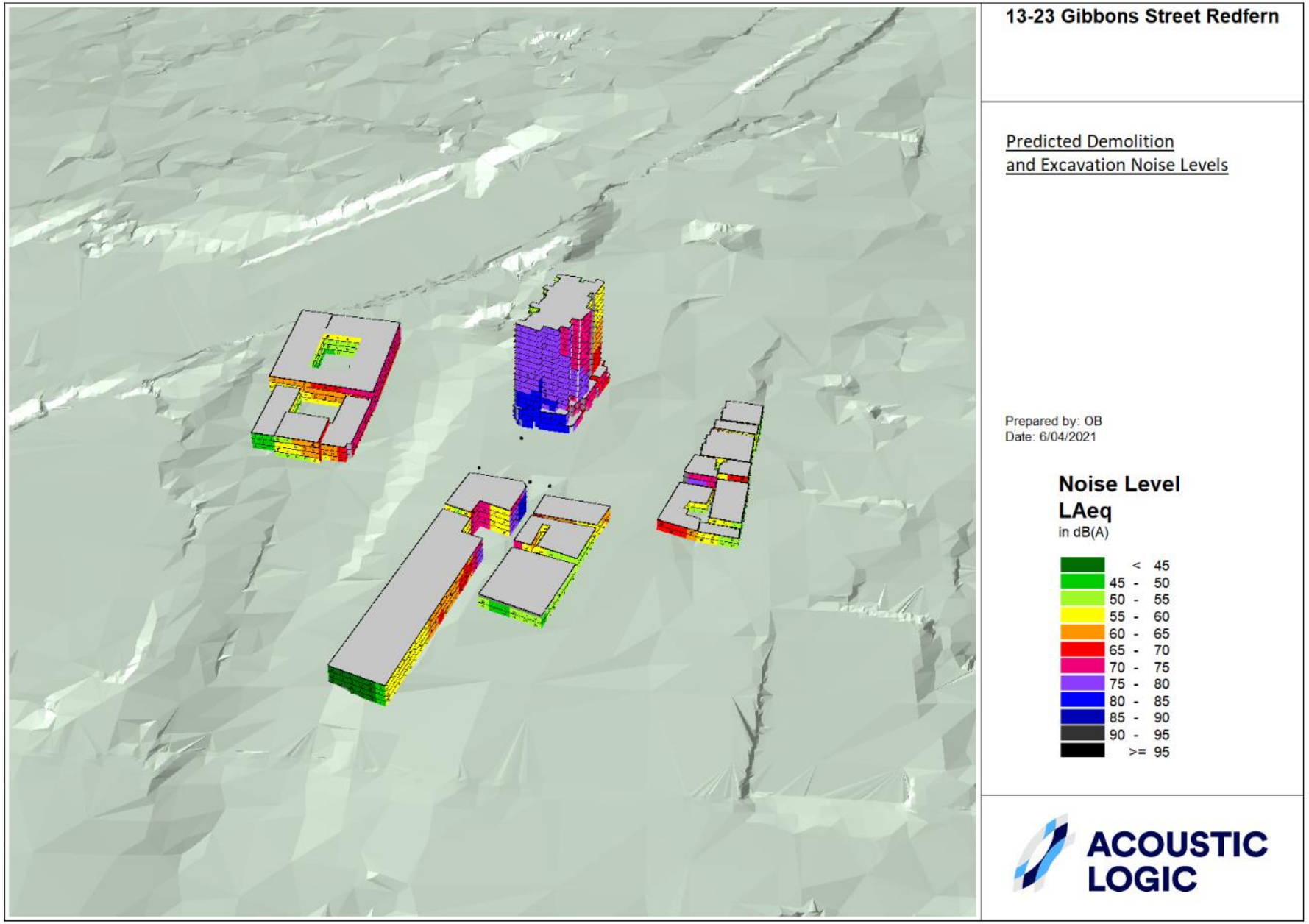
- 1 x excavator with hydraulic hammer, noise source is located at 1.0m above ground.
- 2 x CFA Piling at 4.0m above ground.
- Semi-Trailer at 1.5m above ground.

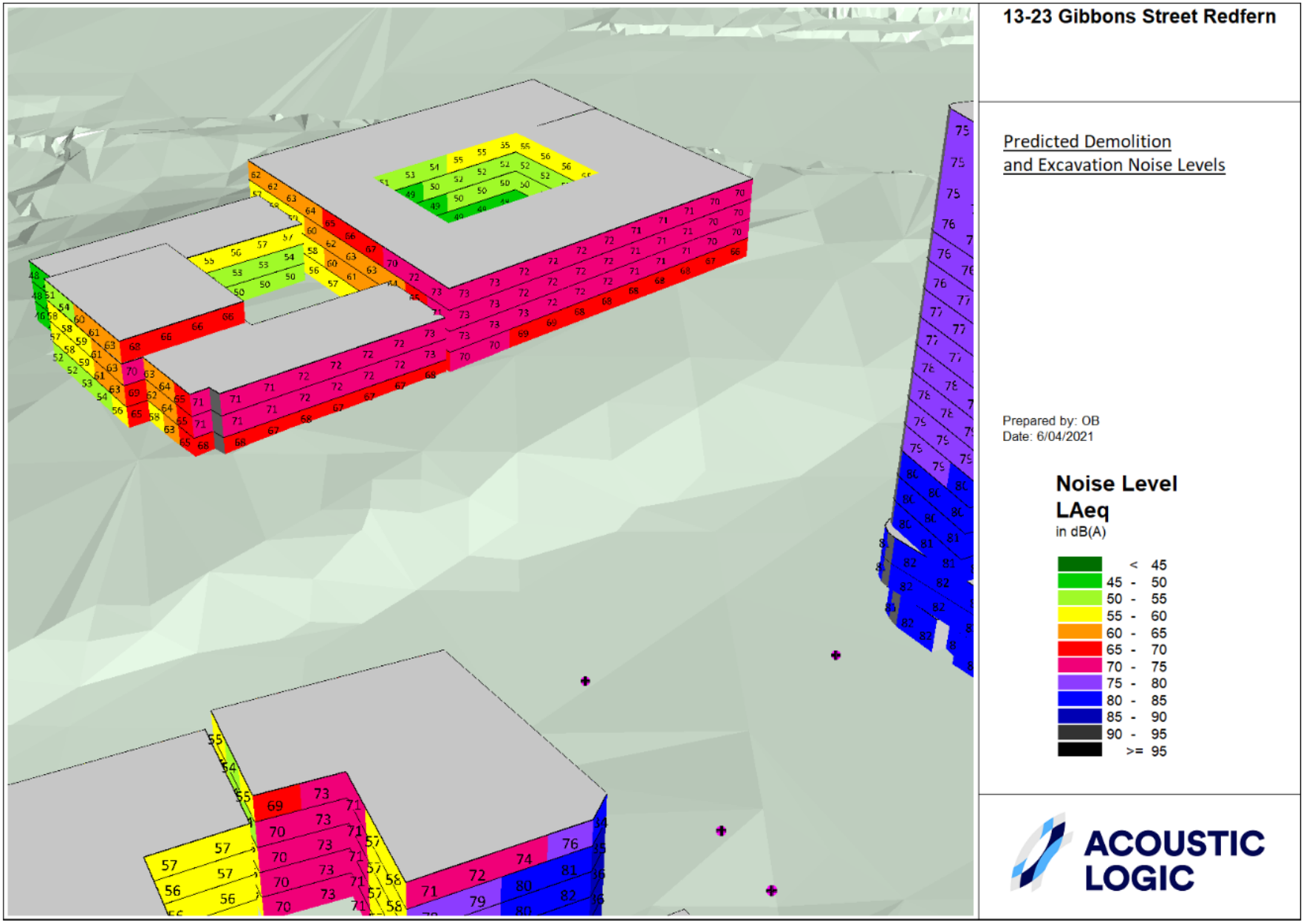
Construction:

- Concrete truck, noise source is located at 1.0m above ground.
- Concrete pump, noise source is located at 1.0m above ground.
- 3 x electric hand tool, noise source is located at 1.0m above ground.
- Electric crane, noise source is located at 10m above ground.
- Semi-trailer truck, noise source is located at 1.5m above ground.

Detailed SoundPlan modelling results have been graphed and presented below:

8.1 DEMOLITION /EXCAVATION STAGE


13-23 Gibbons Street Redfern
Predicted Demolition
and Excavation Noise Levels
Prepared by: OB
Date: 6/04/2021
Noise Level
LAeq
in dB(A)
< 45
45 - 50
50 - 55
55 - 60
60 - 65
65 - 70
70 - 75
75 - 80
80 - 85
85 - 90
90 - 95
>= 95
ACOUSTIC
LOGIC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ACOUSTIC
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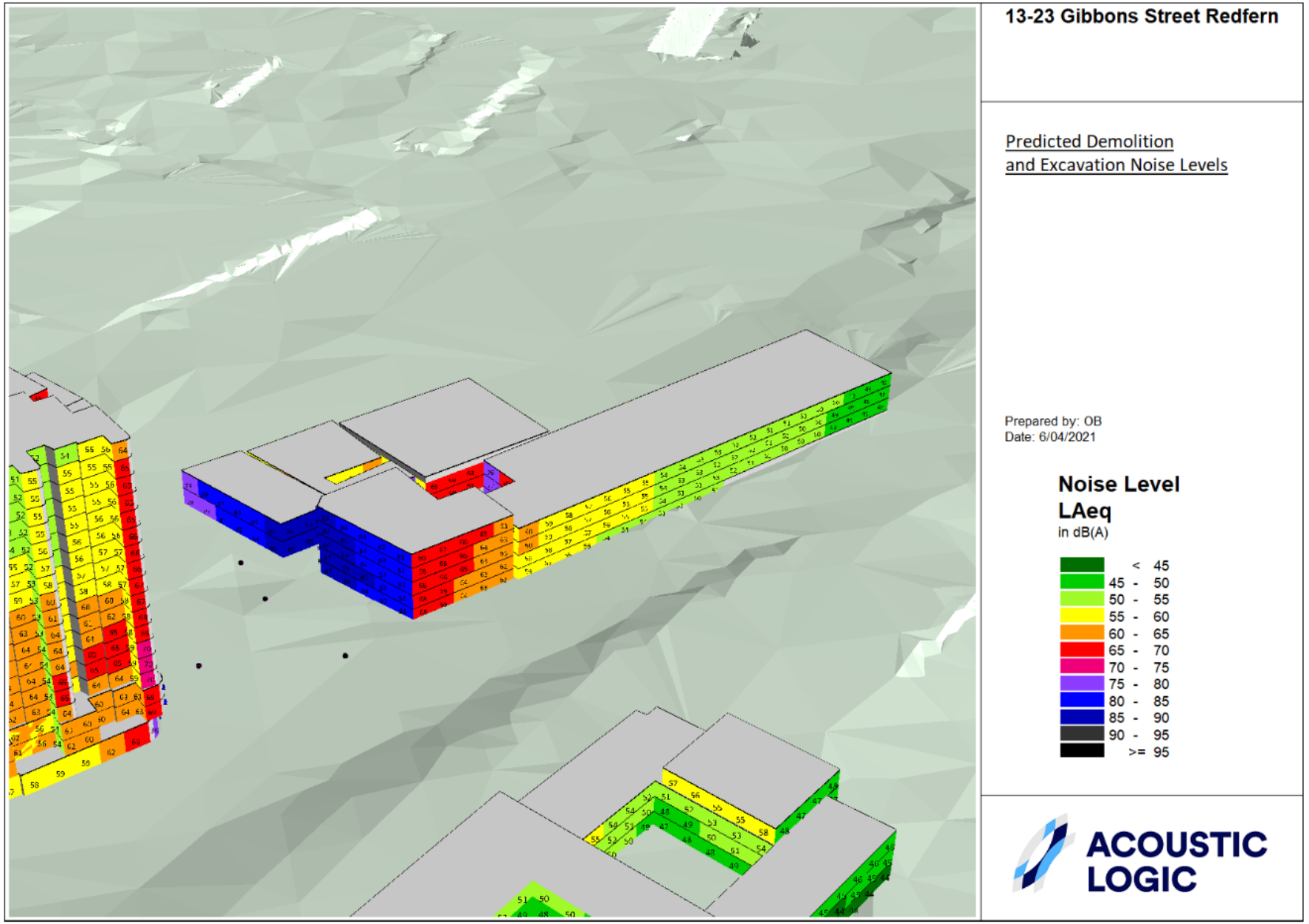
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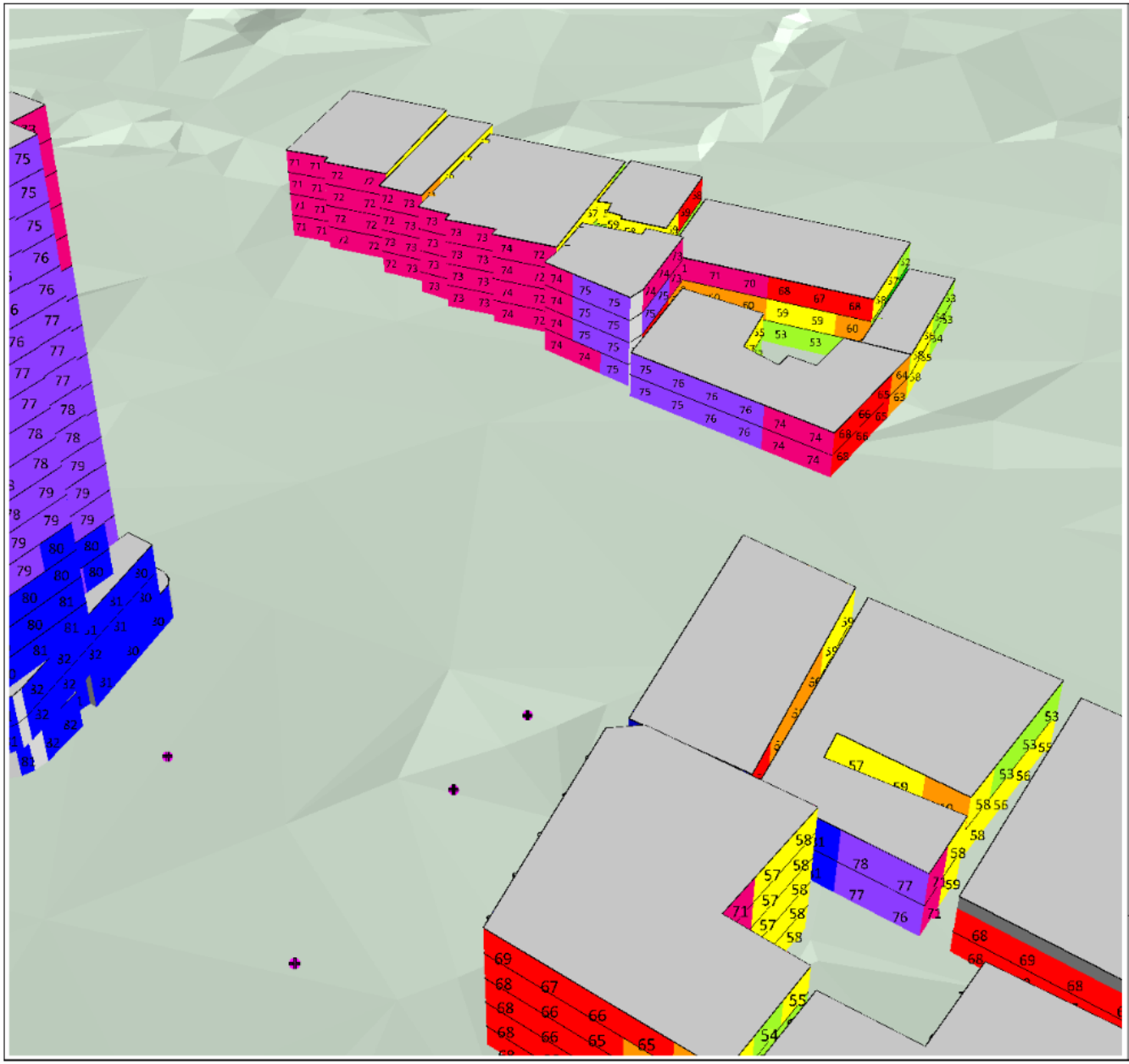
ACOUSTIC
LOGIC



13-23 Gibbons Street Redfern

Predicted Demolition
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Prepared by: OB
Date: 6/04/2021

Noise Level
LAeq
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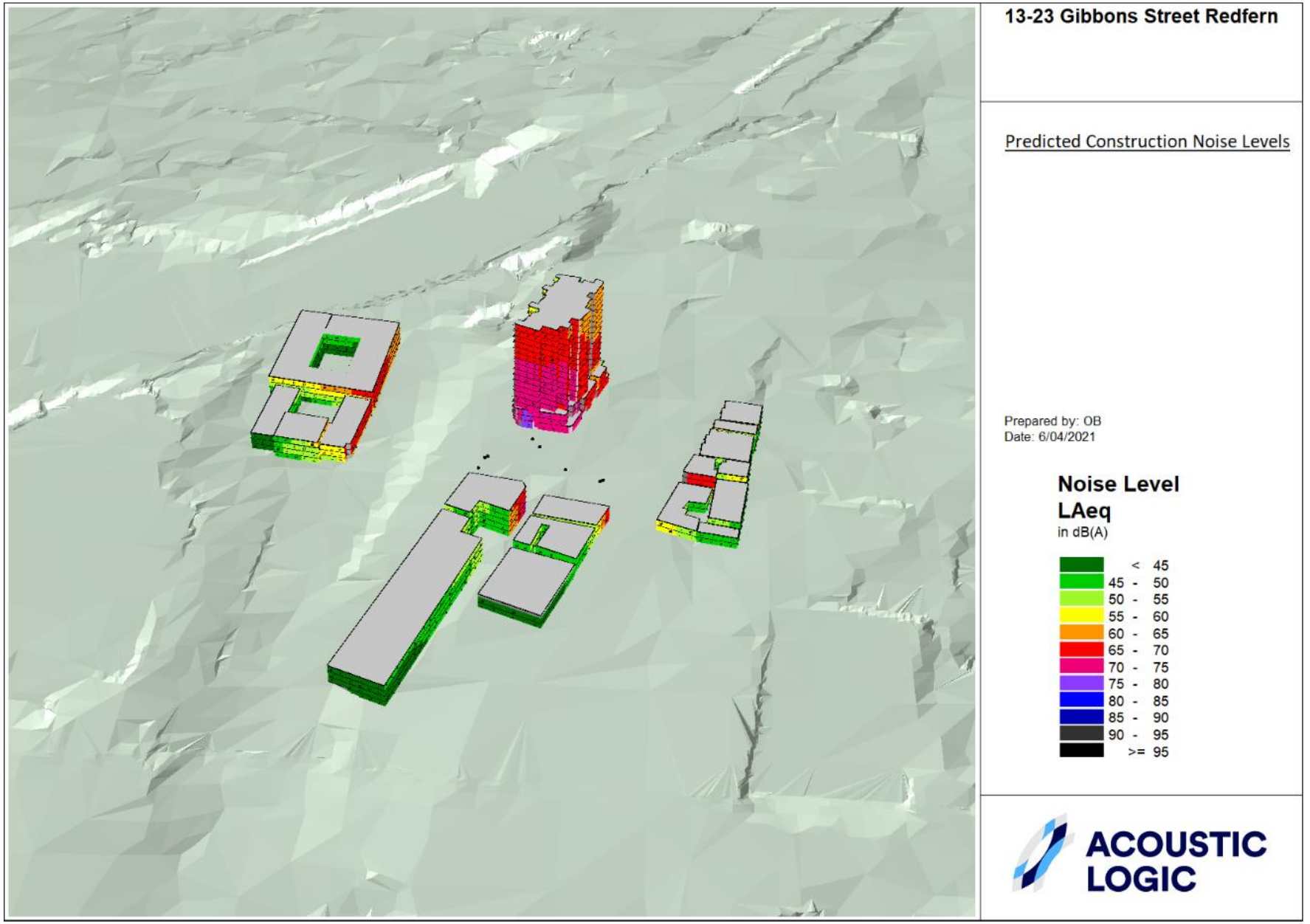
ACOUSTIC LOGIC

8.2 CONSTRUCTION STAGE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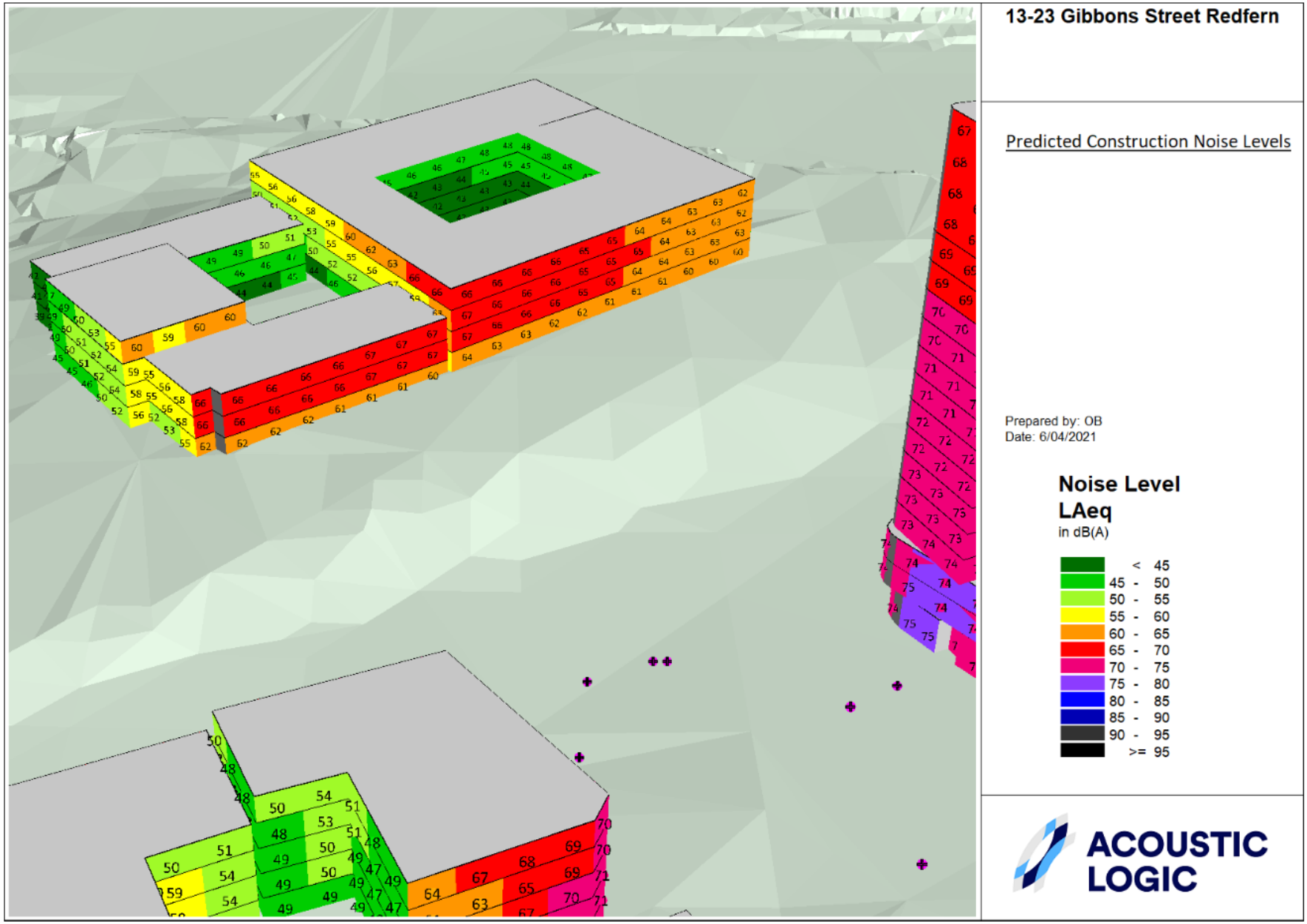
ACOUSTIC LOGIC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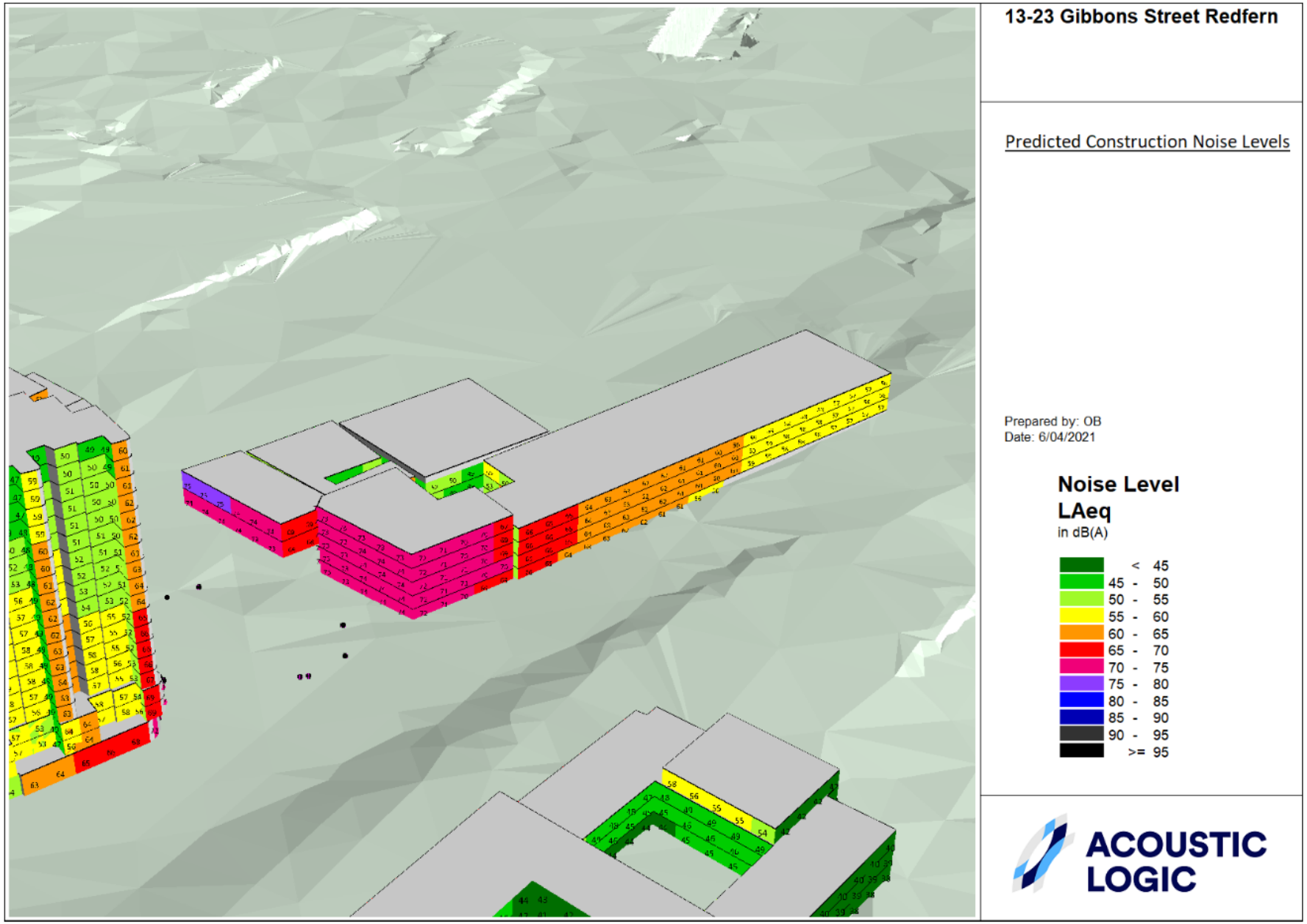
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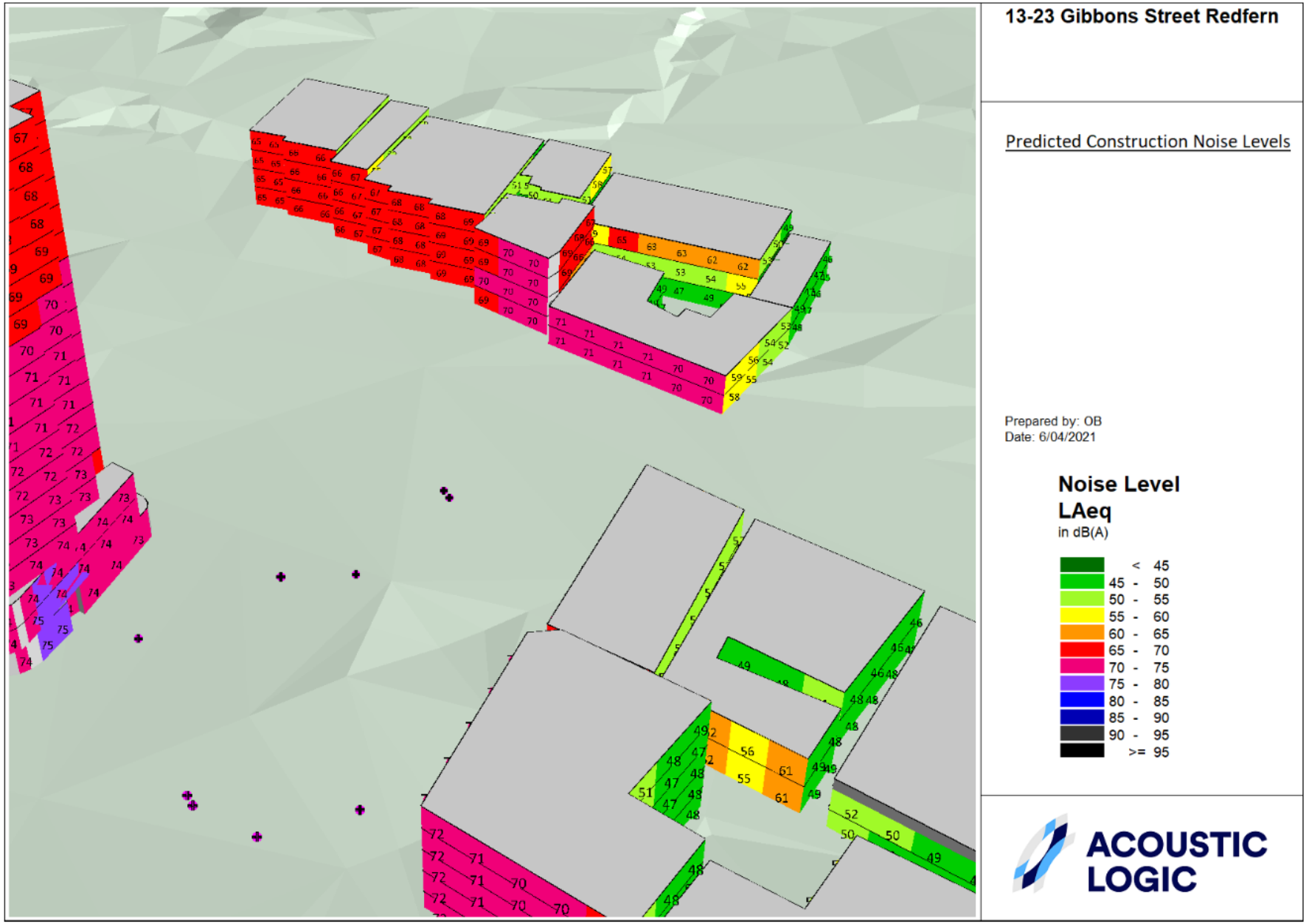
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80 - 85
85 - 90
90 - 95
>= 95
ACOUSTIC LOGIC

8.3 SUMMARY OF NOISE PREDICTION

Table 5 – Predicted Noise Levels

Receiver	Predicted Noise Level during Demolition /Excavation Stage	Predicted Noise Level during Construction Stage dB(A)Leq, 15min	Noise Management Trigger Levels dB(A)Leq, 15min	Highly Affected Noise Level dB(A)Leq	Findings
R1	Receiver Building is Not Occupied	≤ 75 dB(A)	67	75	Noise levels are generally lower than Highly Affected Noise Level
R2	≤ 73 dB(A)	≤ 67 dB(A)	67	75	Noise levels are all lower than Highly Affected Noise Level
R3	≤ 86 dB(A)	≤ 83 dB(A)	67	75	Noise levels are exceed the highly affected noise levels when working close to southern boundary
R4	≤ 77 dB(A)	≤ 71 dB(A)	67	75	Noise levels are generally lower than Highly Affected Noise Level except hammering close to eastern boundary

8.4 DISCUSSION – NOISE

- Receiver 1 is under construction and it wouldn't be occupied during excavation /demolition stage. The noise during construction stage is generally lower than the highly affected noise levels to this receiver.
- Receiver 2- the noise emission is predicted exceed the noise management trigger level for short time periods but they are all lower than the highly affected noise levels.
- Receiver 3- this receiver is close to the project site and the predicted noise levels exceed the highly affected noise levels by EPA ICNG when machines work close to southern boundary.
- Receiver 4- noise emission from project site is generally lower than the highly affected noise levels except hydraulic hammer located close to the eastern boundary.

As the hydraulic hammering used by project site is for short time period and will not result significant noise exceedance.

8.5 DISCUSSION - VIBRATION

Typically, excavation of slab is the activities with the greatest potential for generation of vibration. As the magnitude of vibration acvities is not possible to be predicted the vibration monitoring system is recommended during the demolition of GF/Basement Level.

8.6 RECOMMENDATIONS

In light of the above, we recommend:

- The scheduling of construction activities should be undertaken to reasonably minimise noise impacts to all surrounding land uses.
    - In this regard, highly noise intrusive works including piling, use of excavators and concrete pours should not take place prior to 8am where noise levels at surrounding receivers would exceed the levels in Table 2.
    - Where works are expected which may exceed the highly noise affected management level, respite periods are to be provided. At this stage, it may only be expected that excavation/concrete pouring activities could marginally exceed this noise level at the residential property immediately bounding site to the south.
- Community consultation/notification - Notification (leaflet or similar) of nearby residents is recommended, detailing the duration of excavation works and schedule of planned concrete pours. Although exceedances of the noise management levels is expected at surrounding receivers, the relatively short duration of excavation and structural works would not require any further mitigation measures (such site hoardings to the southern boundaries of site).
- Materials handling/vehicles:
    - Trucks and bobcats to use a non-tonal reversing beacon (subject to OH&S requirements) to minimise potential disturbance of neighbours.
    - Avoid careless dropping of construction materials into empty trucks.
    - Trucks, trailers and concrete trucks (if feasible) should turn off their engines during idling to reduce noise impacts (unless truck ignition needs to remain on during concrete pumping).
- Vibration monitoring is recommended on the southern and northern boundary of site, .
- Complaints handling:
    - An after hours contact number is displayed outside of the building site, so that in the event that surrounding development believes that a noise breach is occurring, they may contact the site.
    - In the event of complaint, the procedures outlined in Section 11 are adopted. Additional methods of control of construction noise and additional noise control measures which may be adopted by the site are detailed in Sections 9 & 10.

8.7 VIBRATION MONITORING

8.7.1 Vibration Monitoring Equipment

Vibration monitoring is to be conducted using Texcel ETM type monitors with externally mounted tri-axial geophones. The geophones will be located as close as practicably possible to the location of the sensitive structure. It is noted that the location of the monitor may need to be placed within the site in question due to security risks.

The monitors are to be set to send an SMS message when alert levels have been exceeded at the location of the geophone.

8.7.2 Vibration Monitoring Locations

Vibration monitoring is required during the GF/Basement demolition and excavation stage of the project at the following locations:

- Northern boundary of site – adjacent R1 residential receiver.
- Southern boundary of site

In the event that ongoing construction activities are considerably below the relevant vibration levels, it is recommended that vibration monitoring requirements for the project be reviewed with the relevant stakeholders.

8.7.3 Vibration Monitoring Results

The ETM vibration monitors can be downloaded remotely to actively review all monitoring data recorded at the monitoring location, including any vibration events found to exceed the trigger levels nominated in Section 6.

In the event multiple events exceeding the nominated trigger levels are recorded, all data recorded by the monitor is to be reviewed and forwarded to a nominated representative of the building contractor. It is proposed that reports are provided regular intervals, with any exceedance in the nominated vibration criteria documented.

8.7.4 Vibration Monitoring Alerts

The following personnel will receive alarms in the event that the nominated vibration trigger levels are exceeded at the site:

1. Acoustic consultant/advisor;
2. Excavation site foreman;
3. The superintendent and any other representative nominated by the project superintendent.

8.7.5 Additional Recommendations

Should ongoing measurements of excessive vibration criteria occur (or in the event trigger levels are exceeded) immediate measures shall be undertaken to investigate the cause of the exceedance and identify the required changes to work practices.

In the case of exceedances of the vibration limits all vibration intensive equipment shall cease until the exceedance is investigated.

The effectiveness of any changes shall be verified before continuing. Documentation and training of site staff shall occur to ensure the practices that produced the exceedances are not repeated.

All repeated exceedances of the trigger level should be fully investigated and reported to management. The investigation of a complaint shall involve where applicable:

- Measurement of vibration at the affected location;
- An investigation of the activities occurring at the time of the incident;
- Inspection of the activity to determine whether any undue vibration is being emitted by equipment/activity; and
- Whether work practices were being carried out either within established guidelines or outside these guidelines.

Where an activity is found to be emitting excessive vibration, the cause is to be rectified as soon as possible.

8.7.6 Contingency Plans

The following course of action is recommended to address situations where vibration exceeding recommended levels are recorded at the site.

Selection of Alternate Equipment or Process

Where an activity is found to generate excessive vibration levels, it may be possible to select an alternative approach or appliance. For example; the use of a hydraulic hammer on certain areas of the site may potentially generate high levels of vibration. By replacing this activity with the use of pneumatic hammers, bulldozers ripping and/or milling machines; the result will be a reduction of vibration at the vibration sensitive rail line.

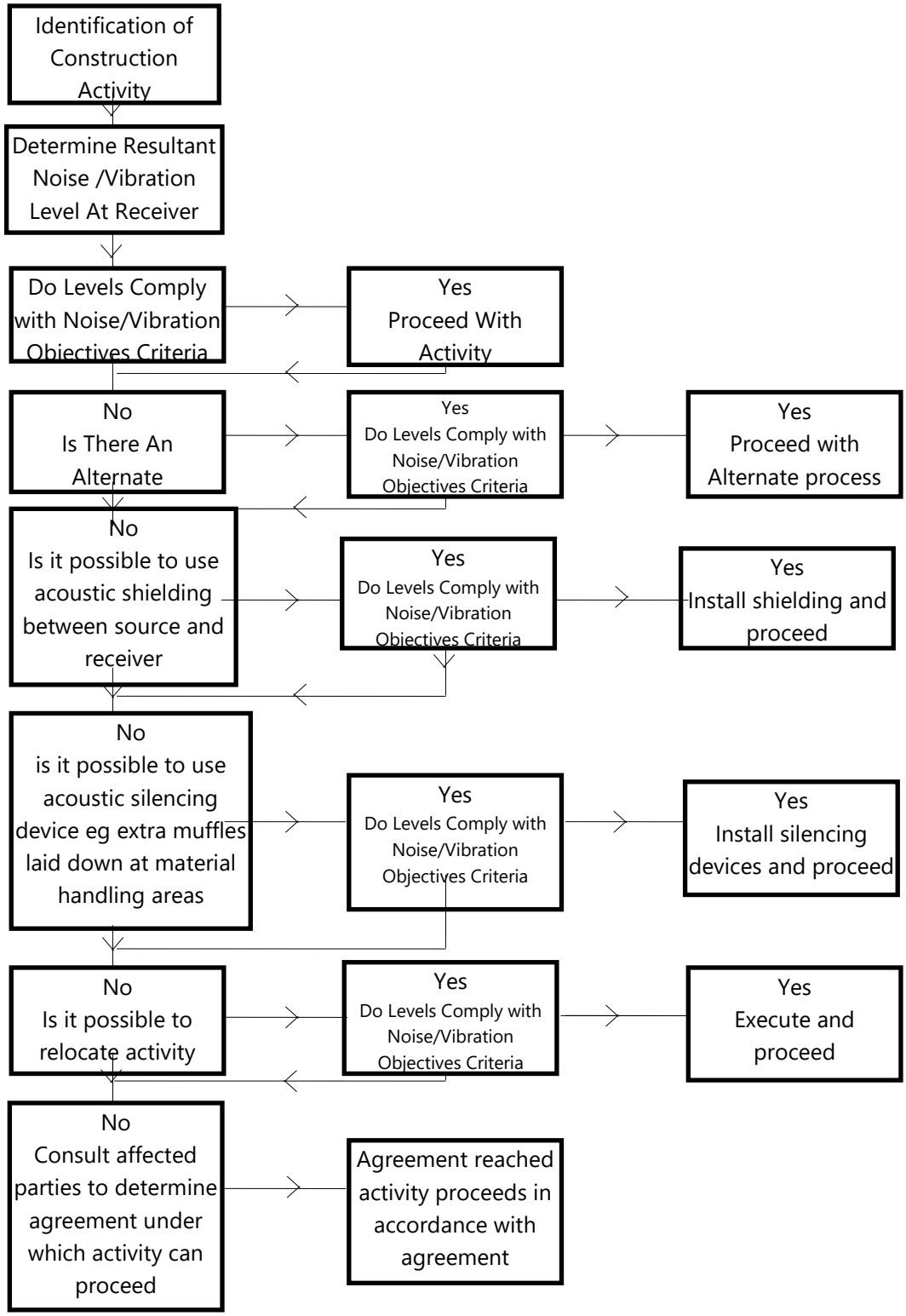
The use of saw cutting equipment to break the ridged connection between areas of rock being excavated and vibration sensitive structure is also an effective way to significantly reduce the transfer of vibration.

Additional Vibration Monitoring

Additional attended vibration monitoring measurements can be undertaken to determine the effectiveness of measures which have been implemented. The results of monitoring can be used to devise further control measures and identify vibration generating activity.

9 CONTROL OF CONSTRUCTION NOISE AND VIBRATION – PROCEDURAL STEPS

The flow chart presented below illustrates the process that will be followed in assessing construction activities.



10 ADDITIONAL NOISE AND VIBRATION CONTROL METHODS

In the event of complaints, there are a number of noise mitigation strategies available which can be considered.

The determination of appropriate noise control measures will be dependent on the particular activities and construction appliances. This section provides an outline of available methods.

10.1 SELECTION OF ALTERNATE APPLIANCE OR PROCESS

Where a particular activity or construction appliance is found to generate excessive noise levels, it may be possible to select an alternative approach or appliance. For example; the use of a hydraulic hammer on certain areas of the site may potentially generate high levels of noise. Undertaking this activity using bulldozers, ripping and/or milling machines will result in lower noise levels.

10.2 ACOUSTIC BARRIER

Given the position of adjacent development, it is unlikely that noise screens will provide significant acoustic benefit for commercial or residential receivers, but will provide noticeable improvement for those on ground level.

The placement of barriers at the source is generally only effective for static plant. Equipment which is on the move or working in rough or undulating terrain cannot be effectively attenuated by placing barriers at the source.

Barriers can also be placed between the source and the receiver.

The degree of noise reduction provided by barriers is dependent on the amount by which line of sight can be blocked by the barrier. If the receiver is totally shielded from the noise source reductions of up to 15dB(A) can be effected. Where only partial obstruction of line of sight occurs, noise reductions of 5 to 8dB(A) may be achieved. Where no line of sight is obstructed by the barrier, generally no noise reduction will occur.

As barriers are used to provide shielding and do not act as an enclosure, the material they are constructed from should have a noise reduction performance that is approximately 10dB(A) greater than the maximum reduction provided by the barrier. In this case the use of a material such as 10mm or 15mm thick plywood (radiata plywood) would be acceptable for the barriers.

10.3 MATERIAL HANDLING

The installation of rubber matting over material handling areas can reduce the sound of impacts due to material being dropped by up to 20dB(A).

10.4 TREATMENT OF SPECIFIC EQUIPMENT

In certain cases it may be possible to specially treat a piece of equipment to dramatically reduce the sound levels emitted.

10.5 ESTABLISHMENT OF SITE PRACTICES

This involves the formulation of work practices to reduce noise generation. A more detailed management plan will be developed for this project in accordance to the construction methodology outlining work procedures and methods for minimising noise.

10.6 COMBINATION OF METHODS

In some cases it may be necessary that two or more control measures be implemented to minimise noise.

11 DEALING WITH COMPLAINTS

Should ongoing complaints of excessive noise or vibration criteria occur immediate measures shall be undertaken to investigate the complaint, the cause of the exceedances and identify the required changes to work practices.

If a noise complaint is received the complaint should be recorded. Any complaint form should list:

- The name and address of the complainant (if provided);
- The time and date the complaint was received;
- The nature of the complaint and the time and date the noise was heard;
- The name of the employee who received the complaint;
- Actions taken to investigate the complaint, and a summary of the results of the investigation;
- Required remedial action, if required;
- Validation of the remedial action; and
- Summary of feedback to the complainant.

A permanent register of complaints should be held.

12 CONCLUSION

A noise and vibration assessment has been undertaken of the proposed 18 storey student accommodation at 13-23 Gibbons Street, Redfern.

- Noise impact is generally lower than the highly affected noise levels except the high noise activities such as hydraulic hammering located close to the receivers. The hammering is only for a short time period under this project.

- Vibration monitoring system is recommended to be located along northern and southern boundary during demolition of GF/Basement and excavation to safeguard the neighbouring buildings.

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

Acoustic Logic Pty Ltd
Alex Washer

13-23 Gibbons St, Redfern NSW

Report for Above Ground Vibration Monitoring (2)

Project ID	20210355.13
Document Title	Report for Above Ground Vibration Monitoring (2)
Attention To	Richard Crookes Constructions Pty Ltd

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	24/09/2021	20210355.13/2409A/R0/TB	TB		GW

TABLE OF CONTENTS

1 INTRODUCTION

Acoustic Logic has been engaged to carry out ground vibration monitoring for the vibration impacts associated with the site excavation and construction components of the 13 Gibbons Street, residential development in Redfern.

This monitoring report presents the vibration monitoring for the period as follows:

- 14th of September 2021 to the 24th of September 2021

The location of the 13 Gibbons Street construction site and the nearest and most affected receivers are shown in Figures 1 and 2. The location of the on-site monitors relative to the site are also shown in these figures.

The vibration management levels have been derived from DIN 4150-3 *Vibrations in buildings - Part 3: Effects on structures* as no site specific vibration criteria have been specified.

2 SITE DESCRIPTION AND SENSITIVE RECEIVERS

The subject site is located between Gibbons Street, Margaret and Regent Streets. All previous buildings have been demolished to ground level at the start of the surface monitoring by Acoustic Logic.

The vibration generating activities scheduled to be carried out on site are the final demolition of the existing basement car park, then an excavation for an underground carpark and building footings then finally the construction stage.

The monitor locations for the respective receivers for this monitoring period are as follows:

- Receiver 1 (R1) – Multistorey residential block on the corner of Gibbons Street and Margaret Street. The vibration monitor is located in the basement carpark
- Receiver 2 (R2) – A heritage category church building. The monitor is located in a Hot Water Heater/ Cleaner's closet.

Figure 1 – Residential and Heritage Category receivers

3 VIBRATION CRITERIA

Vibration caused by construction at any residence or structure outside the subject site must be limited to:

- For structural damage vibration, German Standard DIN 4150-3 Structural Vibration: Effects of Vibration on Structures; and

The criteria and the application of this standard are discussed in separate sections below.

3.1 DAMAGE CRITERIA

German Standard DIN 4150-3 (1999-02) provides vibration velocity guideline levels for use in evaluating the effects of vibration on structures. The criteria presented in DIN 4150-3 (2016-12) are presented in Table 2 of the standard.

It is noted that the peak velocity is the absolute value of the maximum of any of the three orthogonal component particle velocities as measured at the foundation, and the maximum levels measured in the x- and y-horizontal directions in the plane of the floor of the uppermost storey.

Table 1 – DIN 4150-3 (2016-12) Safe Limits for Building Vibration

Type of Structure		Peak Particle Velocity (mms^{-1})				
		At Foundation at a Frequency of			Plane of Floor of Uppermost Storey	Floor Slabs, Vertical Direction
		< 10Hz	10Hz to 50Hz	50Hz to 100Hz	All Frequencies	All Frequencies
1	Buildings used in commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40	20
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15	20
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8	*20

* May be required to be lower to suit condition and construction of floor.

4 VIBRATION MONITORING

Vibration monitoring was conducted using two Texcel ETM vibration monitors with external Tri axial geophones. The monitors are programmed to store statistical vibration data over every 5-minute period, along with any 'triggered' events that occur throughout the monitoring period.

The vibration monitor installation locations are shown in Figure 2. The vibration sensor (geophone) in the ex-Church is adhered to the on-grade ground slab. The geophone in the carpark has been fastened to the basement slab with dynabolts. Both monitoring locations are suitable for construction vibration monitoring at receiving structures

This period presents the results of vibration monitoring for the period between the 14th of September 2021 to the 24th of September 2021. Primary works carried out on site during this period include:

- Demolition of existing carpark slab which is above the previous building's basement
- Bore (soldier) Piling the site perimeter along Gibbons and Margaret Streets

Pool Vibration monitor

Apartment Driveway Boundary Vibration monitor

Figure 2 – Vibration Monitor Locations

5 MEASUREMENT RESULTS

The following Tables summarise the frequency analysed events recorded at each respective vibration monitor. The charts of daily vibration levels and the corresponding frequency analyses are presented in the Appendices for each respective monitor.

5.1 RECEIVER 1 – GIBBONS STREET APARTMENT RECEIVERS

Table 2 – Basement Vibration Levels

Vibration Geophone Location	Date	Maximum Measured Vibration Level mm/s	Criteria Vibration Level	Complies
Carpark Slab	All	<2.08 mm/s	5mm/s PPV	Yes

5.2 RECEIVER 2 – CHEFS WAREHOUSE (EX CHURCH)

Table 3 – Ground Slab Vibration Levels

Vibration Geophone Location	Date	Maximum Measured Vibration Level mm/s	Criteria Vibration Level	Complies
Ground Slab	All	<3.37 mm/s	3mm/s PPV	Yes (Frequency Analysed)

5.3 ANALYSES OF VIBRATION LEVELS

Daily plots of the Vibration levels versus Time and versus Frequency are attached to the Appendices.

The vibration levels for this monitoring period are under the frequency based vibration criteria.

The vibration levels were under the frequency independent vibration limit so no further analyses were necessary.

The vibrations at the Church were significant on the 15th, 16th and 17th of September 2021. The vibration levels were frequency analysed and they were found to comply with the DIN heritage building criteria.

6 MANAGEMENT OF VIBRATION LEVELS

No exceedances of the nominated criteria have occurred at monitoring locations in this monitoring period.

Vibration monitoring data are collated and reported on a fortnightly basis however the remote real time vibration monitoring system sends SMS alerts when trigger levels are exceeded and the monitors are downloaded daily. This allows for the prompt investigation of sources and the review and adjustment of work practices if necessary.

A register of vibration events is maintained by Richard Crookes when and where vibrations are excessive.

7 CONCLUSION

Acoustic Logic has carried out above ground vibration monitoring for the vibration impacts associated with the demolition , excavation and construction works at the residential development site at 13 Gibbons Street, Redfern.

This monitoring report presents the vibration monitoring for the periods as follows:

- Vibration Monitoring: 14th of September 2021 to the 24th of September 2021

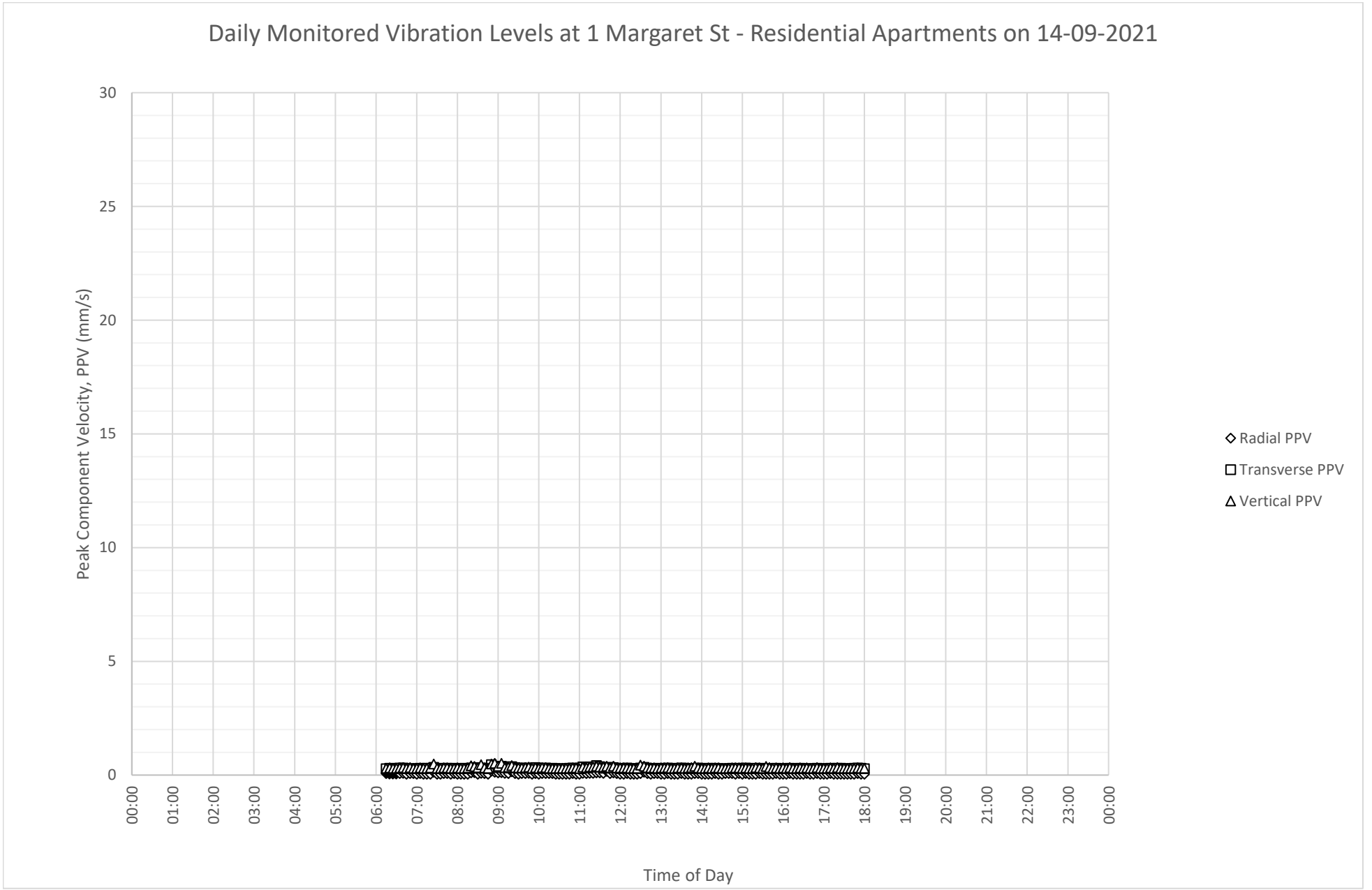
Acoustic Logic has undertaken a detailed analysis of the vibration events captured in that period and has made comments in the Sections above.

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

Acoustic Logic Pty Ltd
Tomas Bohdan

APPENDIX 1 – VIBRATION MONITORING DATA – RECEIVER 1- GIBBONS STREET APARTMENTS


Daily Monitored Vibration Levels at 1 Margaret St - Residential Apartments on 14-09-2021
Peak Component Velocity, PPV (mm/s)
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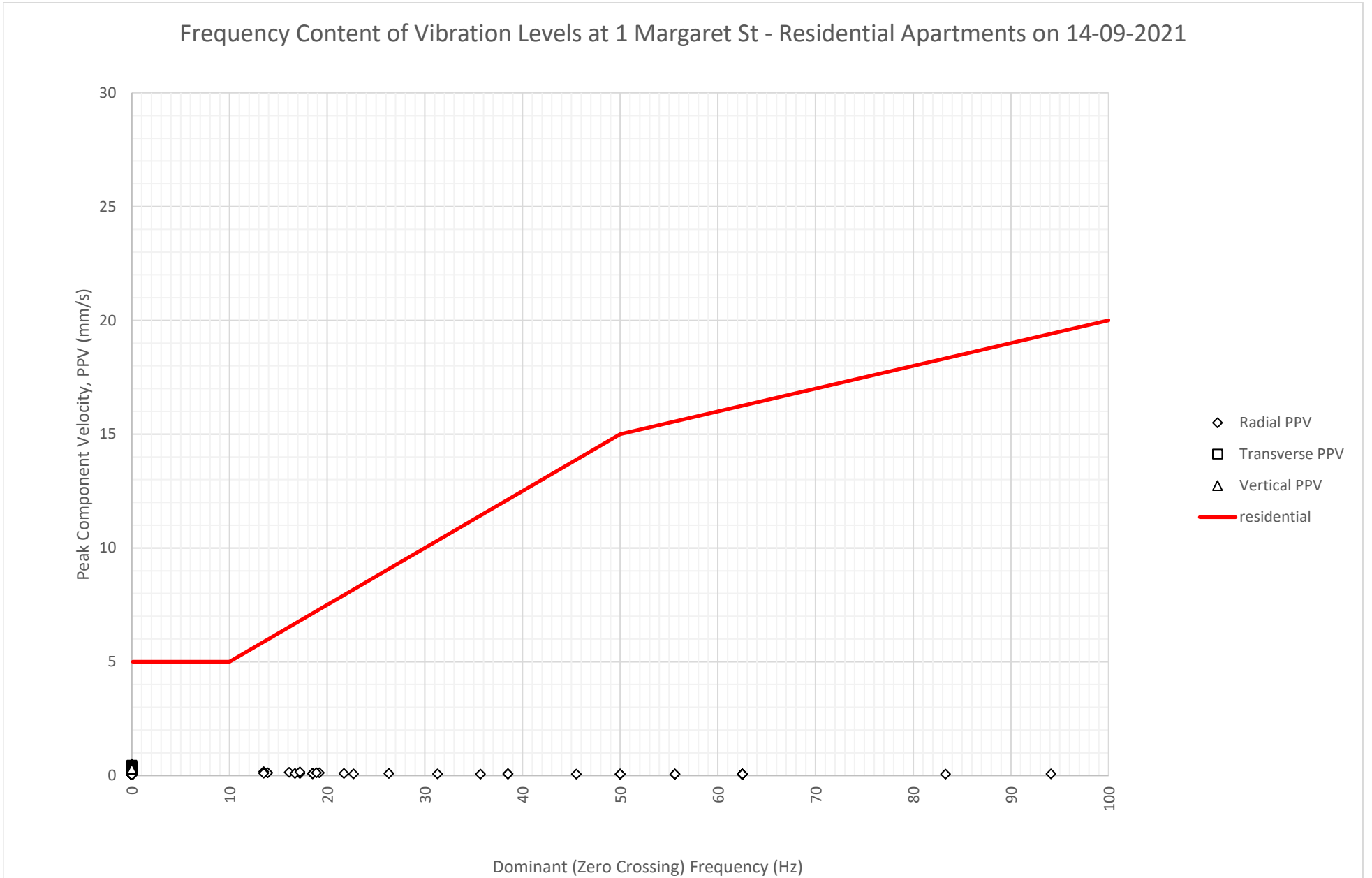
Time of Day
Radial PPV
Transverse PPV
Vertical PPV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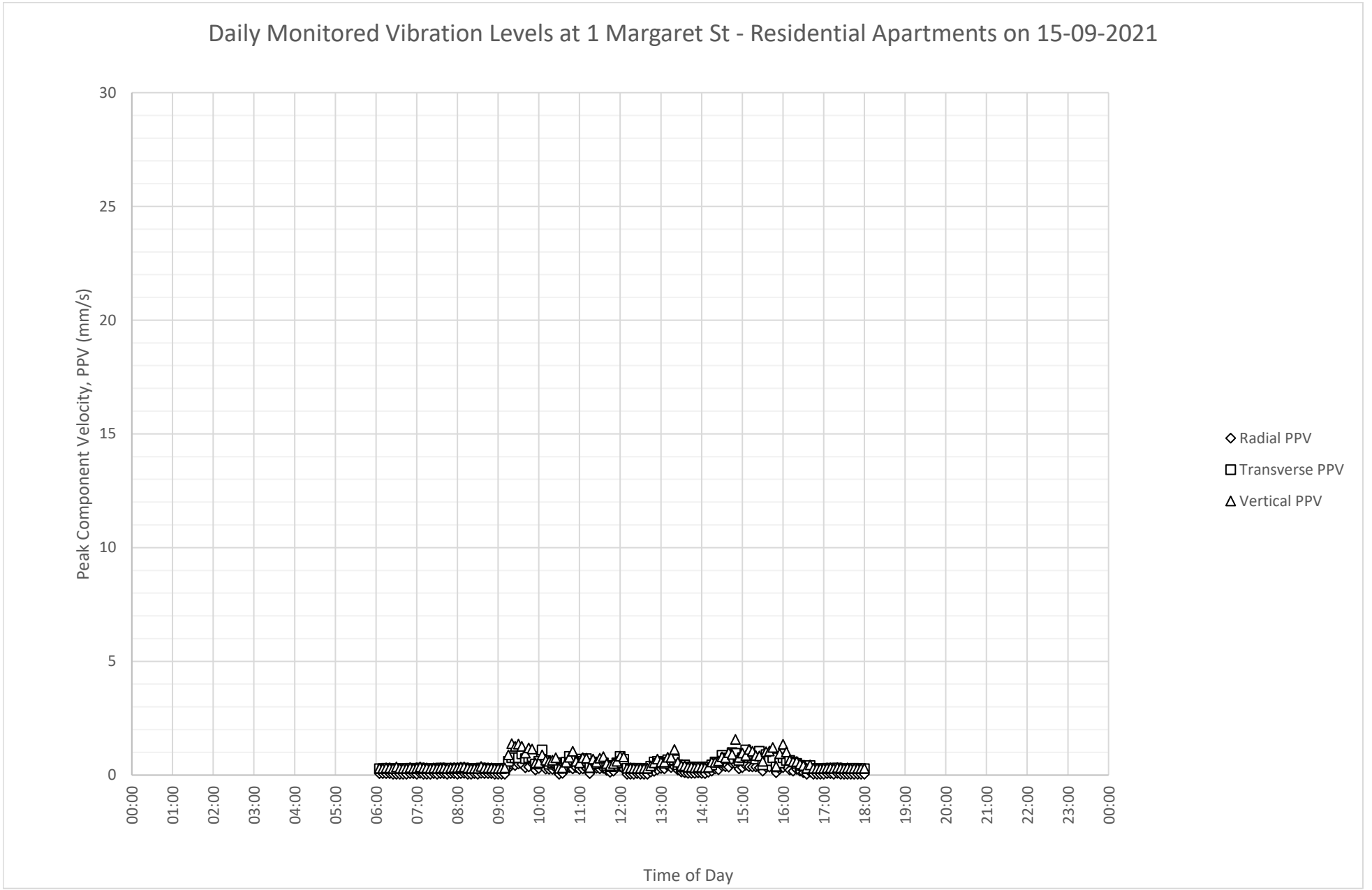
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential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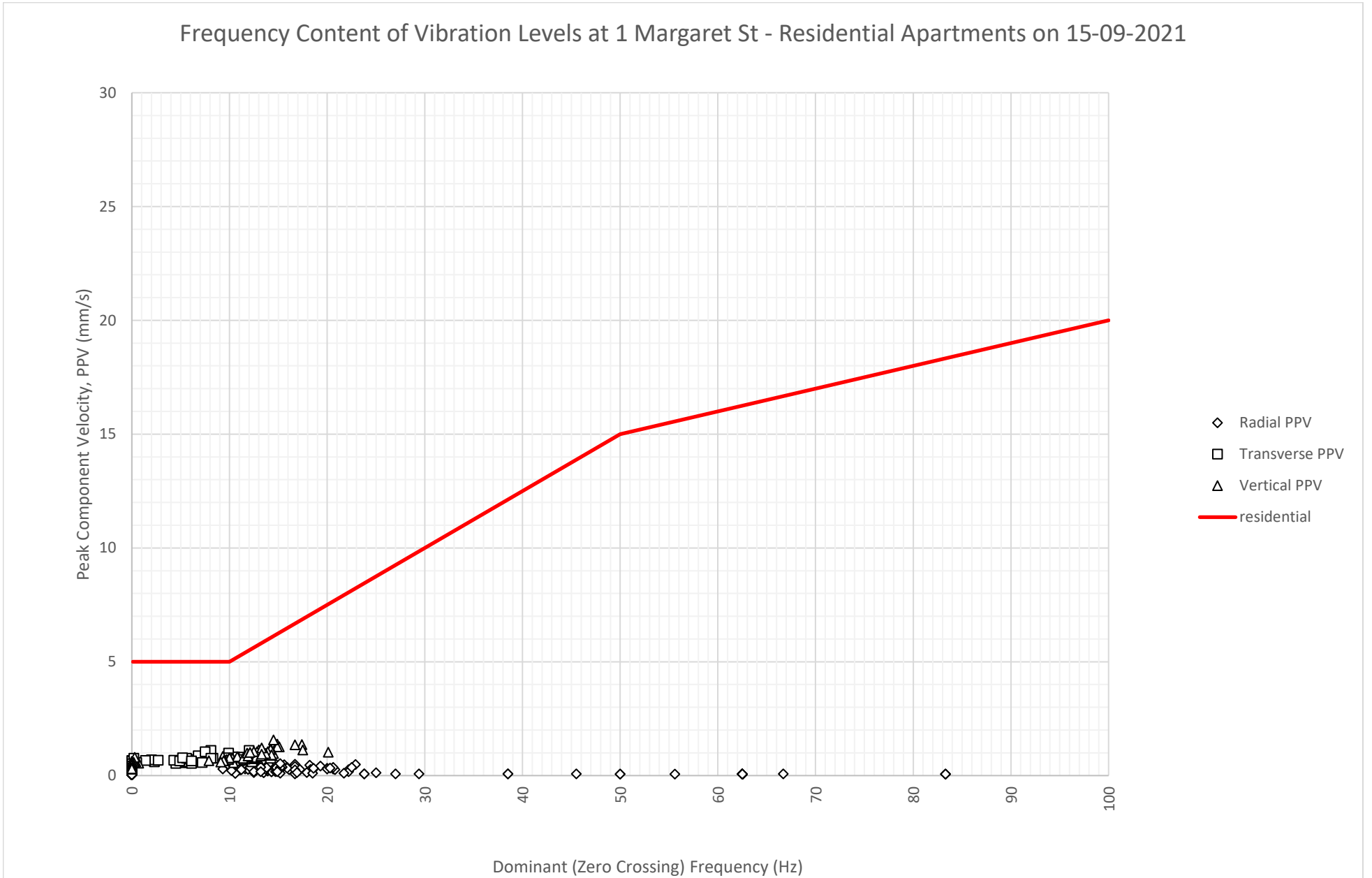
Time of Day
Radial PPV
Transverse PPV
Vertical PPV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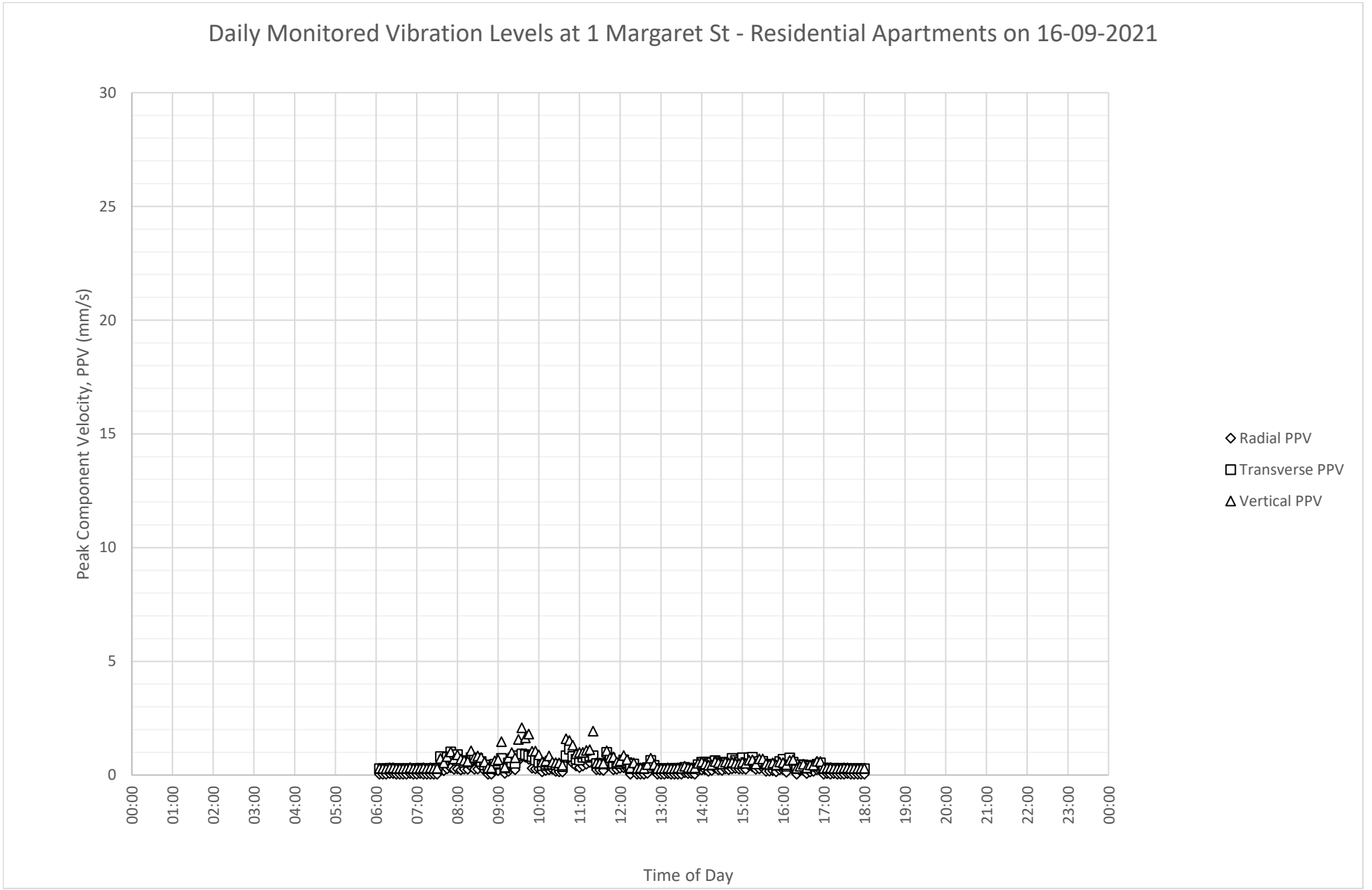
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential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Time of Day
Radial PPV
Transverse PPV
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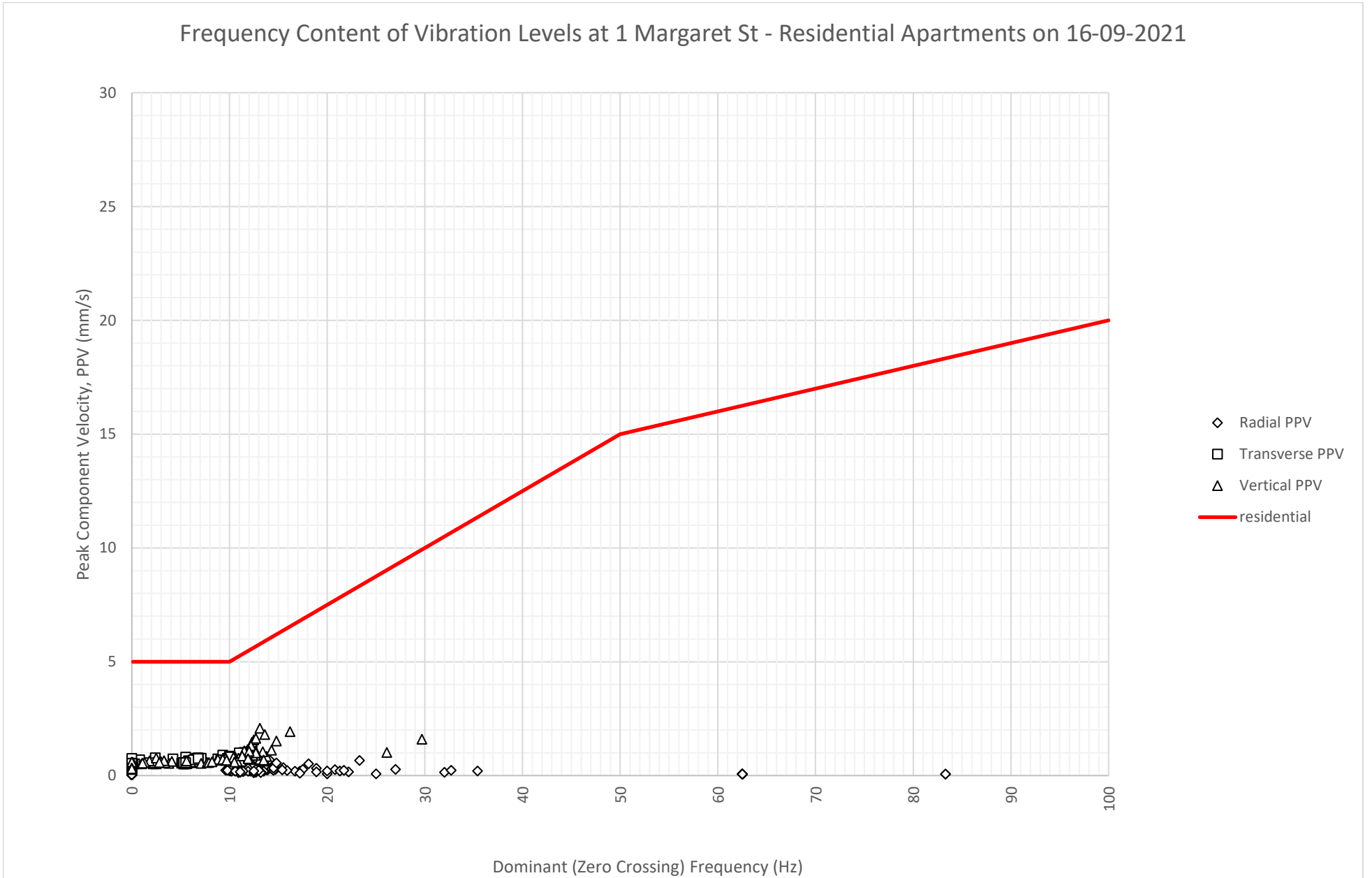
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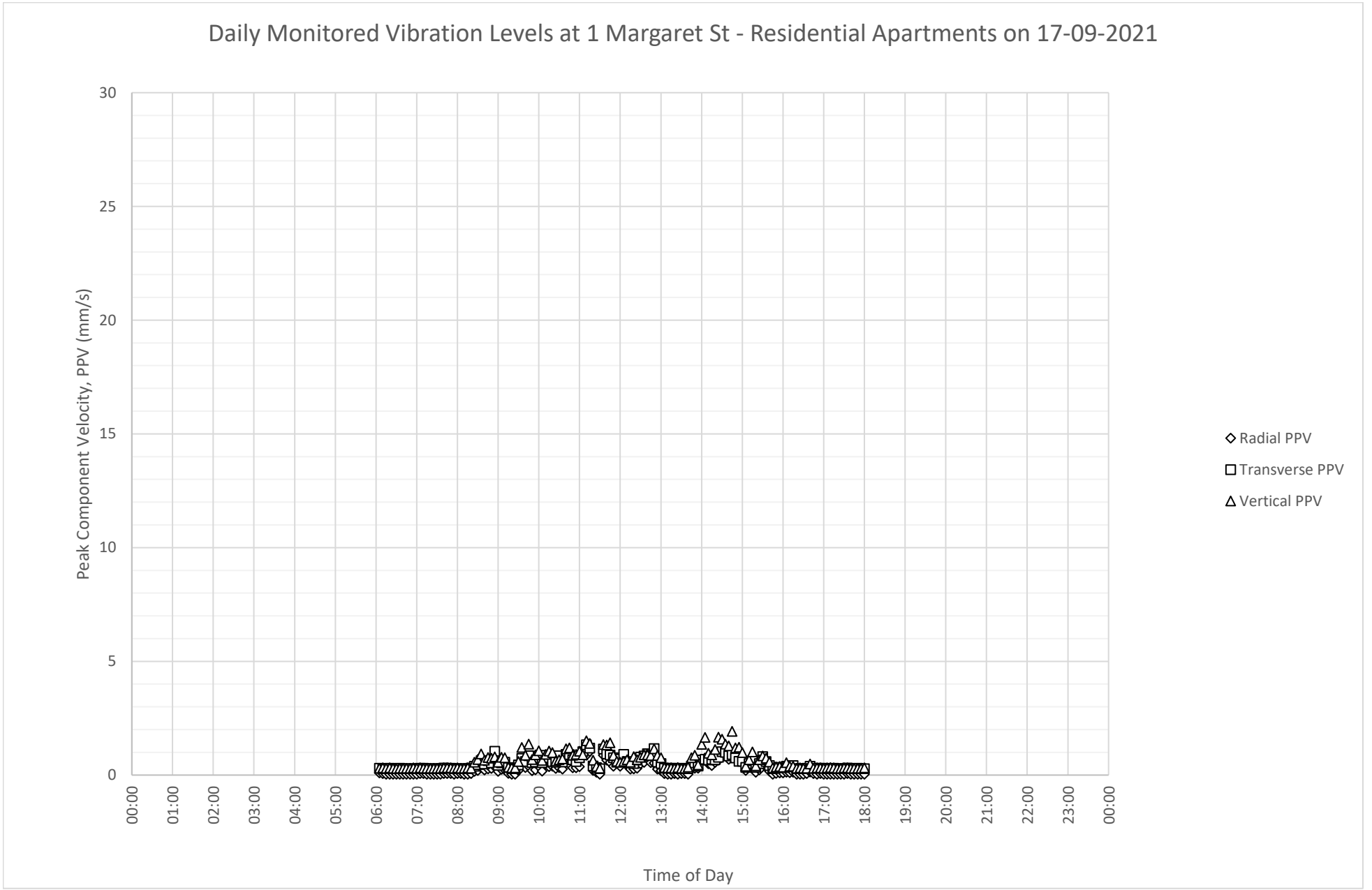
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential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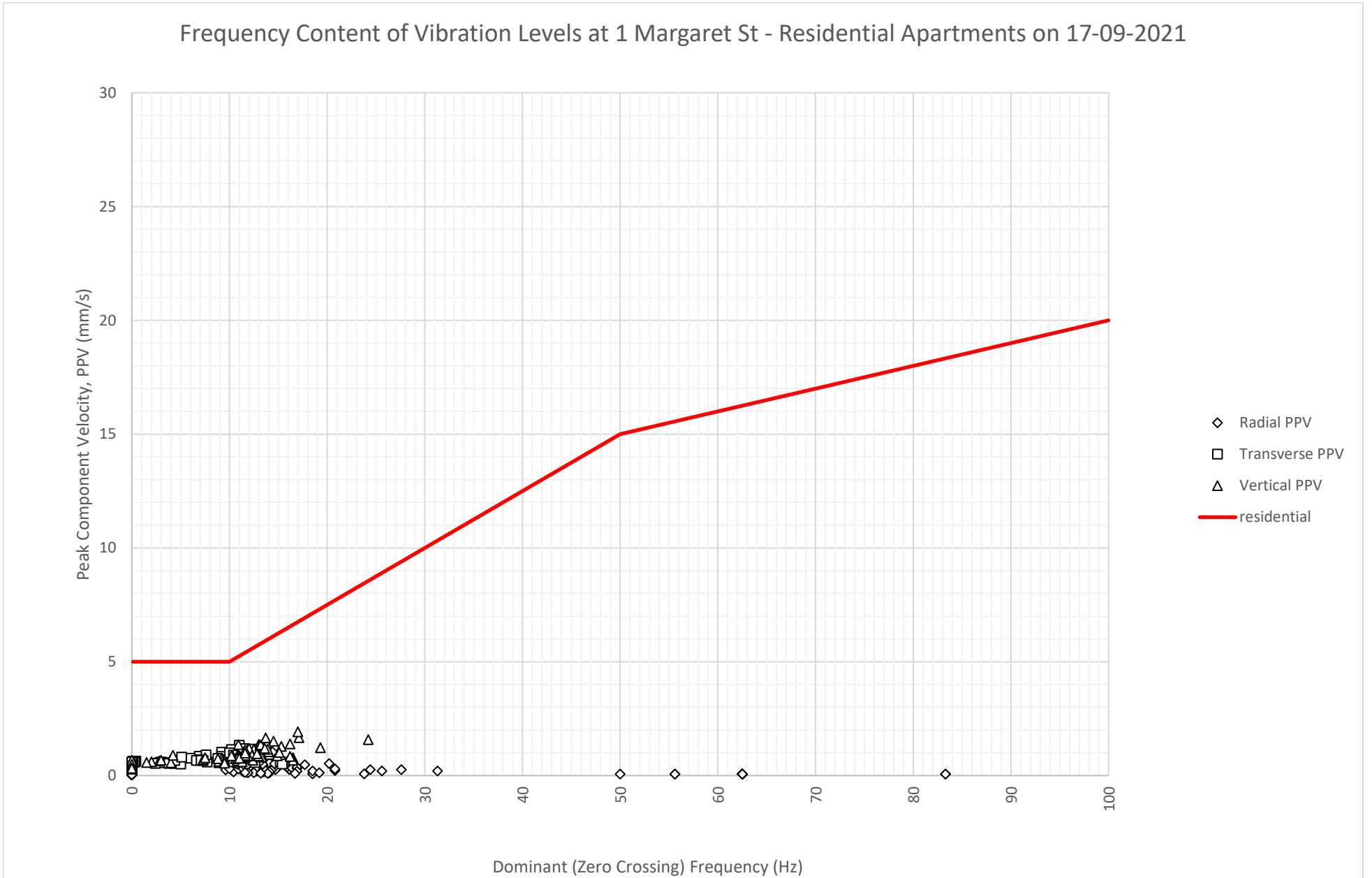
Transverse PPV
Vertical PPV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Dominant (Zero Crossing) Frequency (Hz)
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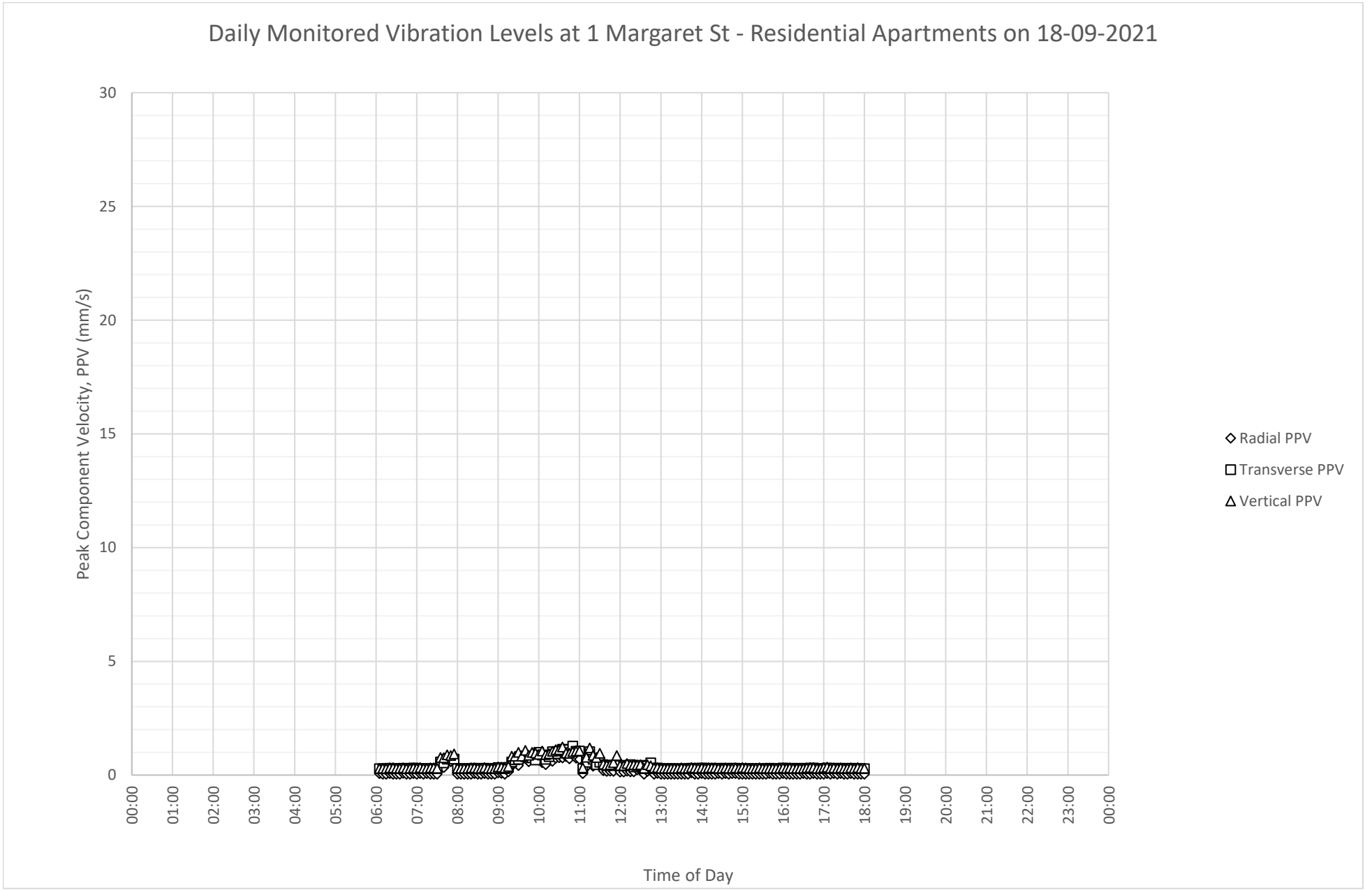
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Time of Day
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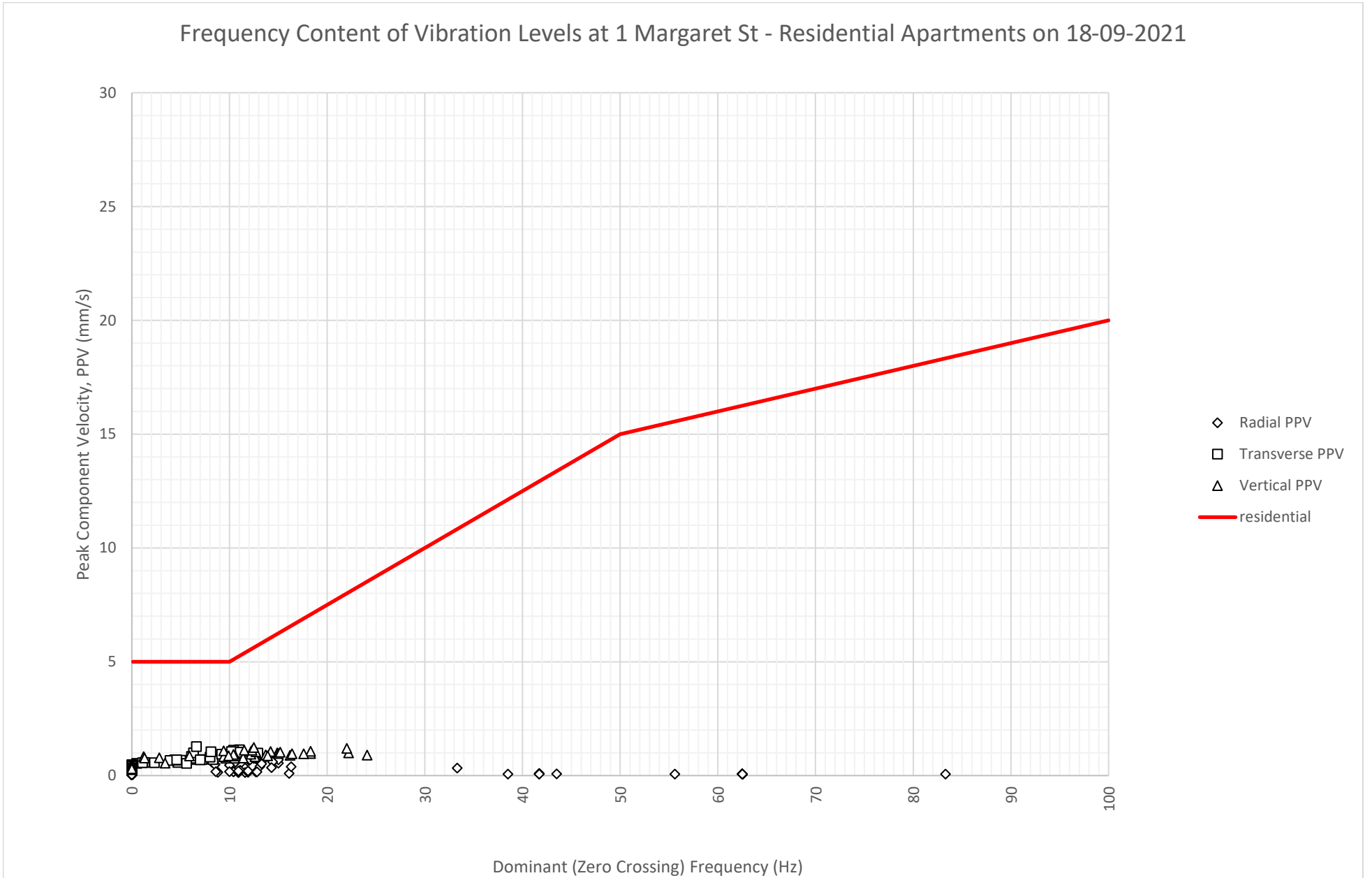
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Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
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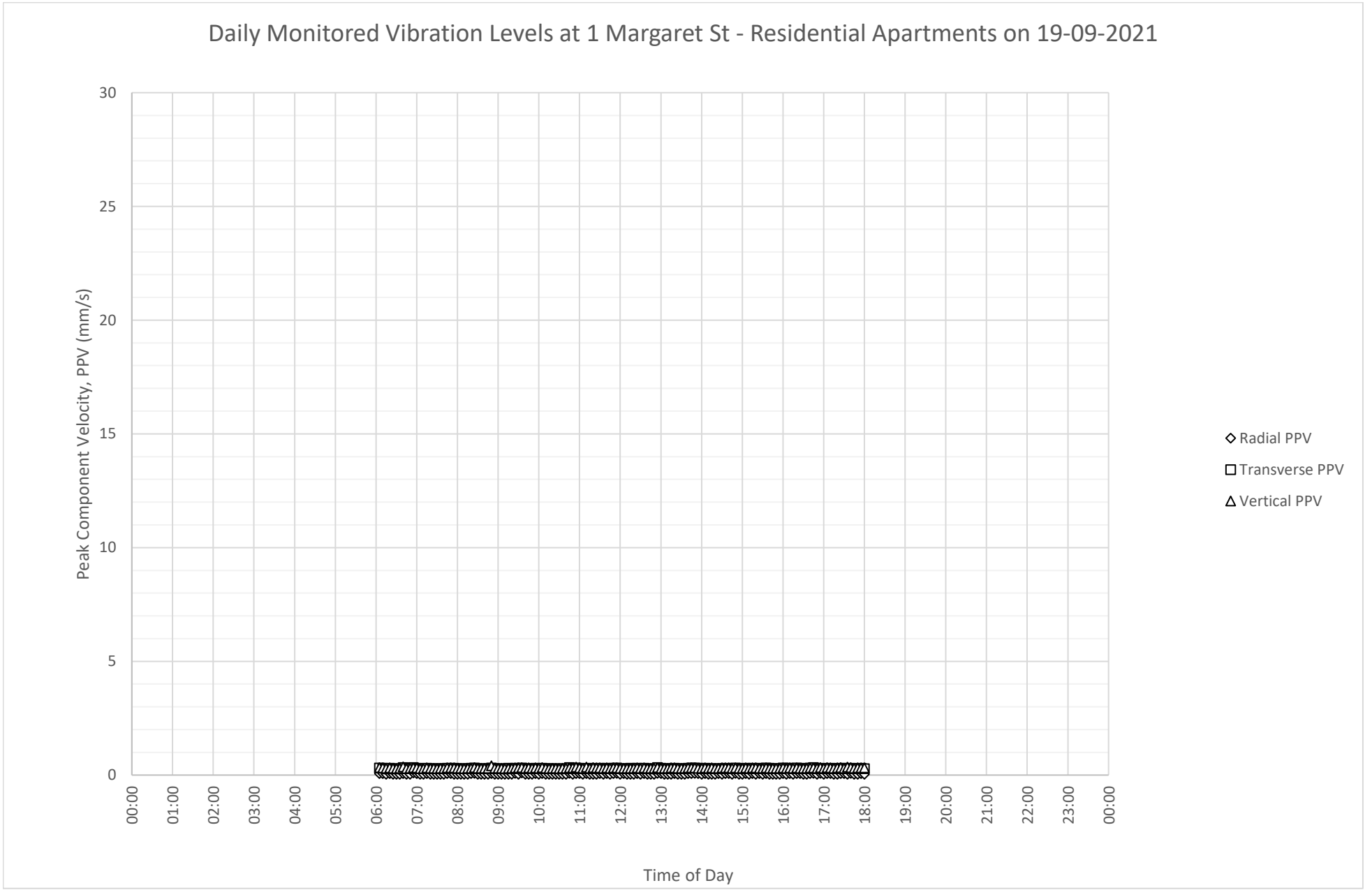
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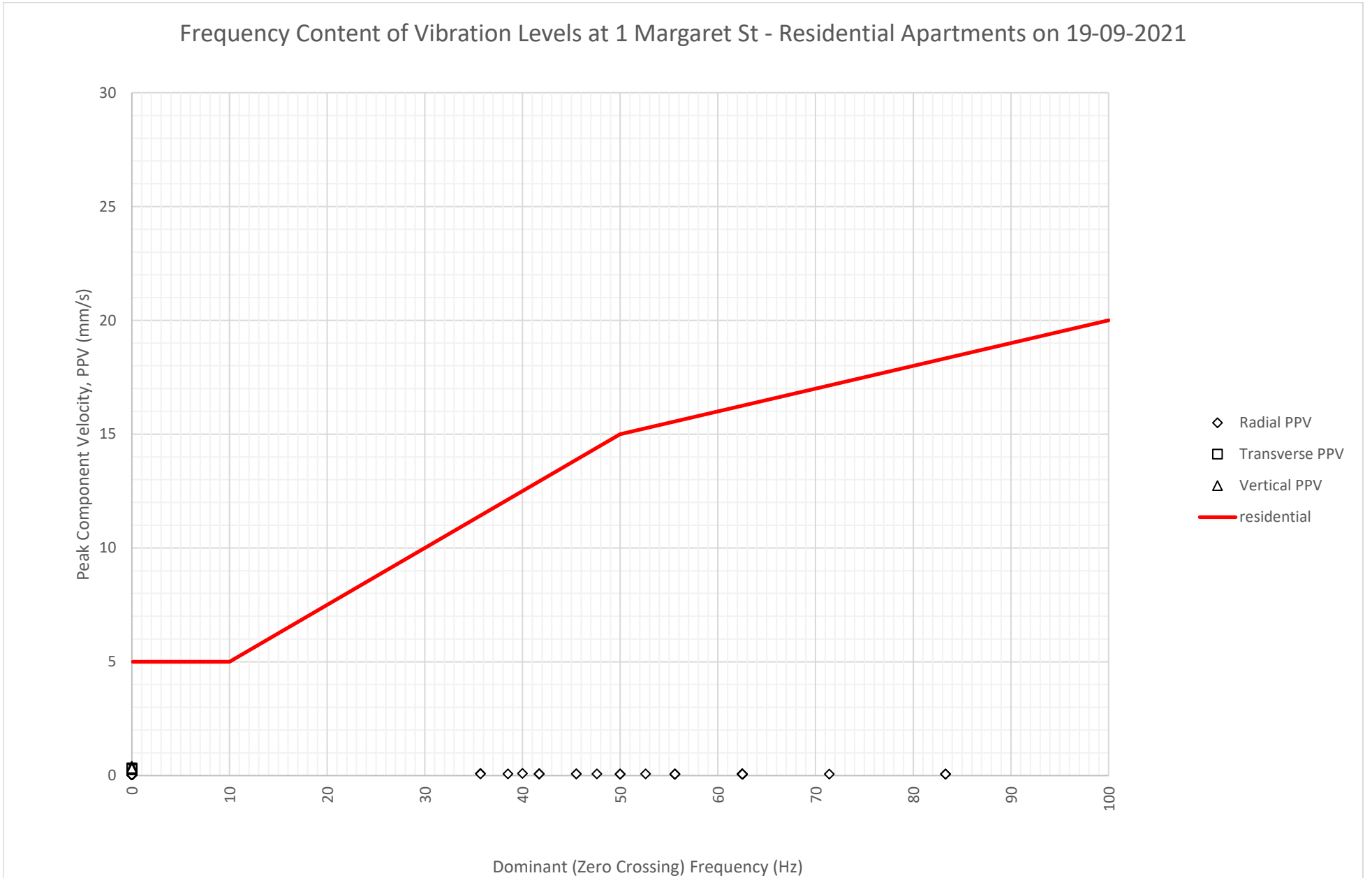
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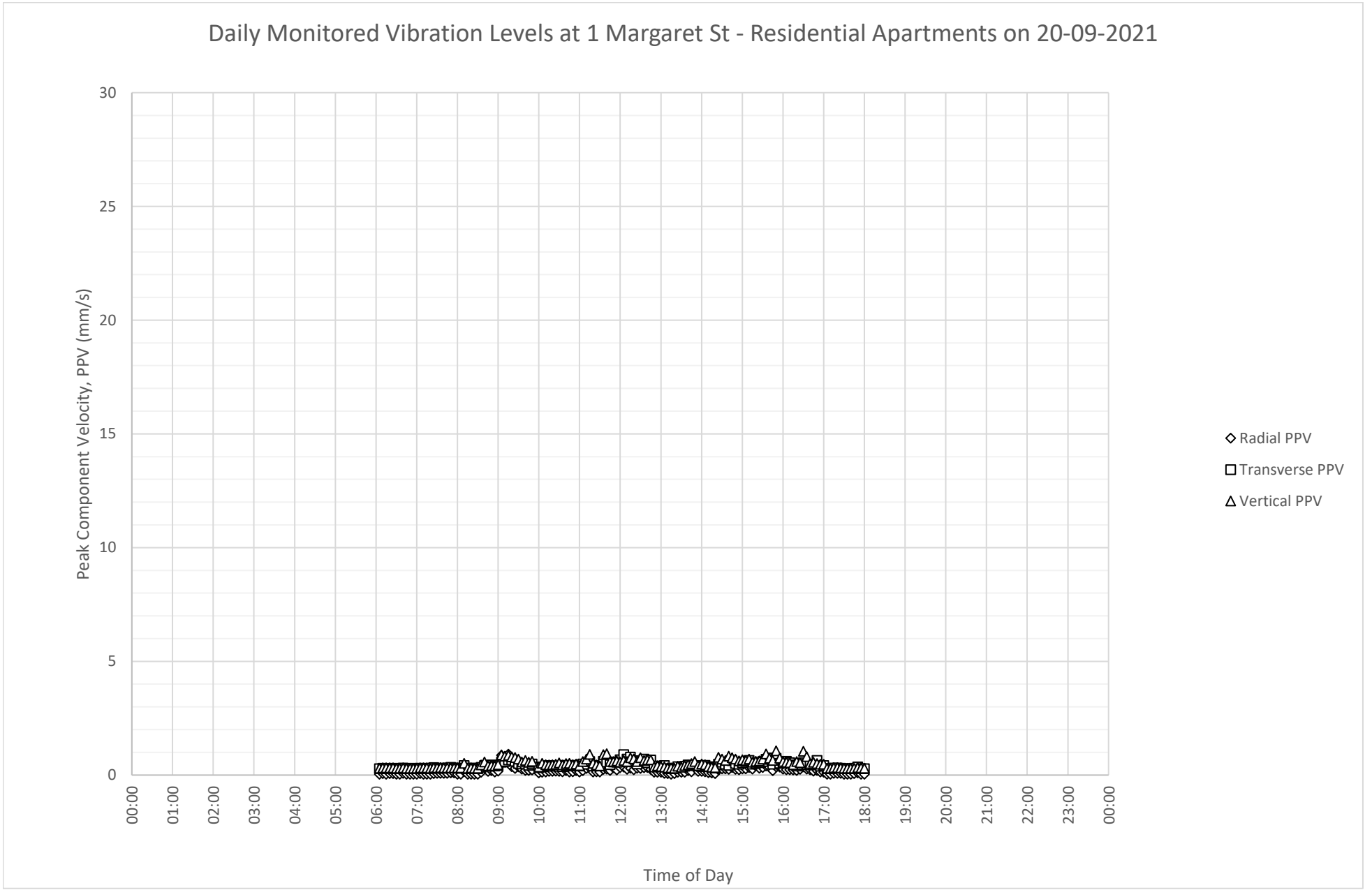
Transverse PPV
Vertical PPV
residential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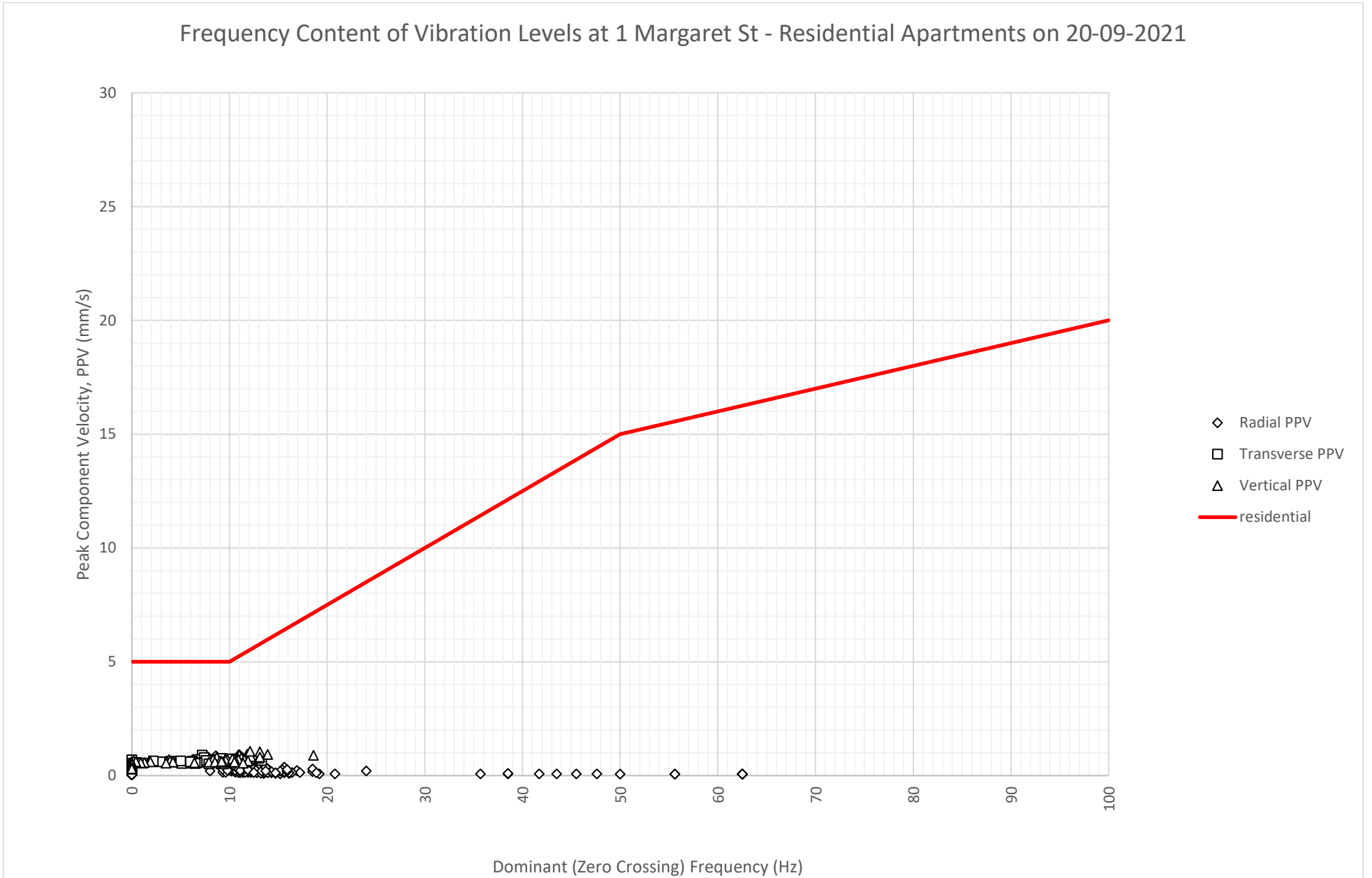
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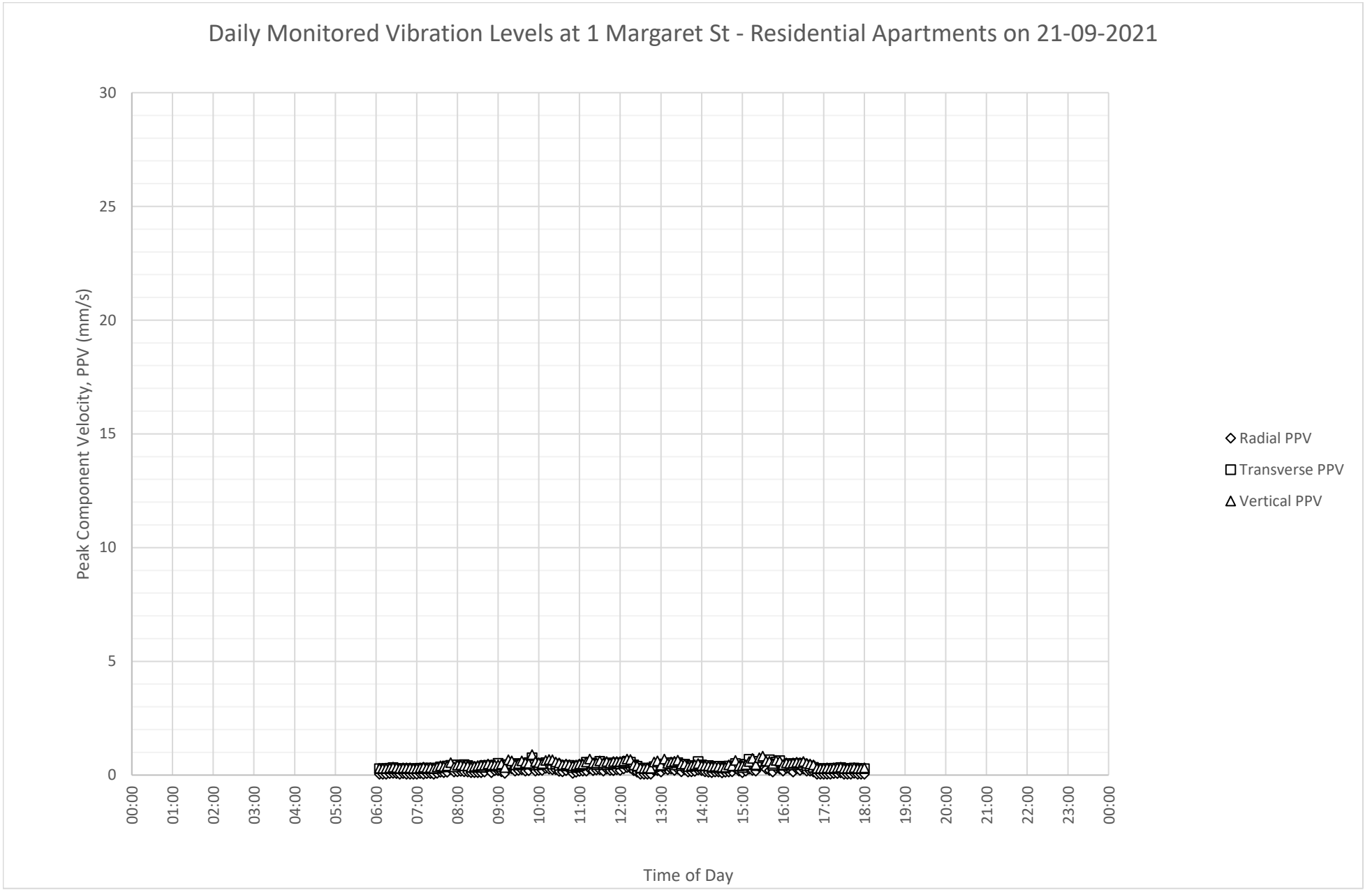
Radial PPV
Transverse PPV
Vertical PPV
residential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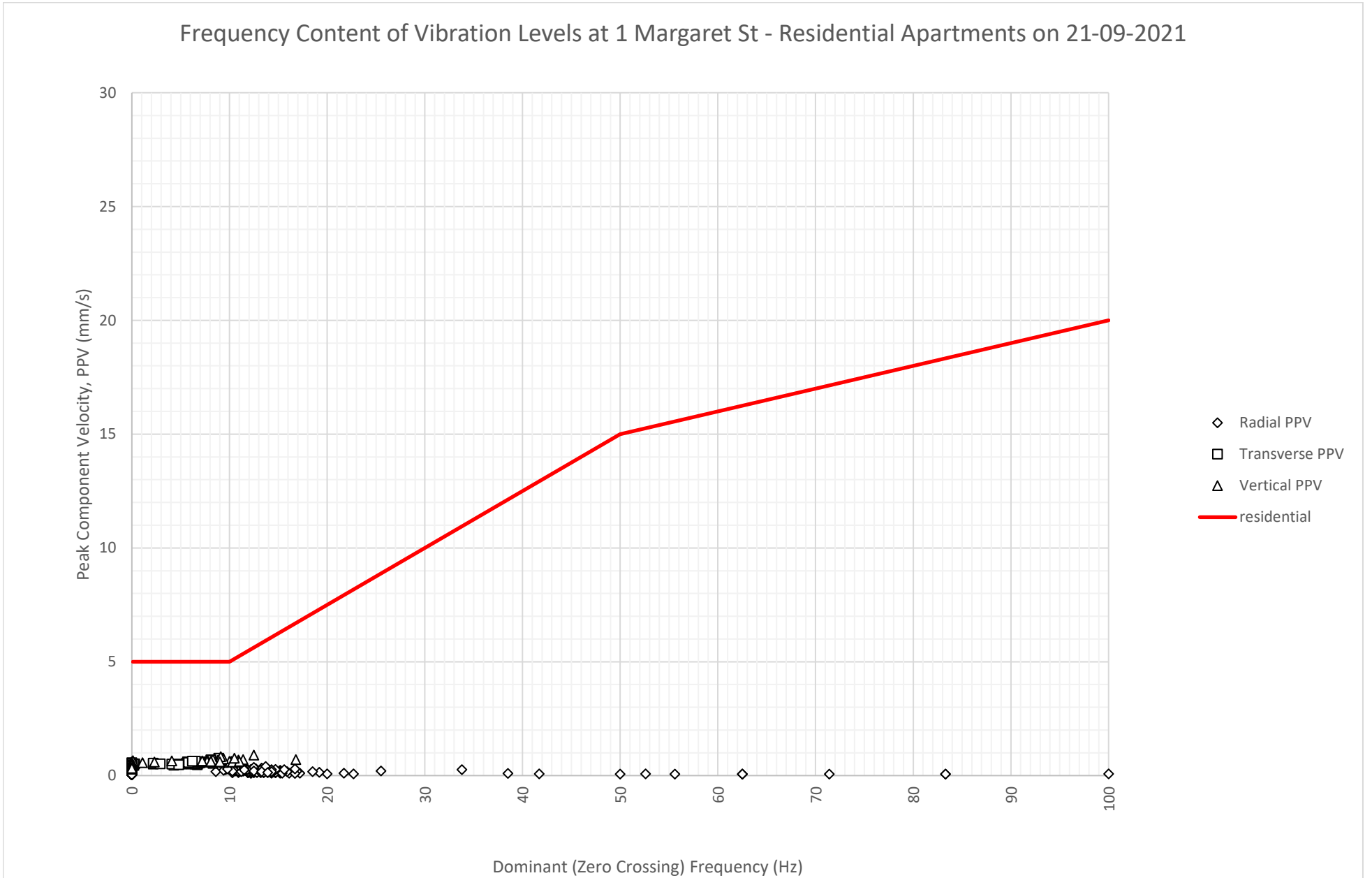
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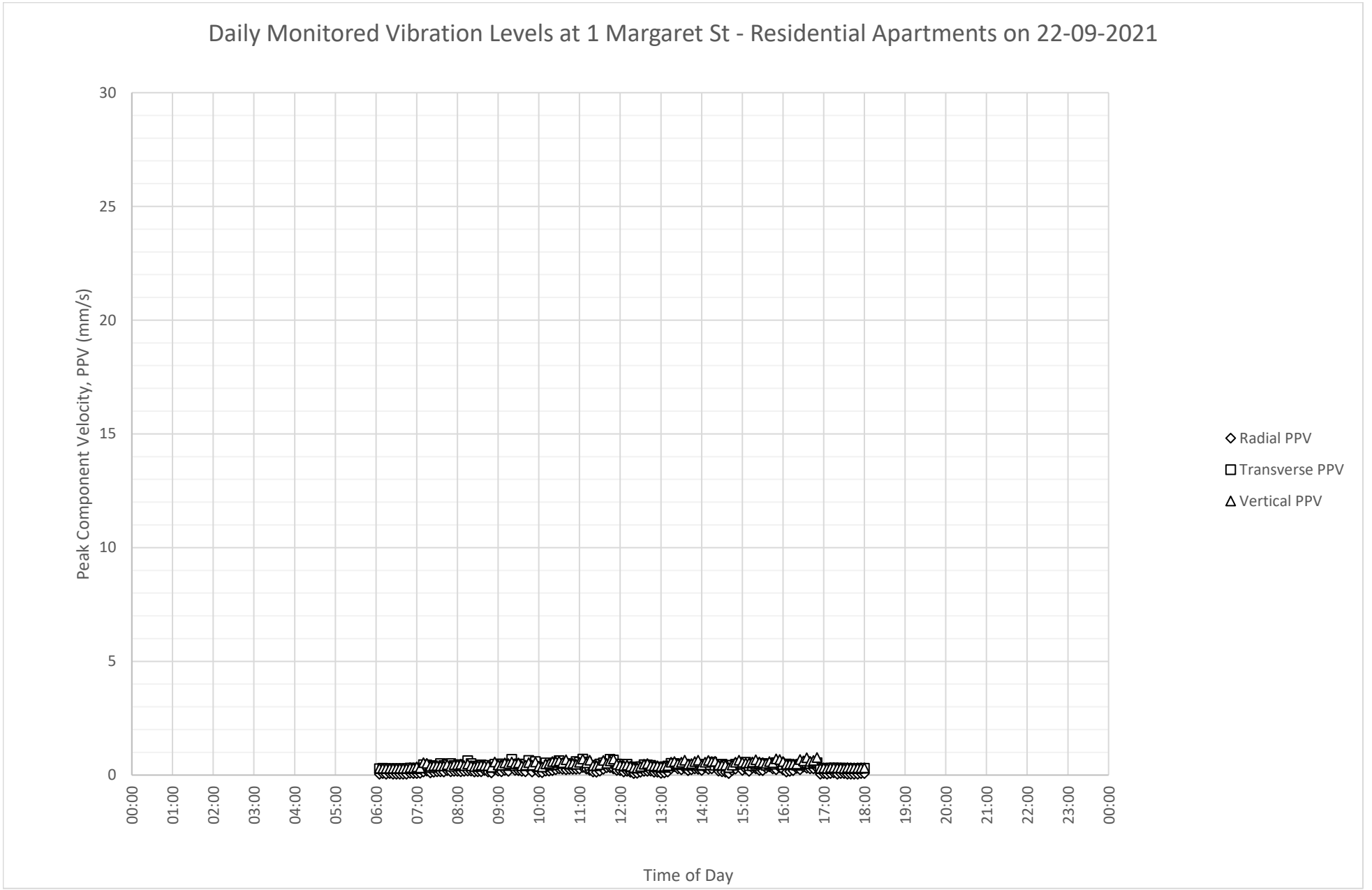
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential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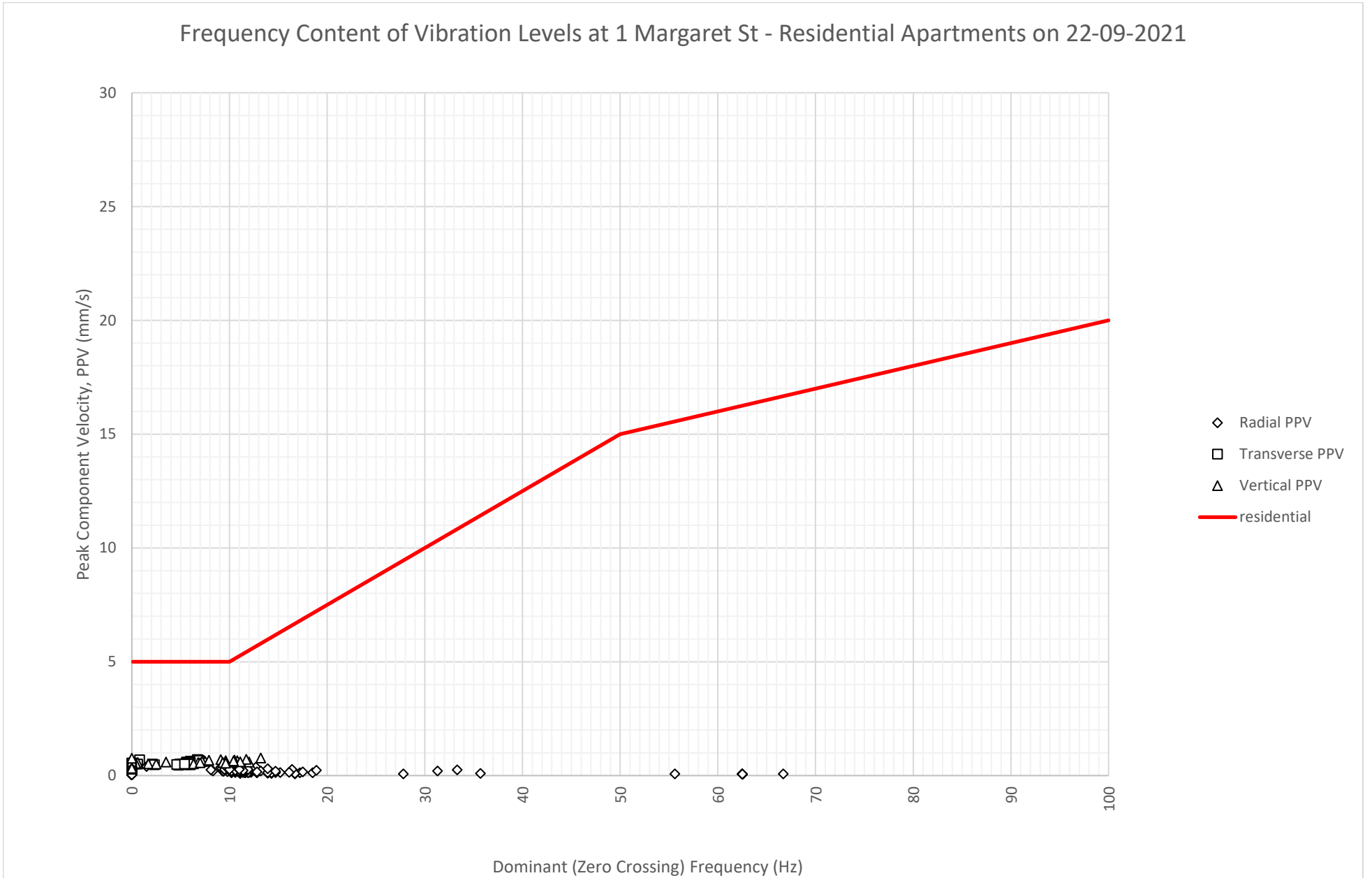
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St - Residential Apartments on 22-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
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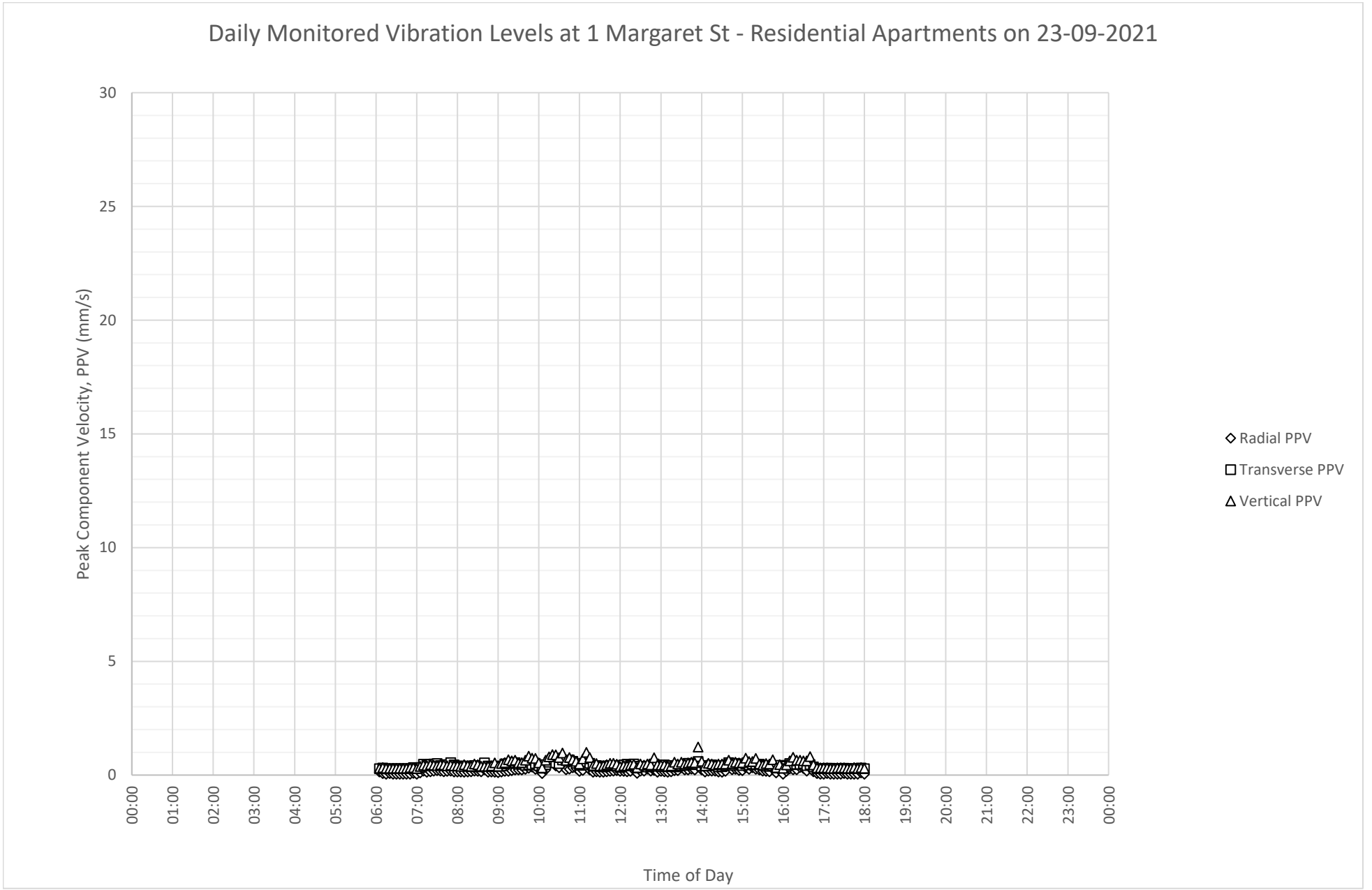
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential


Daily Monitored Vibration Levels at 1 Margaret St - Residential Apartments on 23-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
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05:00
06:00
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13:00
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15:00
16:00
17:00
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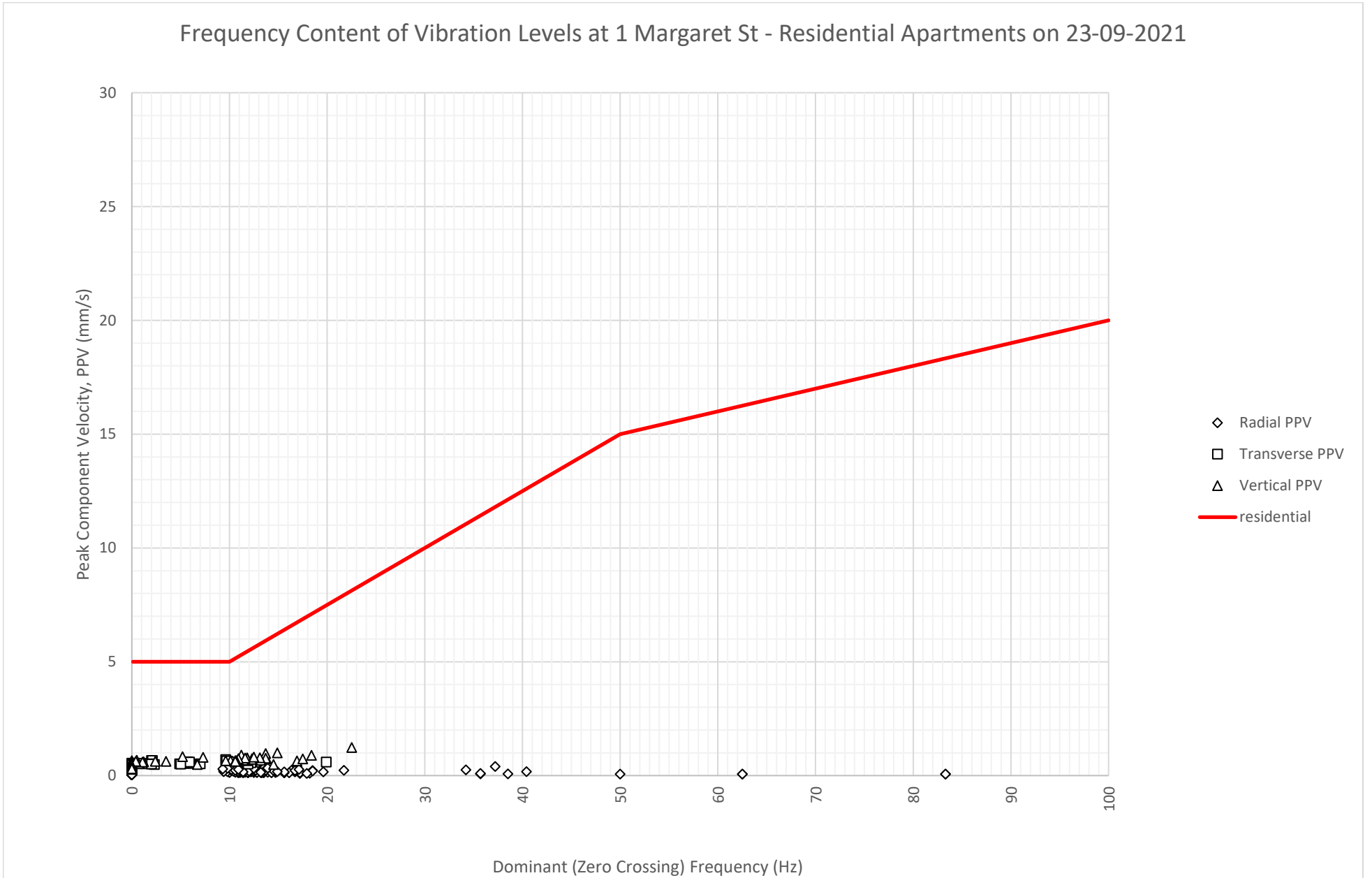
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St - Residential Apartments on 23-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
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40
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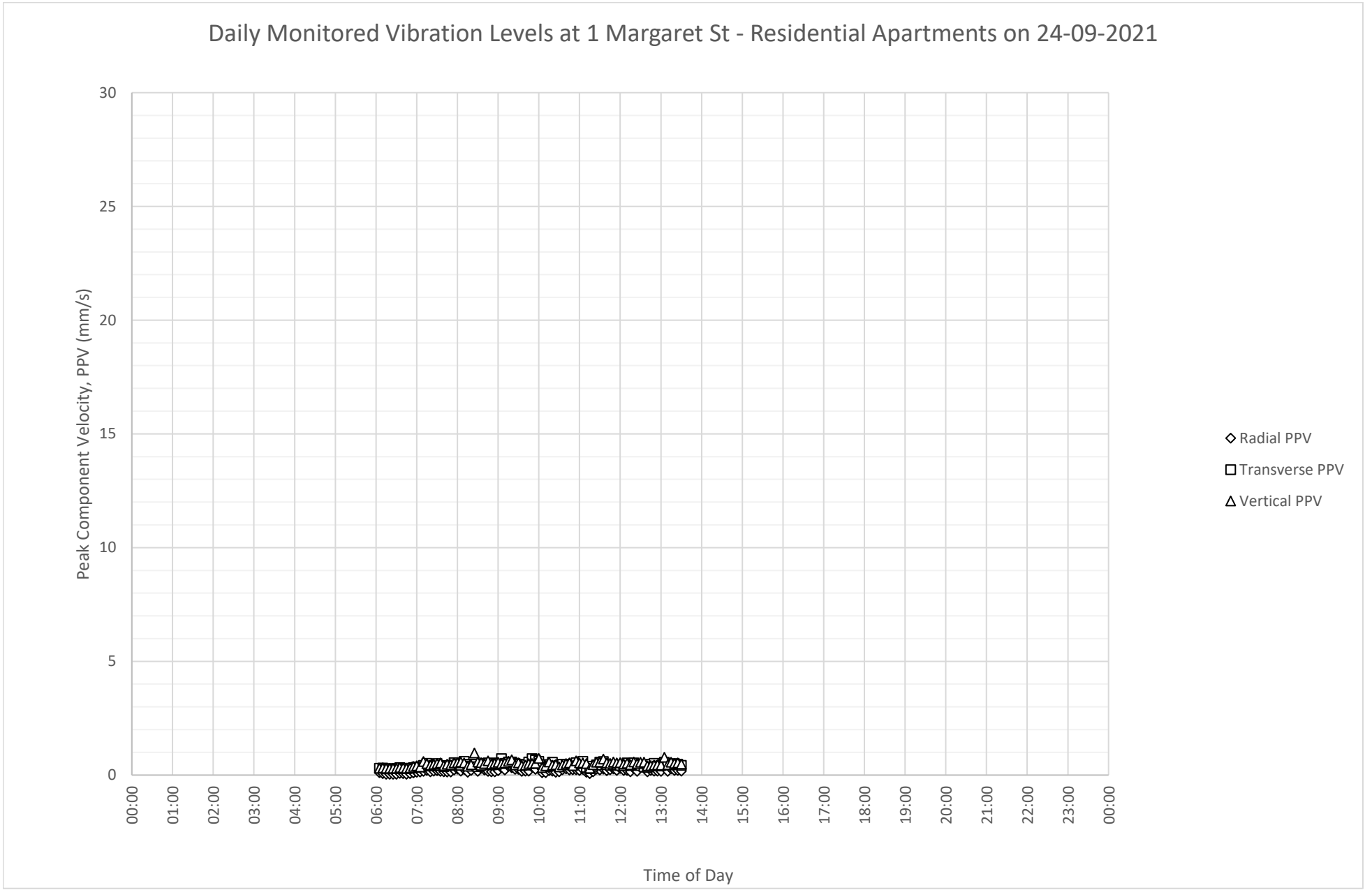
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential


Daily Monitored Vibration Levels at 1 Margaret St - Residential Apartments on 24-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
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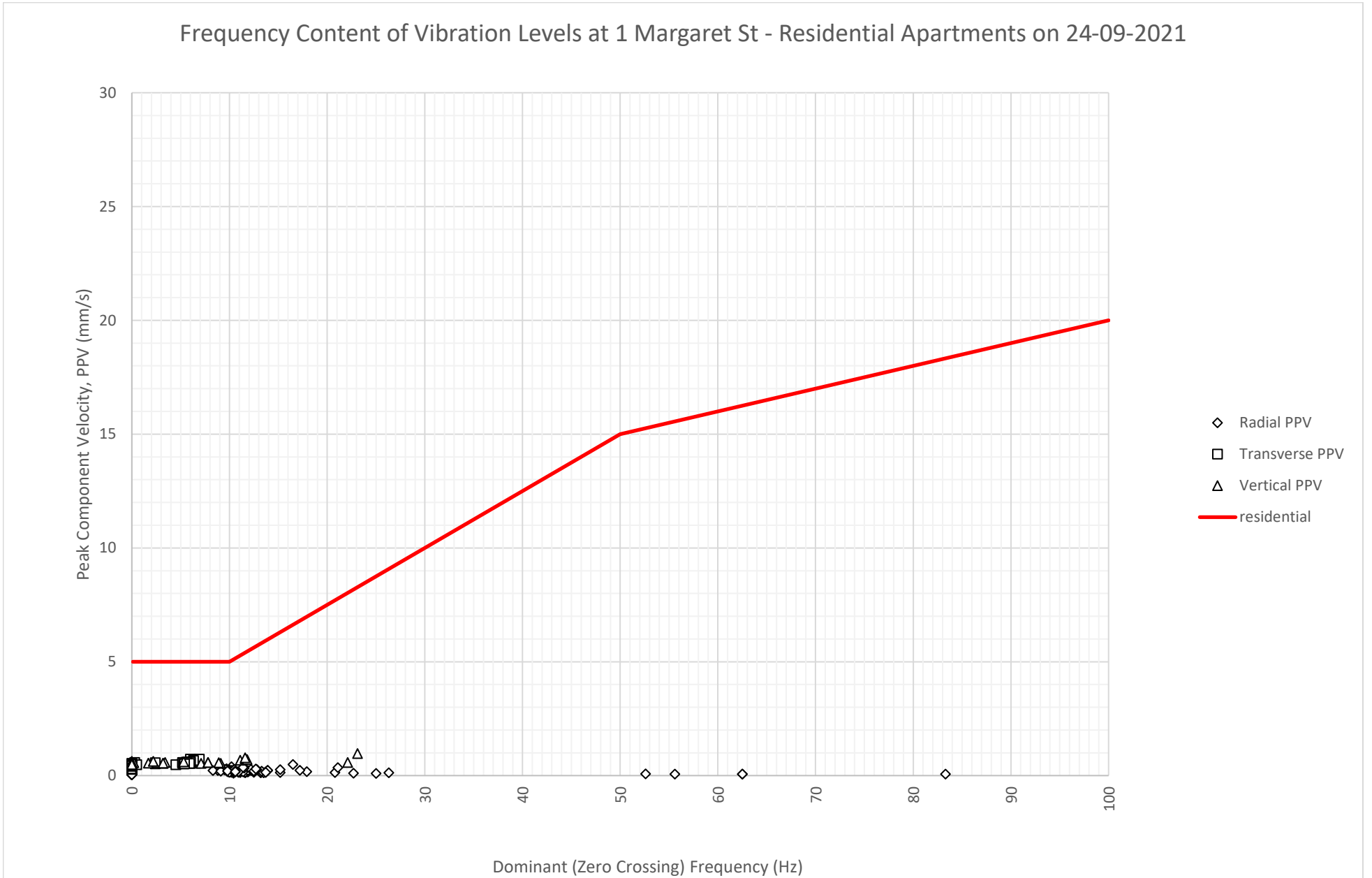
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St - Residential Apartments on 24-09-2021
Peak Component Velocity, PPV (mm/s)
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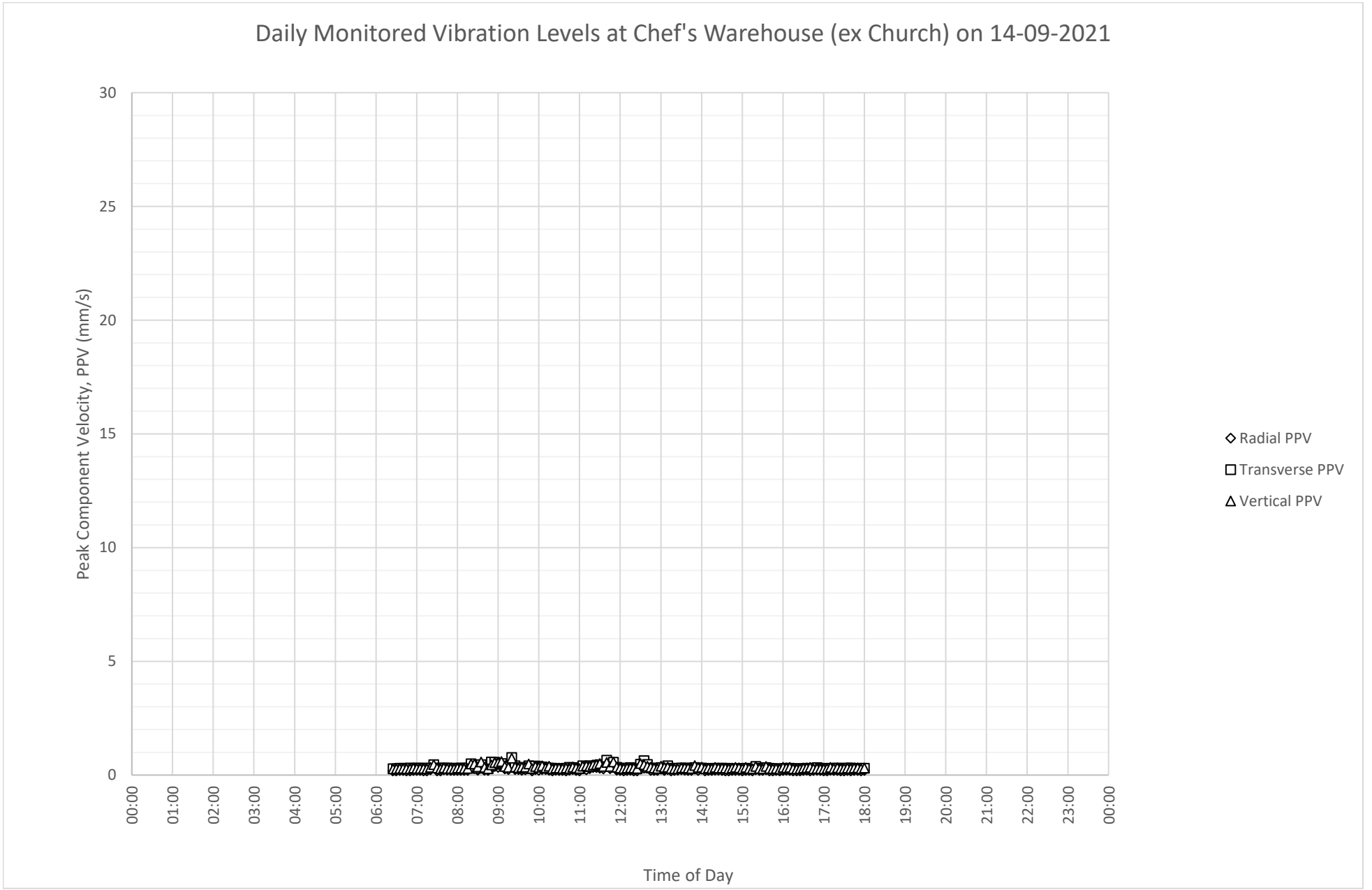
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential

APPENDIX 2 – VIBRATION MONITORING DATA – RECEIVER 2-EX CHURCH


Daily Monitored Vibration Levels at Chef's Warehouse (ex Church) on 14-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
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06:00
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16:00
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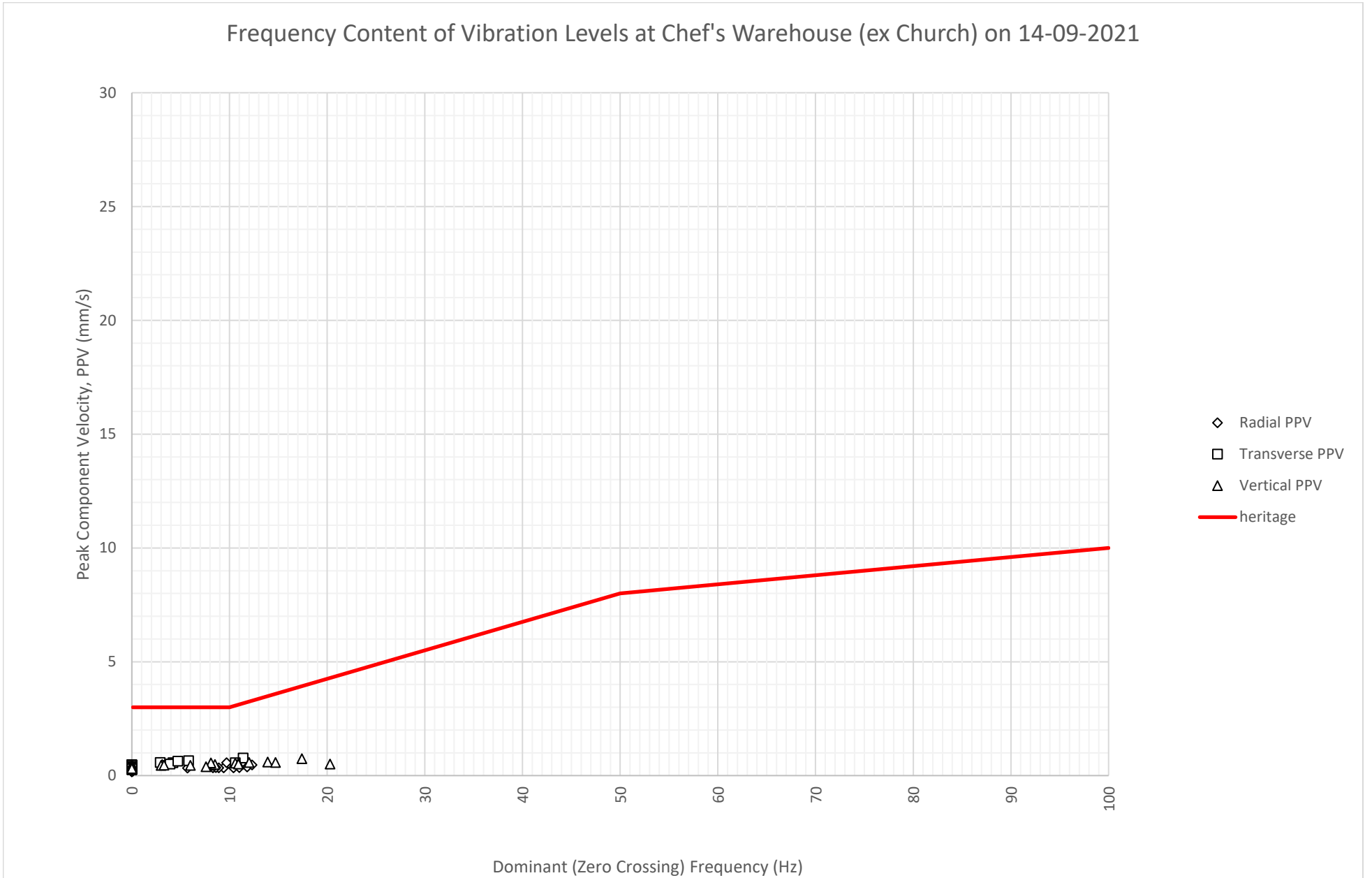
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chef's Warehouse (ex Church) on 14-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
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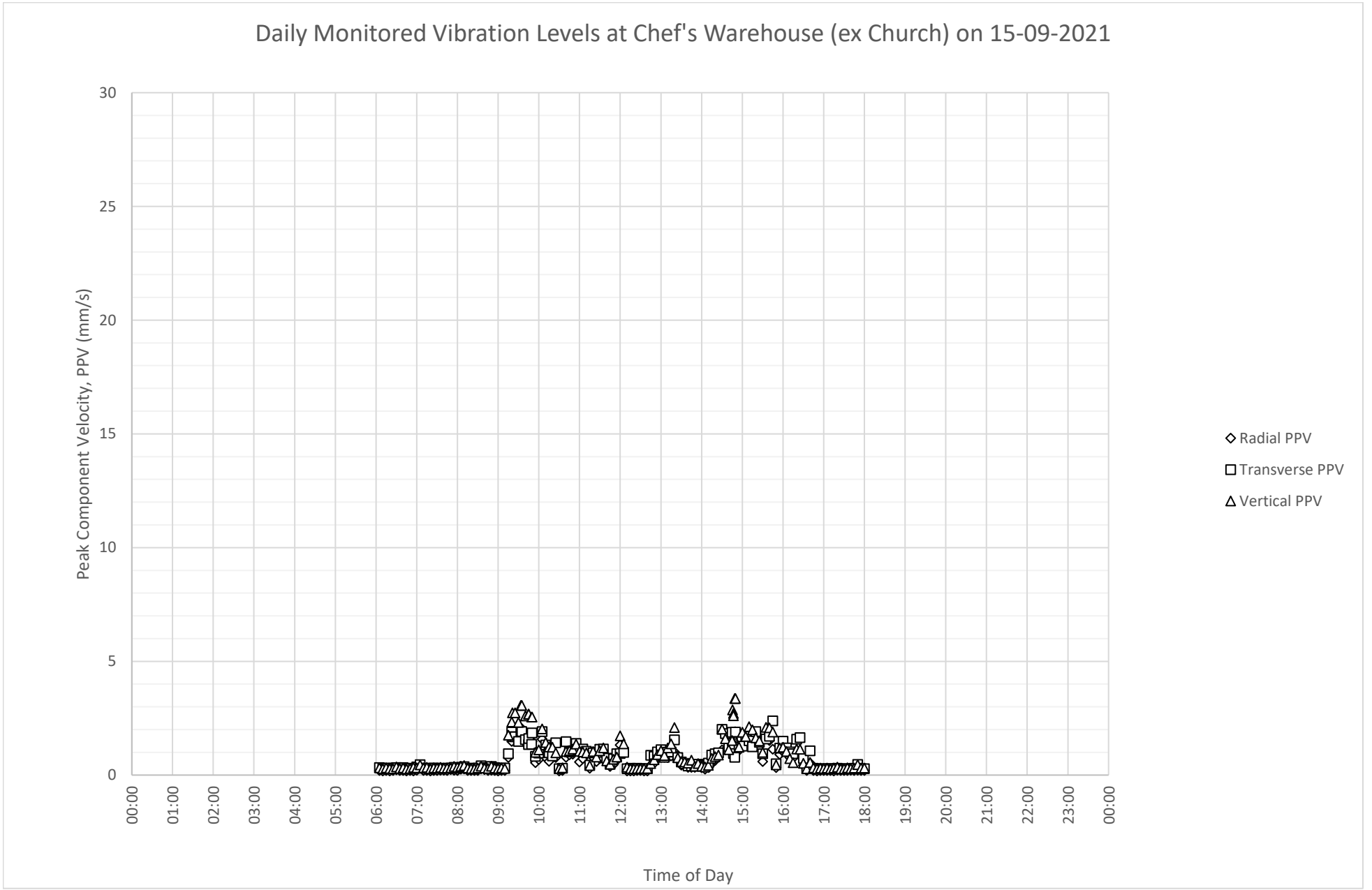
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chef's Warehouse (ex Church) on 15-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
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16:00
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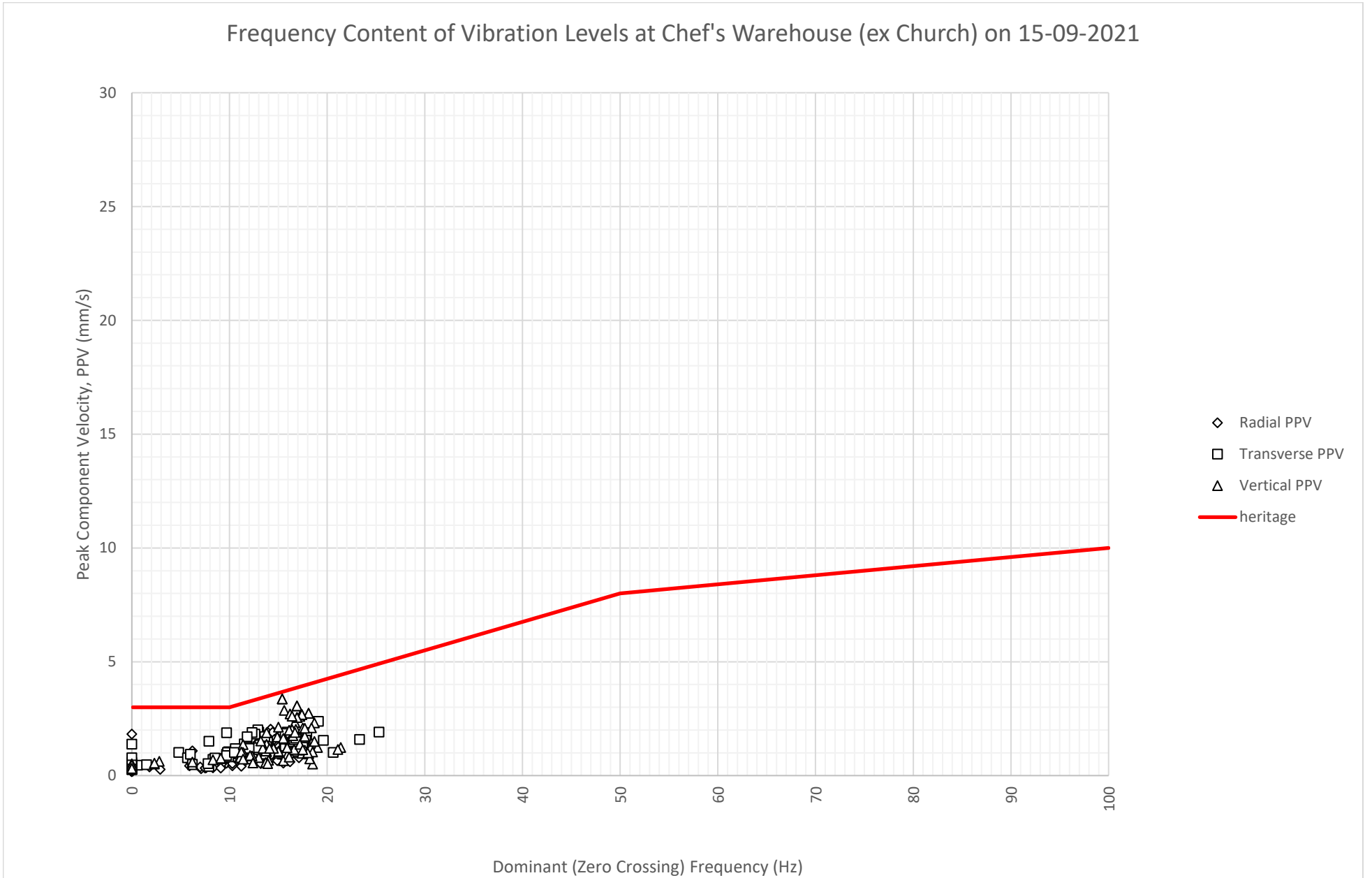
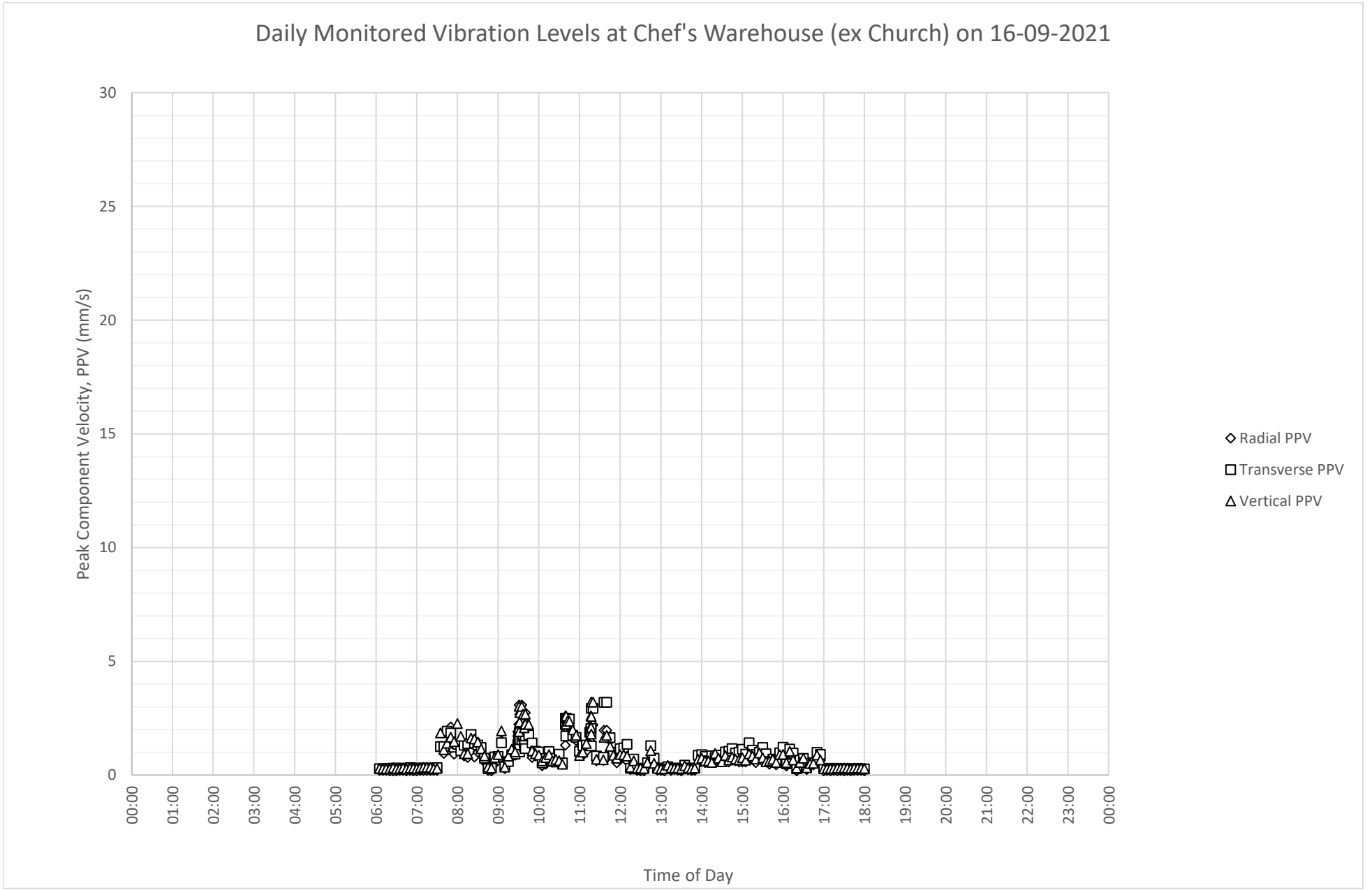
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chef's Warehouse (ex Church) on 15-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chef's Warehouse (ex Church) on 16-09-2021
Peak Component Velocity, PPV (mm/s)
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25
20
15
10
5
0
00:00
01:00
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05:00
06:00
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20:00
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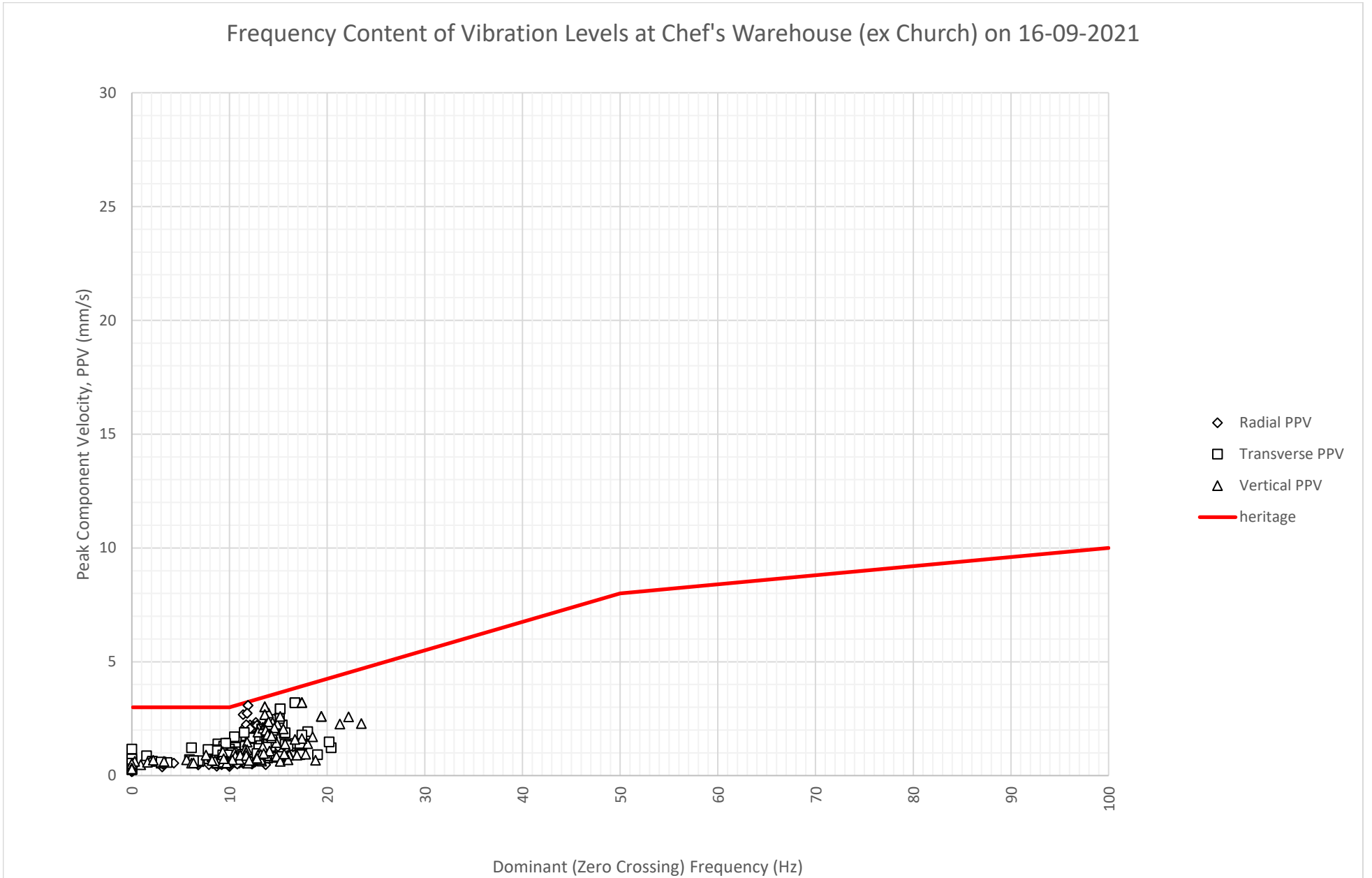
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chef's Warehouse (ex Church) on 16-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
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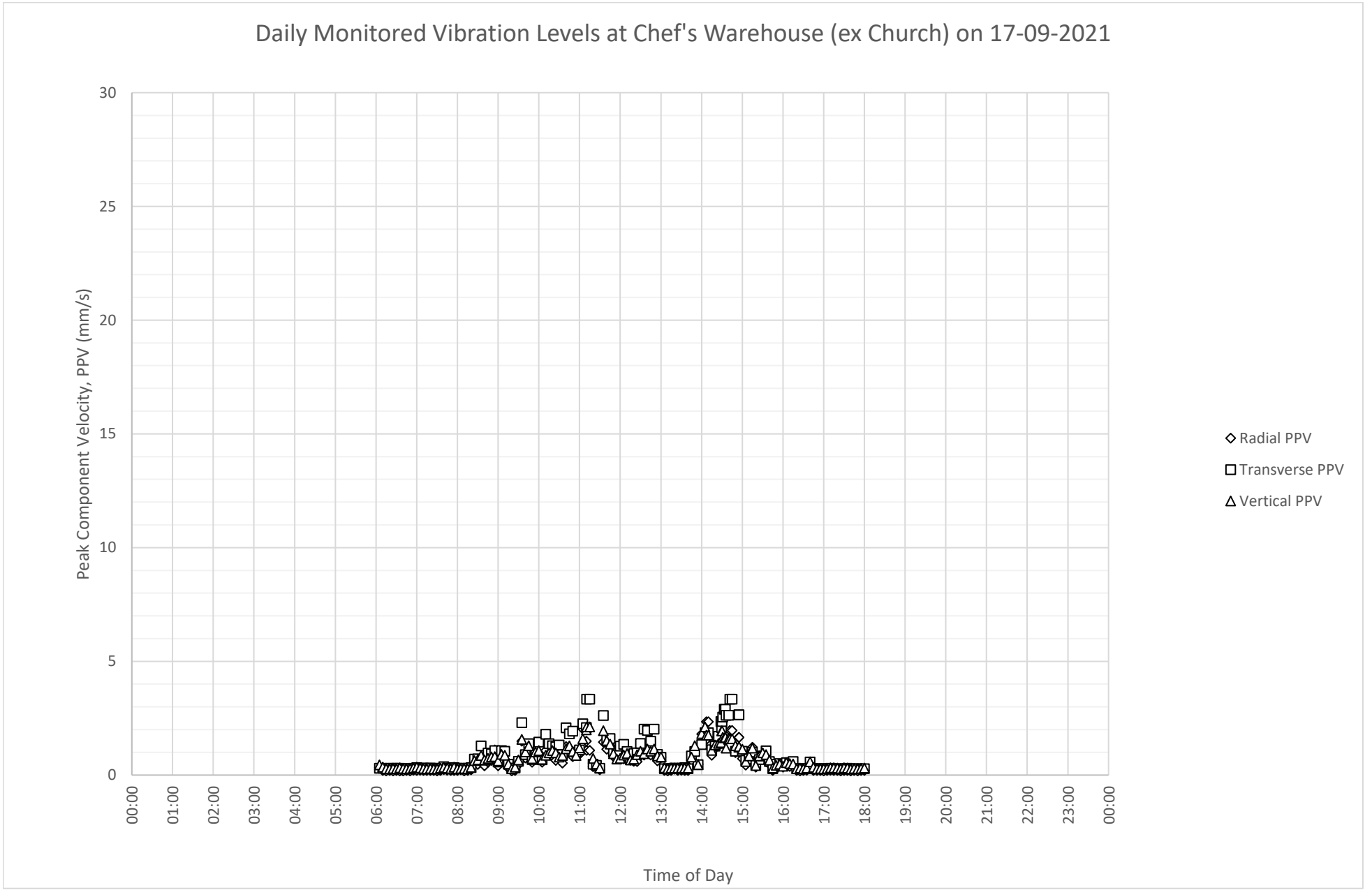
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chef's Warehouse (ex Church) on 17-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
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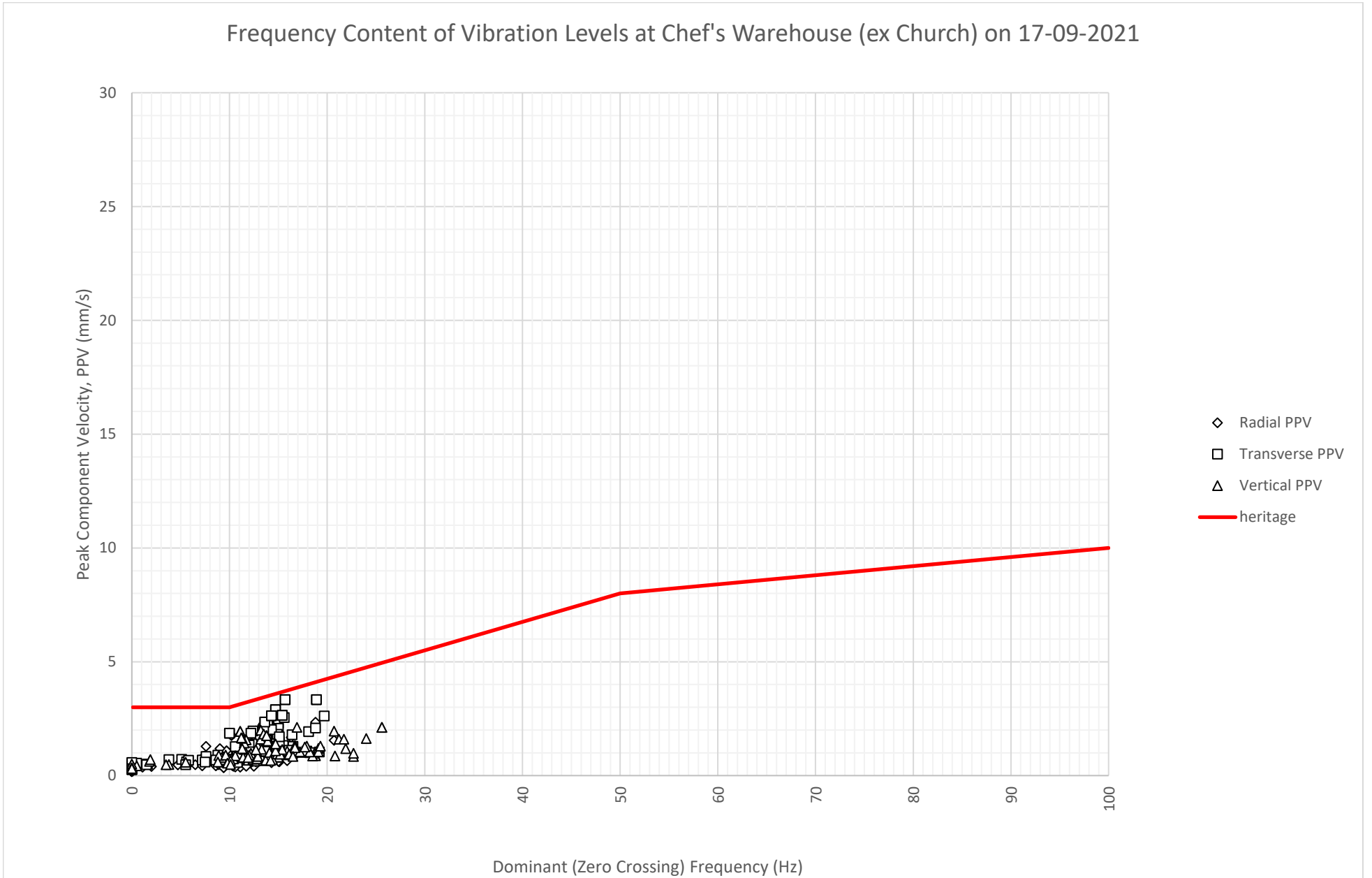
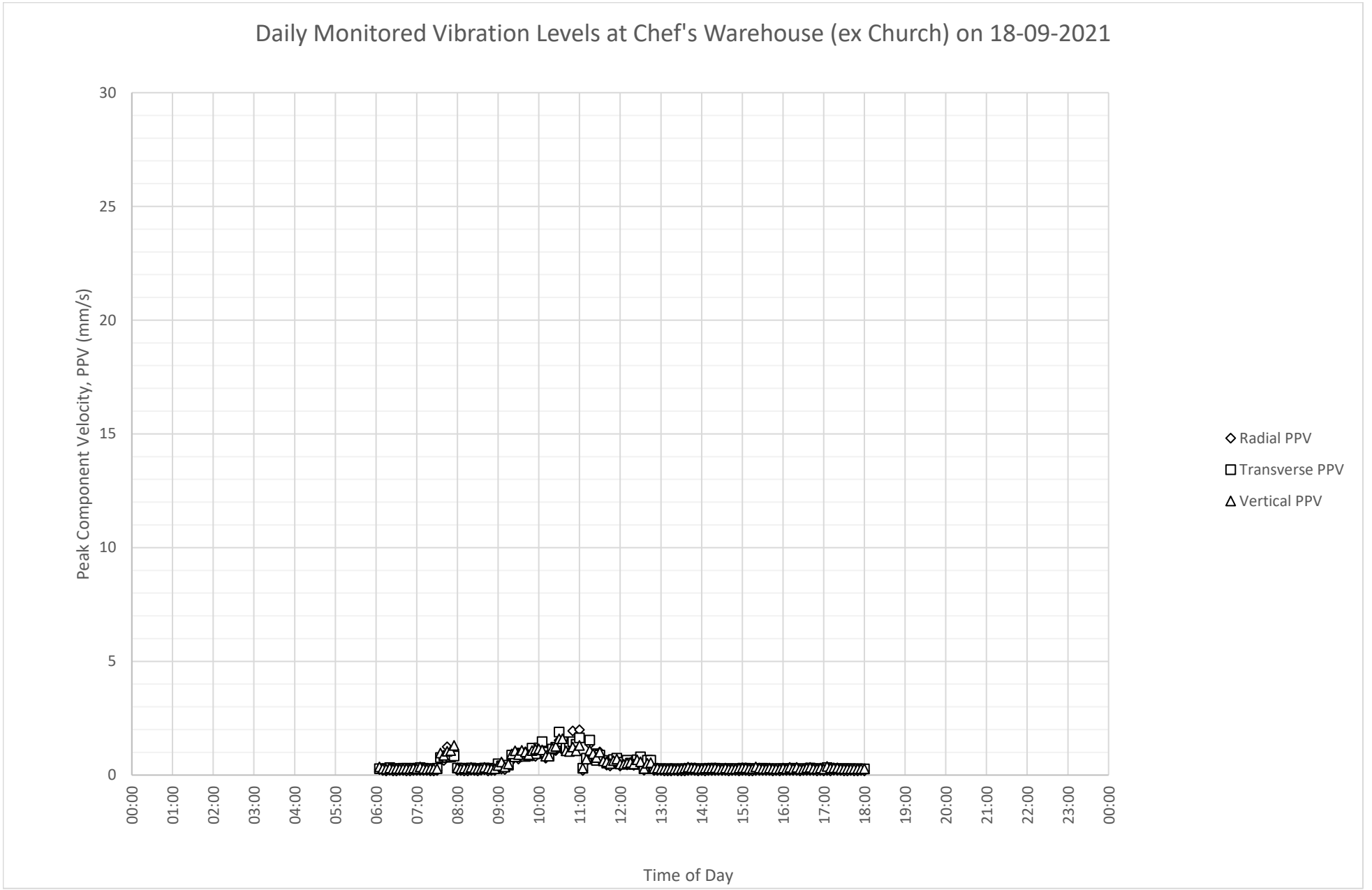
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chef's Warehouse (ex Church) on 17-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chef's Warehouse (ex Church) on 18-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
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15:00
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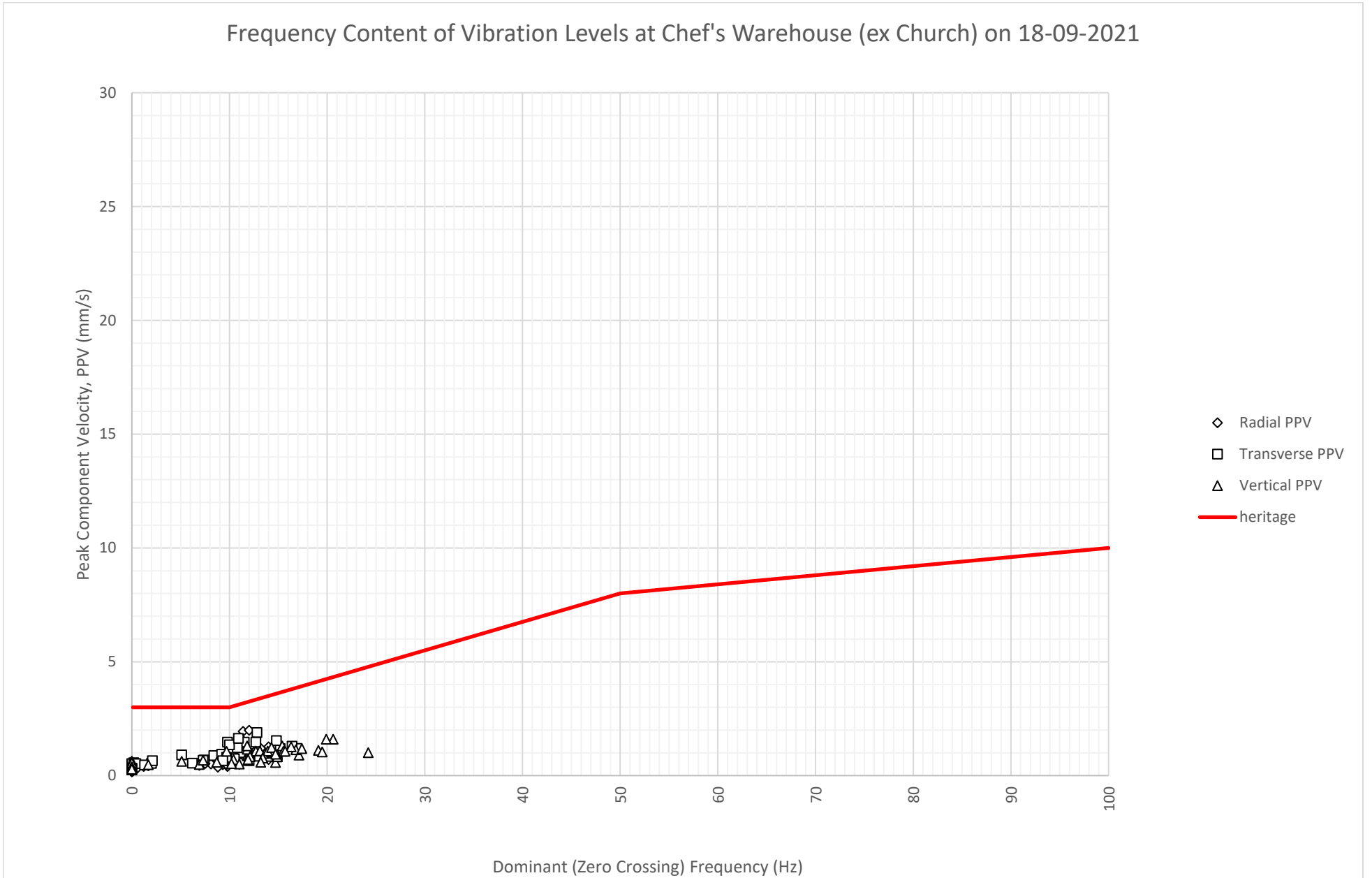
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chef's Warehouse (ex Church) on 18-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
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60
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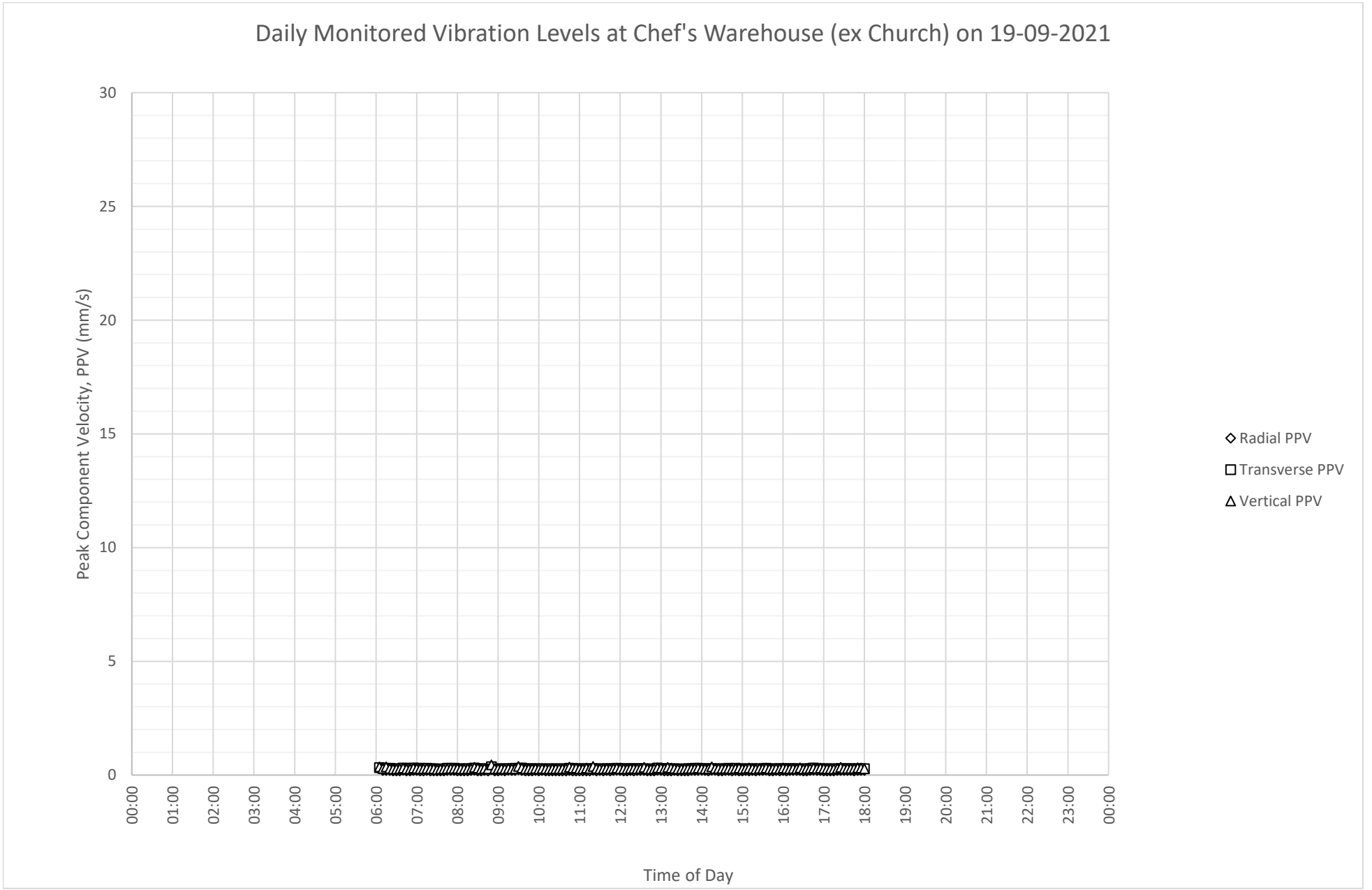
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chef's Warehouse (ex Church) on 19-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
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16:00
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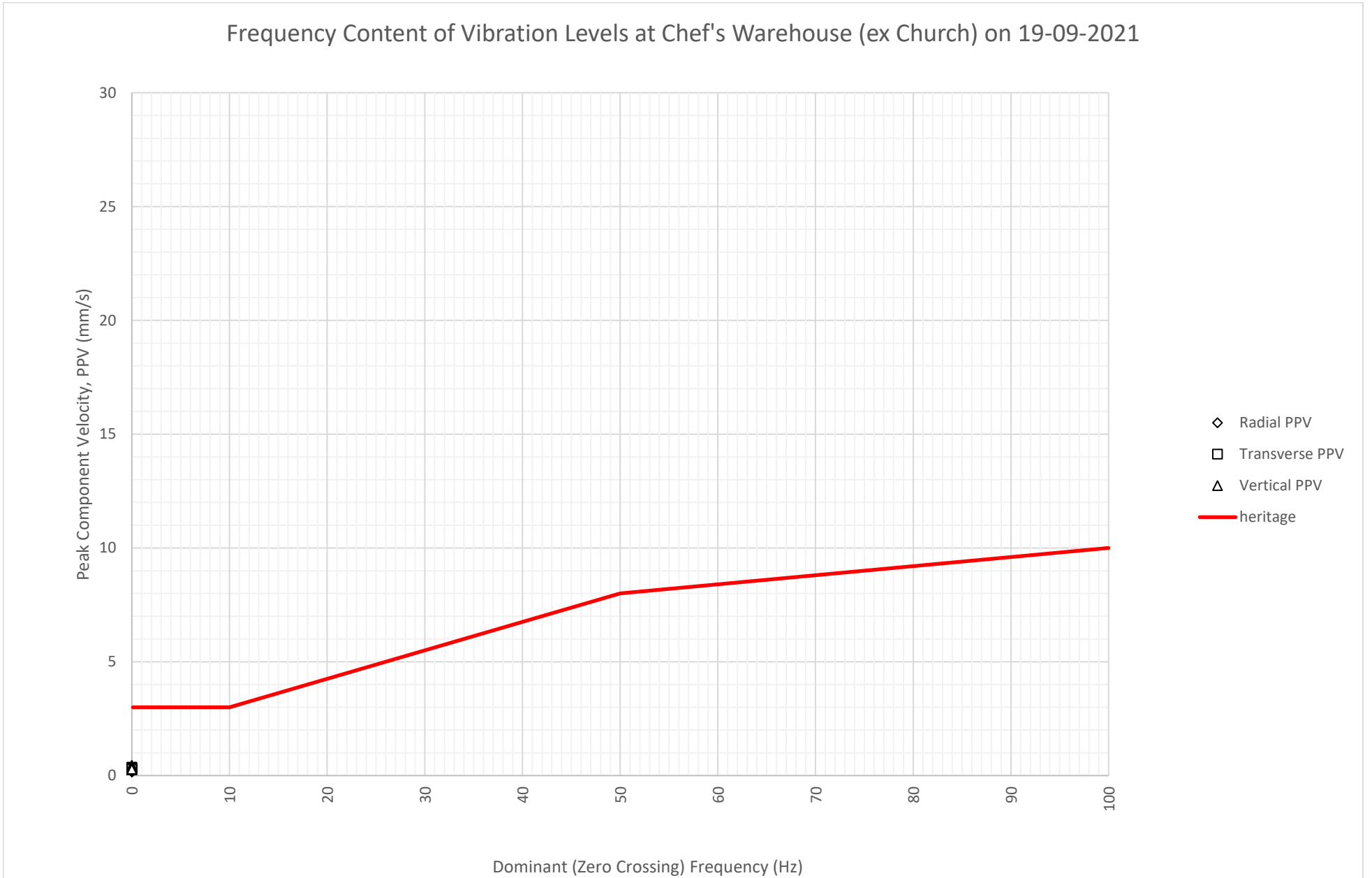
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chef's Warehouse (ex Church) on 19-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
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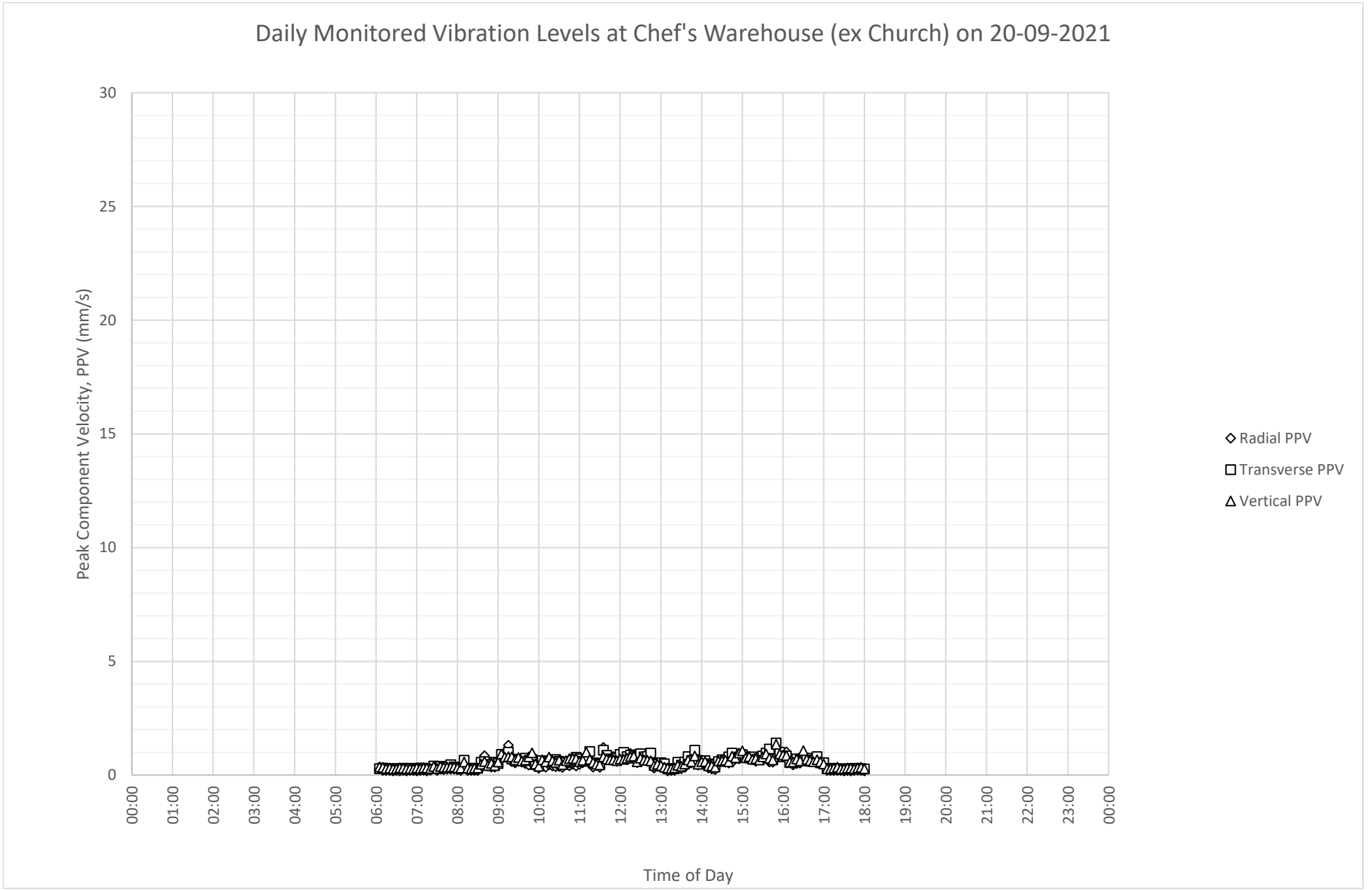
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chef's Warehouse (ex Church) on 20-09-2021
Peak Component Velocity, PPV (mm/s)
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25
20
15
10
5
0
00:00
01:00
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06:00
07:00
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13:00
14:00
15:00
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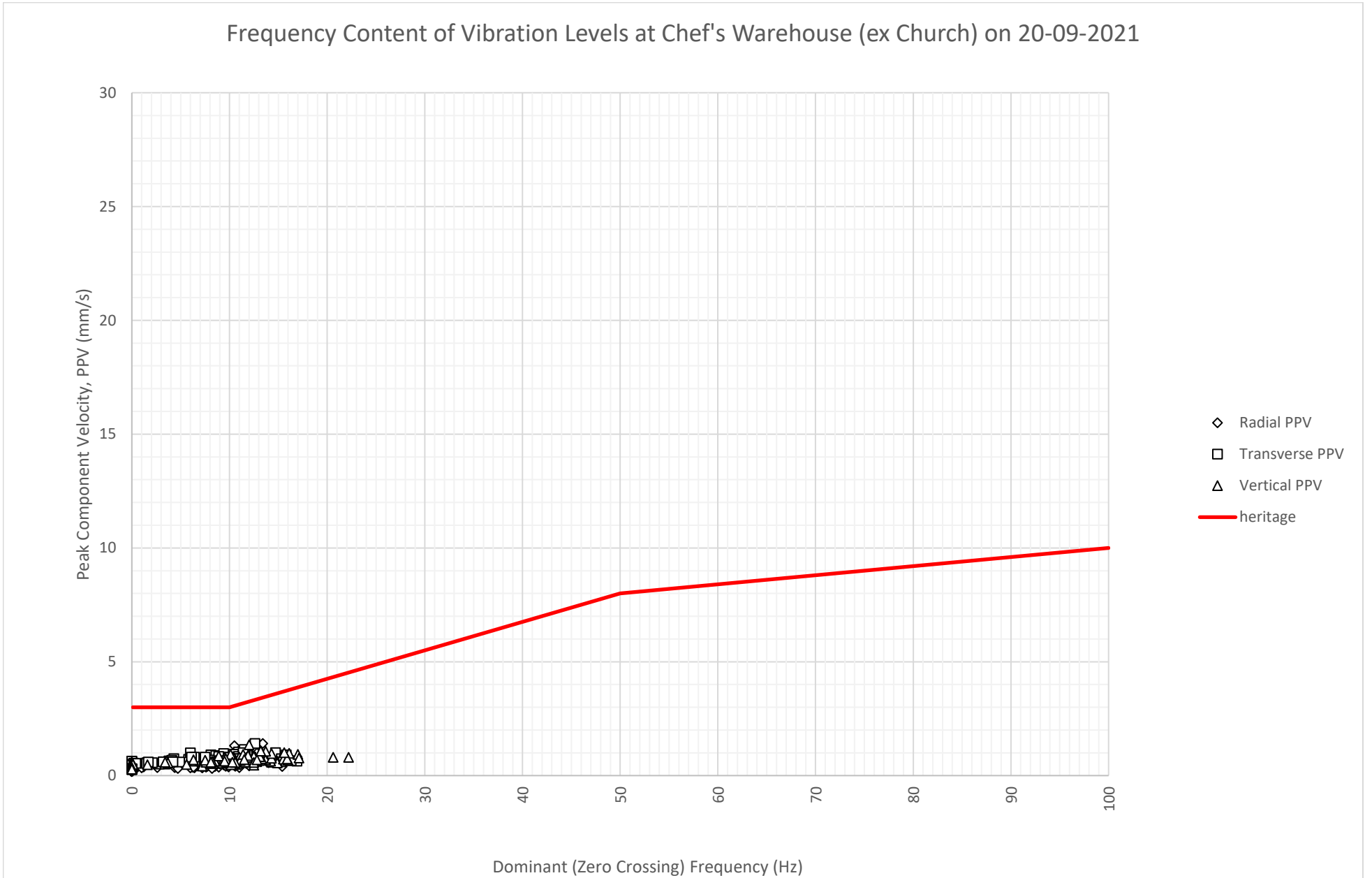
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chef's Warehouse (ex Church) on 20-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
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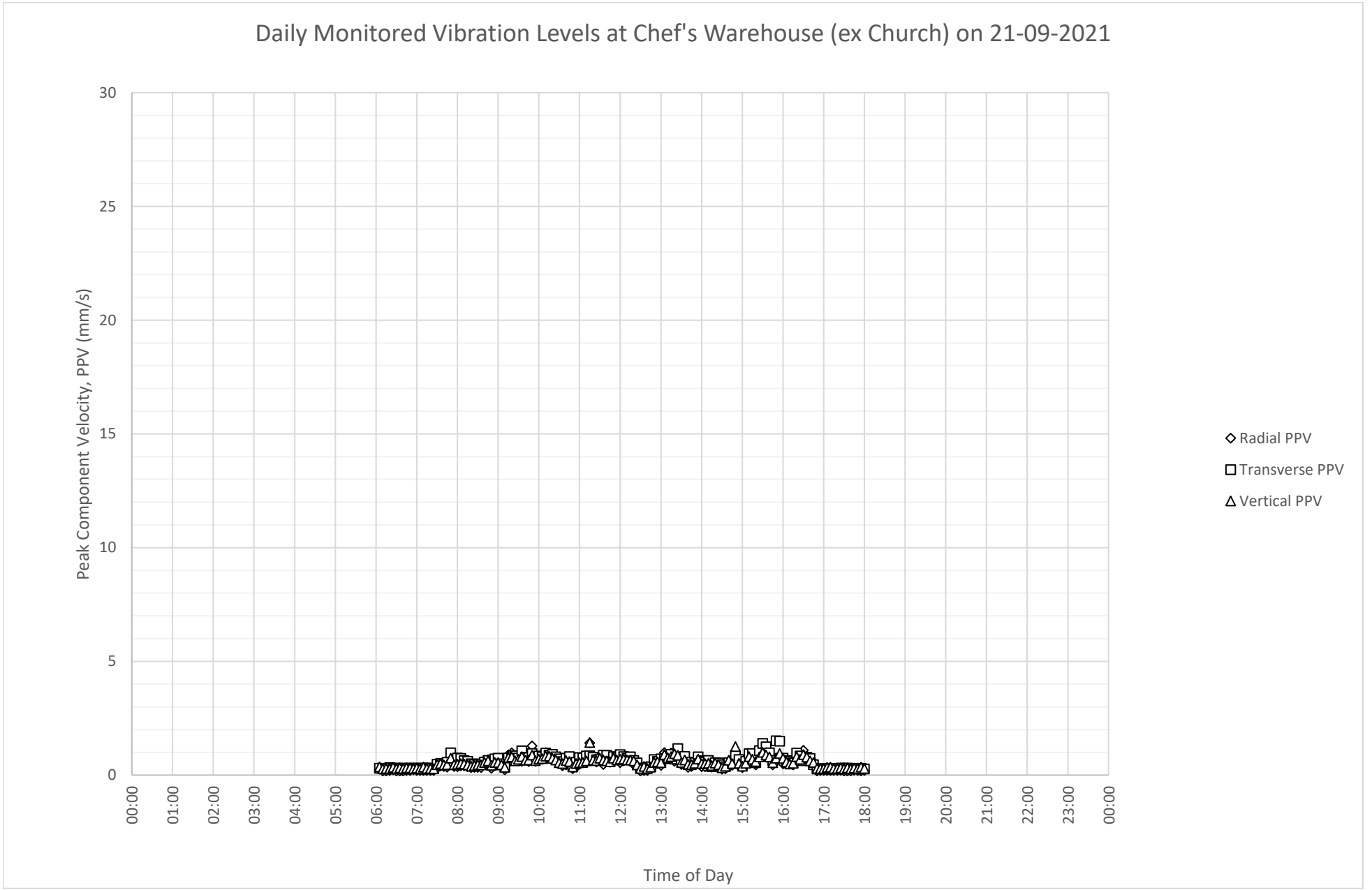
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chef's Warehouse (ex Church) on 21-09-2021
Peak Component Velocity, PPV (mm/s)
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25
20
15
10
5
0
00:00
01:00
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05:00
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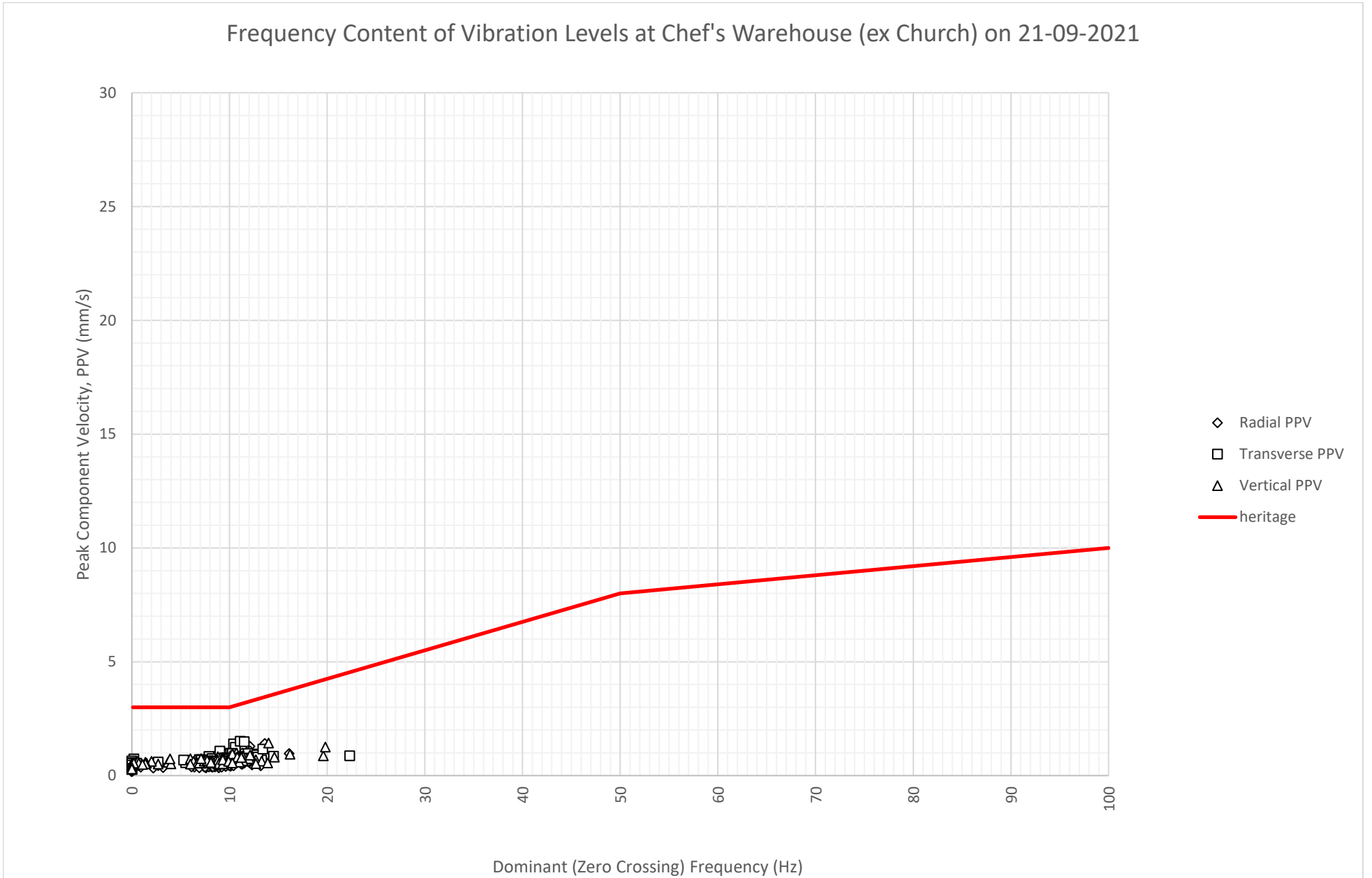
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chef's Warehouse (ex Church) on 21-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
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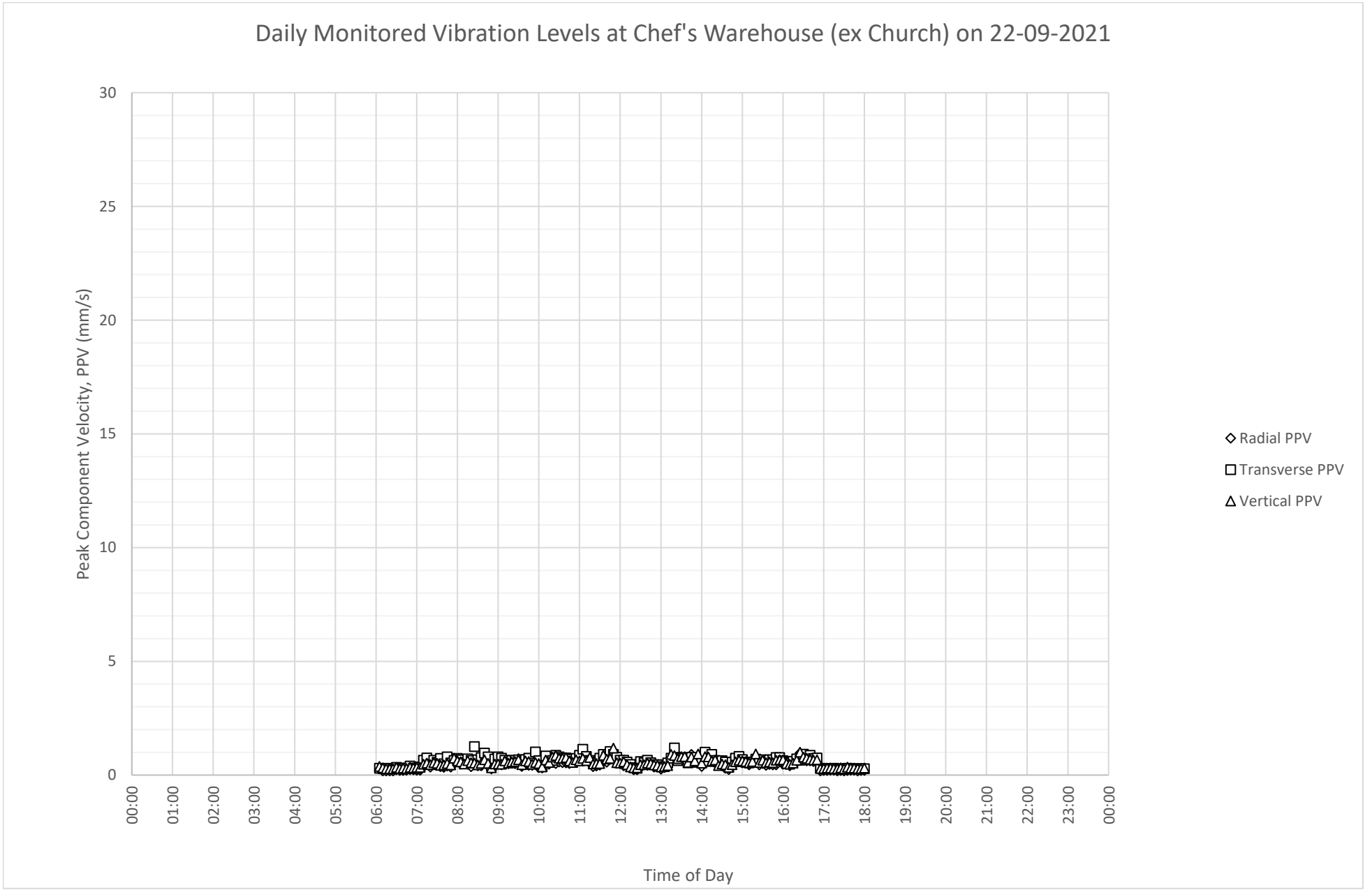
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chef's Warehouse (ex Church) on 22-09-2021
Peak Component Velocity, PPV (mm/s)
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15
10
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0
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01:00
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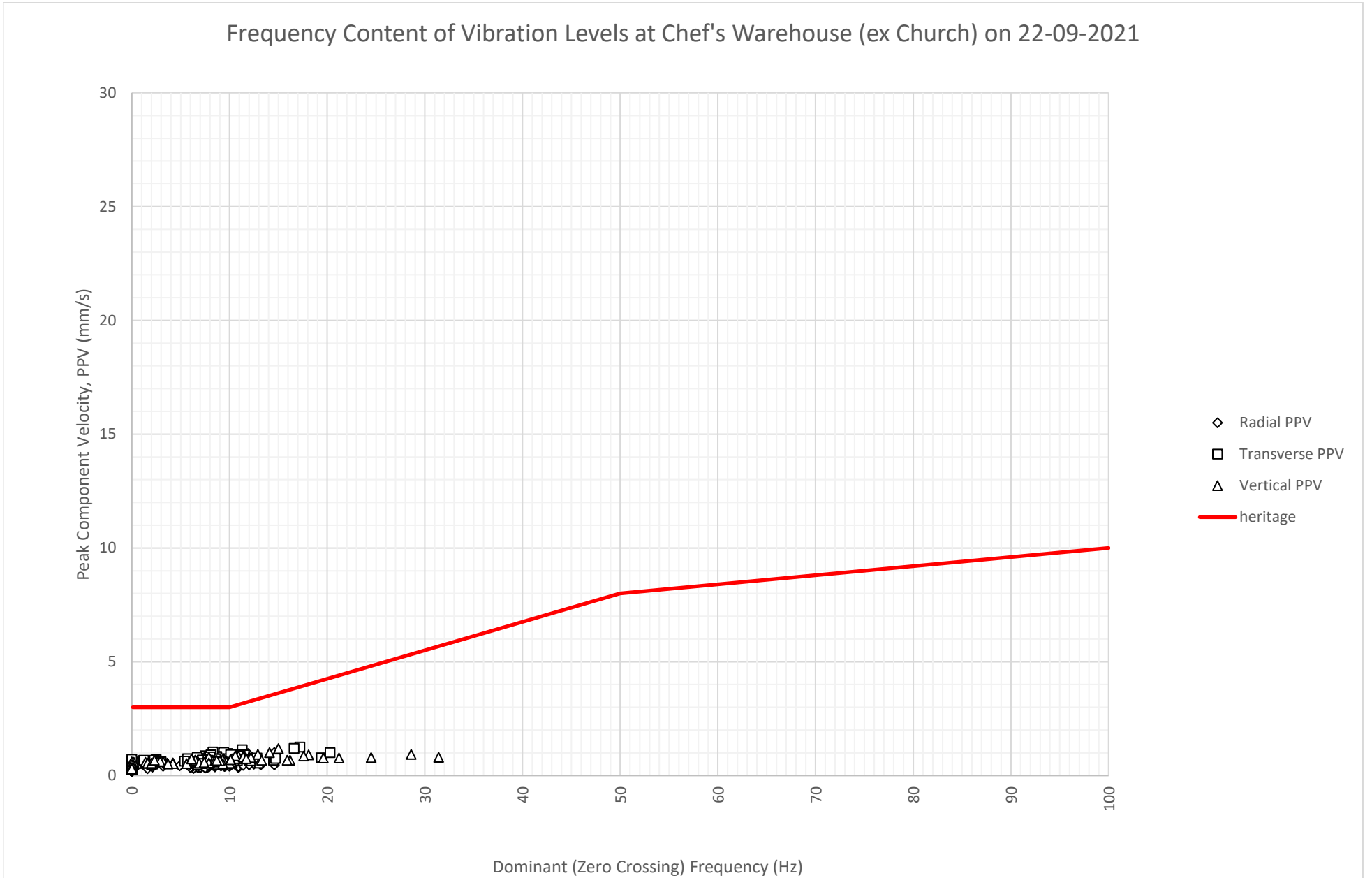
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chef's Warehouse (ex Church) on 22-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
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0
0
10
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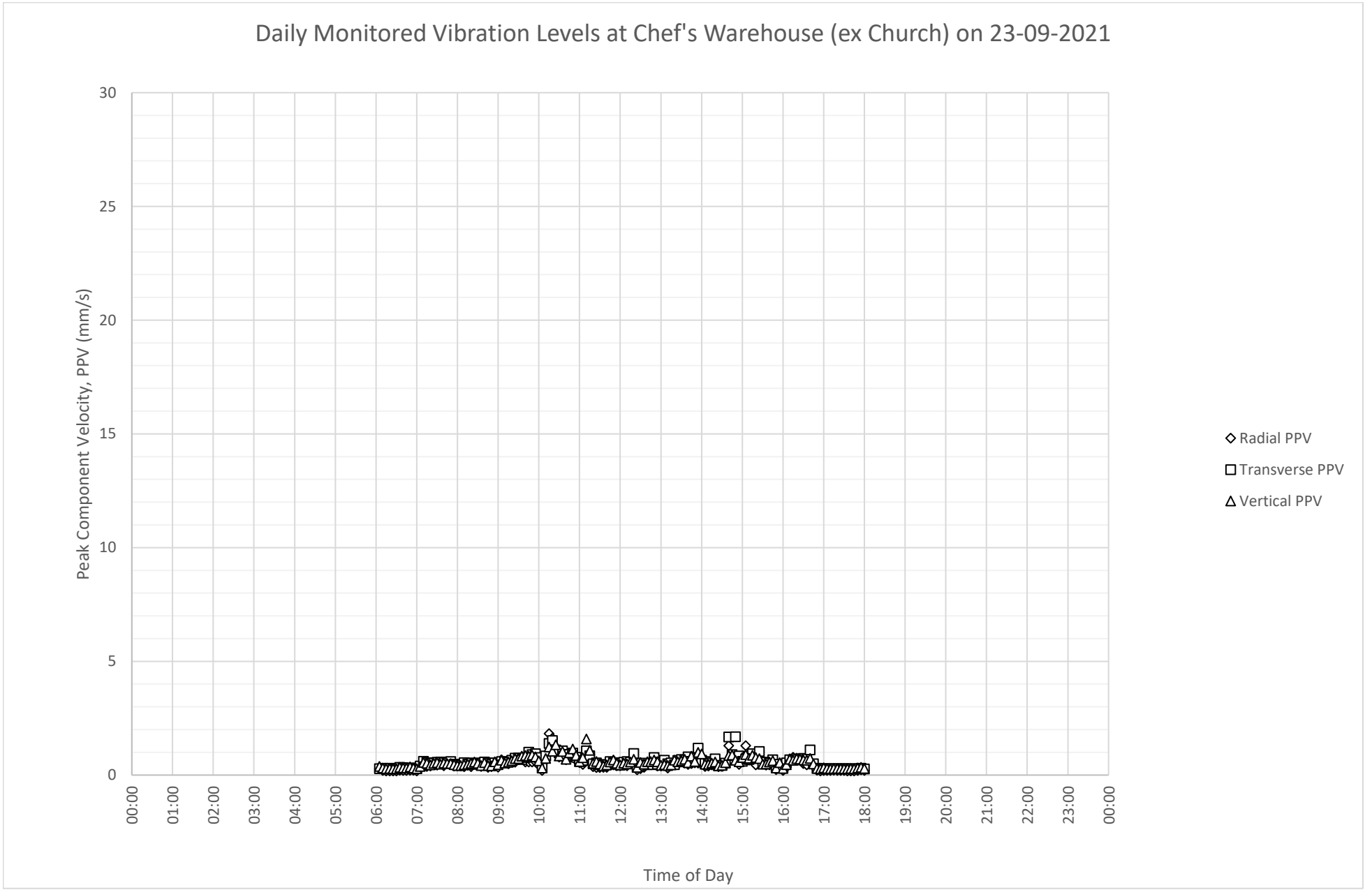
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chef's Warehouse (ex Church) on 23-09-2021
Peak Component Velocity, PPV (mm/s)
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25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
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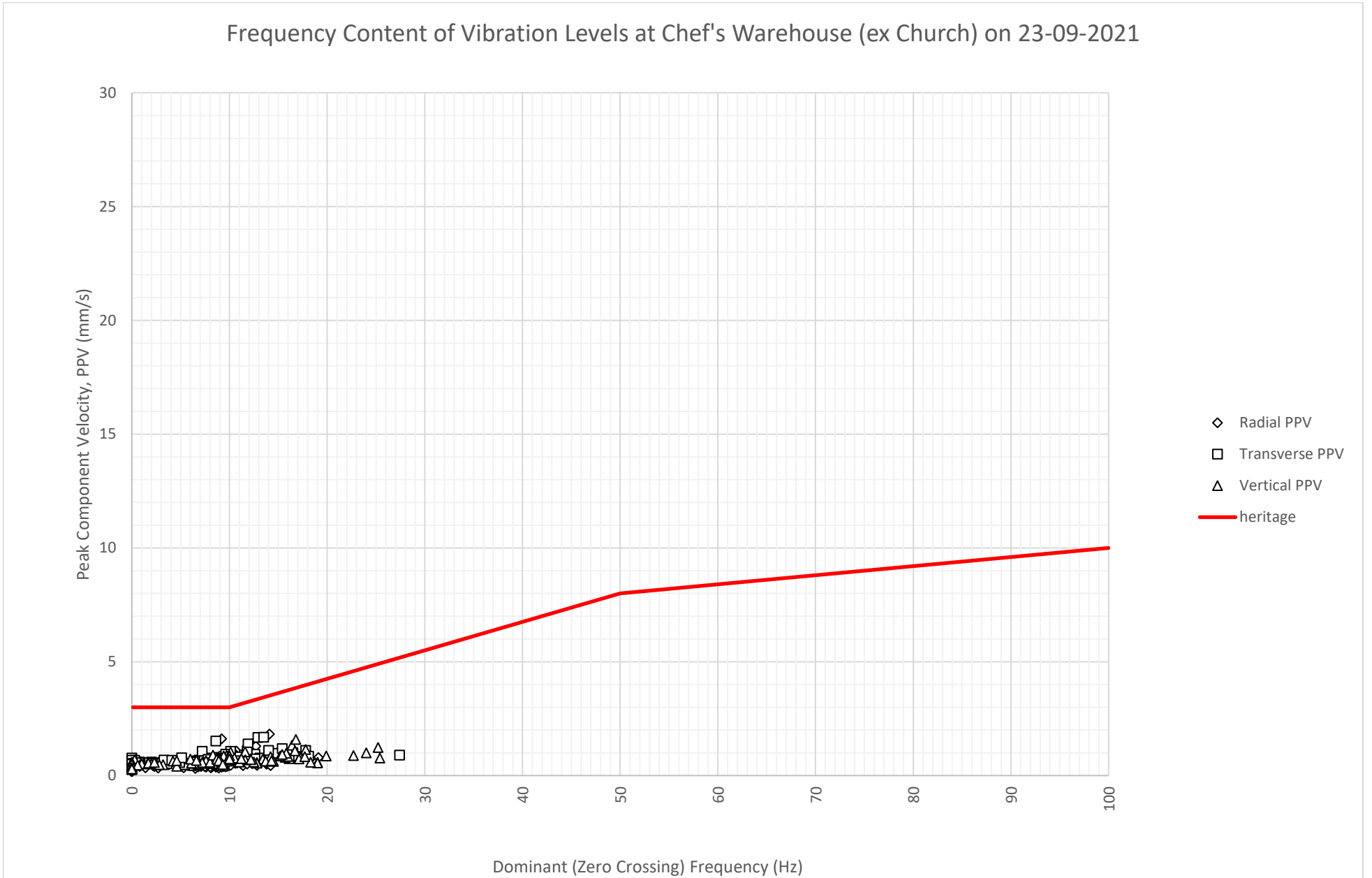
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chef's Warehouse (ex Church) on 23-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
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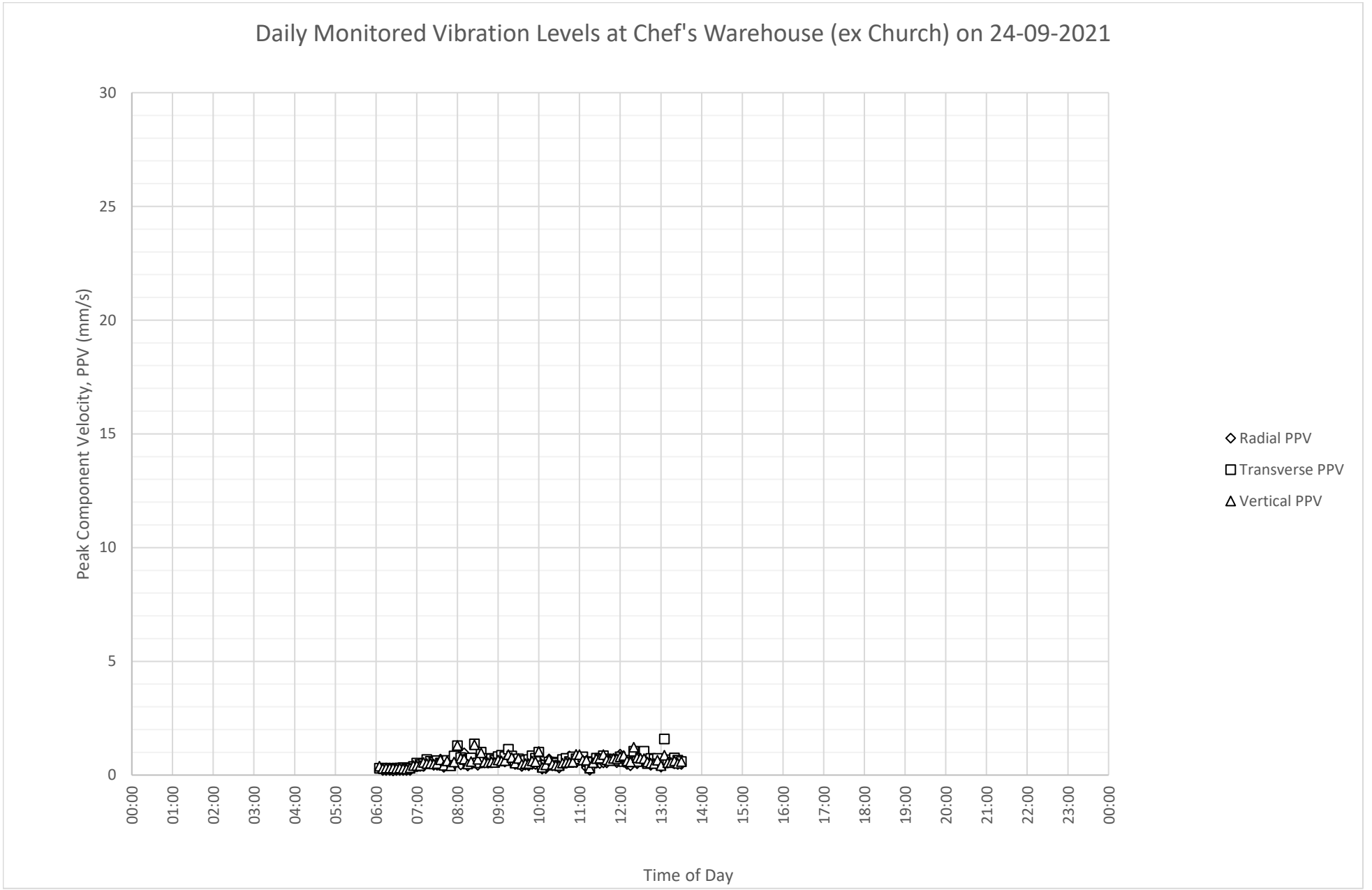
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chef's Warehouse (ex Church) on 24-09-2021
Peak Component Velocity, PPV (mm/s)
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15
10
5
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00:00
01:00
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06:00
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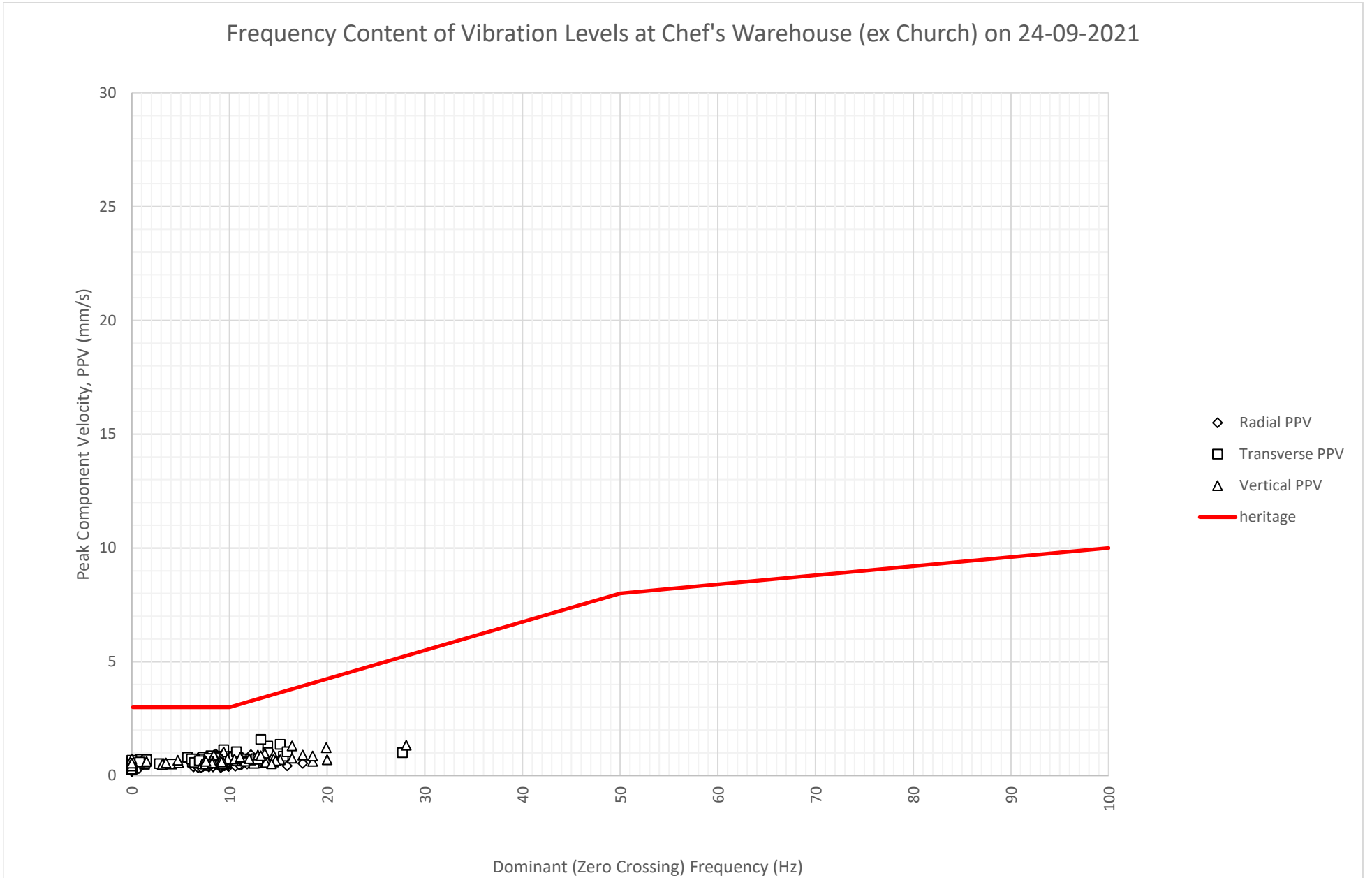
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chef's Warehouse (ex Church) on 24-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
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5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage

13-23 Gibbons St, Redfern NSW

Report for Above Ground Vibration Monitoring (3)

Project ID	20210355.13
Document Title	Report for Above Ground Vibration Monitoring (3)
Attention To	Richard Crookes Constructions Pty Ltd

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	13/10/2021	20210355.13/1310A/R0/TB	TB		GW

TABLE OF CONTENTS

1 INTRODUCTION

Acoustic Logic has been engaged to carry out ground vibration monitoring for the vibration impacts associated with the site excavation and construction components of the 13 Gibbons Street, residential development in Redfern.

This monitoring report presents the vibration monitoring for the period as follows:

- 24th of September 2021 to the 13th of October 2021

The location of the 13 Gibbons Street construction site and the nearest and most affected receivers are shown in Figures 1 and 2. The location of the on-site monitors relative to the site are also shown in these figures.

The vibration management levels have been derived from DIN 4150-3 *Vibrations in buildings - Part 3: Effects on structures* as no site specific vibration criteria have been specified.

2 SITE DESCRIPTION AND SENSITIVE RECEIVERS

The subject site is located between Gibbons Street, Margaret and Regent Streets. All previous buildings have been demolished to ground level at the start of the surface monitoring by Acoustic Logic.

The vibration generating activities scheduled to be carried out on site are the final demolition of the existing basement car park, then an excavation for an underground carpark and building footings then finally the construction stage.

The monitor locations for the respective receivers for this monitoring period are as follows:

- Receiver 1 (R1) – Multistorey residential block on the corner of Gibbons Street and Margaret Street. The vibration monitor is located in the basement carpark
- Receiver 2 (R2) – A heritage category church building. The monitor is located in a Hot Water Heater/ Cleaner's closet.

Figure 1 – Residential and Heritage Category receivers

3 VIBRATION CRITERIA

Vibration caused by construction at any residence or structure outside the subject site must be limited to:

- For structural damage vibration, German Standard DIN 4150-3 Structural Vibration: Effects of Vibration on Structures; and

The criteria and the application of this standard are discussed in separate sections below.

3.1 DAMAGE CRITERIA

German Standard DIN 4150-3 (1999-02) provides vibration velocity guideline levels for use in evaluating the effects of vibration on structures. The criteria presented in DIN 4150-3 (2016-12) are presented in Table 2 of the standard.

It is noted that the peak velocity is the absolute value of the maximum of any of the three orthogonal component particle velocities as measured at the foundation, and the maximum levels measured in the x- and y-horizontal directions in the plane of the floor of the uppermost storey.

Table 1 – DIN 4150-3 (2016-12) Safe Limits for Building Vibration

Type of Structure		Peak Particle Velocity (mms^{-1})				
		At Foundation at a Frequency of			Plane of Floor of Uppermost Storey	Floor Slabs, Vertical Direction
		< 10Hz	10Hz to 50Hz	50Hz to 100Hz	All Frequencies	All Frequencies
1	Buildings used in commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40	20
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15	20
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8	*20

* May be required to be lower to suit condition and construction of floor.

4 VIBRATION MONITORING

Vibration monitoring was conducted using two Texcel ETM vibration monitors with external Tri axial geophones. The monitors are programmed to store statistical vibration data over every 5-minute period, along with any 'triggered' events that occur throughout the monitoring period.

The vibration monitor installation locations are shown in Figure 2. The vibration sensor (geophone) in the ex-Church is adhered to the on-grade ground slab. The geophone in the carpark has been fastened to the basement slab with dynabolts. Both monitoring locations are suitable for construction vibration monitoring at receiving structures

This period presents the results of vibration monitoring for the period between the 24th of September 2021 to the 13th of October 2021. Primary works carried out on site during this period include:

- Demolition of existing carpark slab which is above the previous building's basement
- Bore (soldier) Piling the site perimeter along Gibbons and Margaret Streets

Pool Vibration monitor

Apartment Driveway Boundary Vibration monitor

Figure 2 – Vibration Monitor Locations

5 MEASUREMENT RESULTS

The following Tables summarise the frequency analysed events recorded at each respective vibration monitor. The charts of daily vibration levels and the corresponding frequency analyses are presented in the Appendices for each respective monitor.

5.1 RECEIVER 1 – GIBBONS STREET APARTMENT RECEIVERS

Table 2 – Basement Vibration Levels

Vibration Geophone Location	Date	Maximum Measured Vibration Level mm/s	Criteria Vibration Level	Complies
Carpark Slab	All	1.1<mm/s	5mm/s PPV	Yes

5.2 RECEIVER 2 – CHEFS WAREHOUSE (EX CHURCH)

Table 3 – Ground Slab Vibration Levels

Vibration Geophone Location	Date	Maximum Measured Vibration Level mm/s	Criteria Vibration Level	Complies
Ground Slab	All	2.77<mm/s	3mm/s PPV	Yes

5.3 ANALYSES OF VIBRATION LEVELS

Daily plots of the Vibration levels versus Time and versus Frequency are attached to the Appendices.

The vibration levels were under the frequency independent vibration limit so no further analyses were necessary. The vibration levels were frequency analysed and they were found to comply with the DIN heritage building criteria.

It is noted that the maximum vibration level recorded for this period (2.77mm/s) in the radial direction occurred on the 30th of September 2021 at midday, a similar event at (2.67mm/s). in the radial direction was recorded on the 25th of September 2021. These may be related to the closing of a door at lunchtime.

6 MANAGEMENT OF VIBRATION LEVELS

No exceedances of the nominated criteria have occurred at monitoring locations in this monitoring period.

Vibration monitoring data are collated and reported on a fortnightly basis however the remote real time vibration monitoring system sends SMS alerts when trigger levels are exceeded and the monitors are downloaded daily. This allows for the prompt investigation of sources and the review and adjustment of work practices if necessary.

A register of vibration events is maintained by Richard Crookes when and where vibrations are excessive.

7 CONCLUSION

Acoustic Logic has carried out above ground vibration monitoring for the vibration impacts associated with the demolition , excavation and construction works at the residential development site at 13 Gibbons Street, Redfern.

This monitoring report presents the vibration monitoring for the periods as follows:

- Vibration Monitoring: 24th of September 2021 to the 13th of October 2021

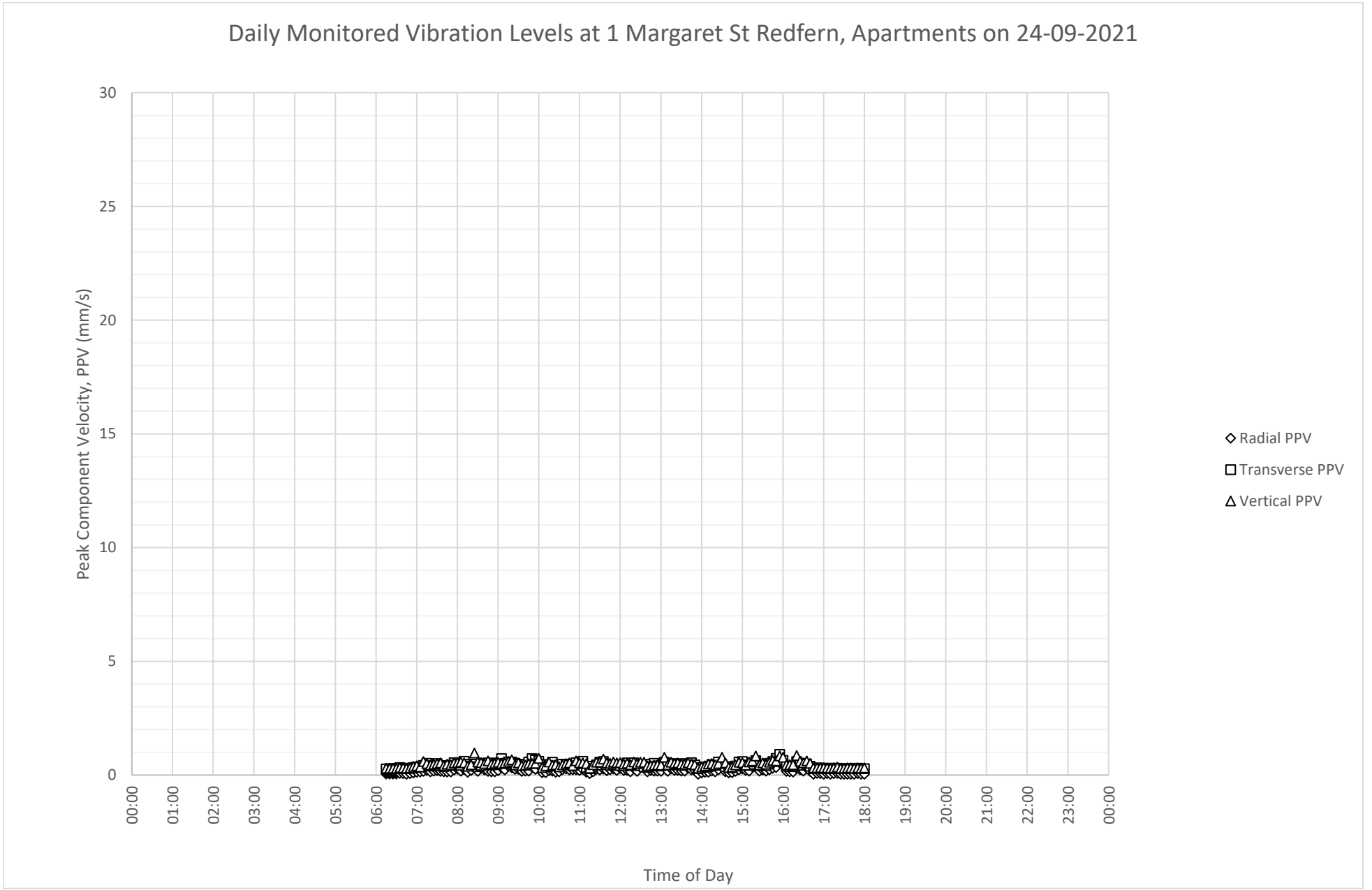
Acoustic Logic has undertaken a detailed analysis of the vibration events captured in that period and has made comments in the Sections above.

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

Acoustic Logic Pty Ltd
Tomas Bohdan

APPENDIX 1 – VIBRATION MONITORING DATA – RECEIVER 1- GIBBONS STREET APARTMENTS


Daily Monitored Vibration Levels at 1 Margaret St Redfern, Apartments on 24-09-2021
Peak Component Velocity, PPV (mm/s)
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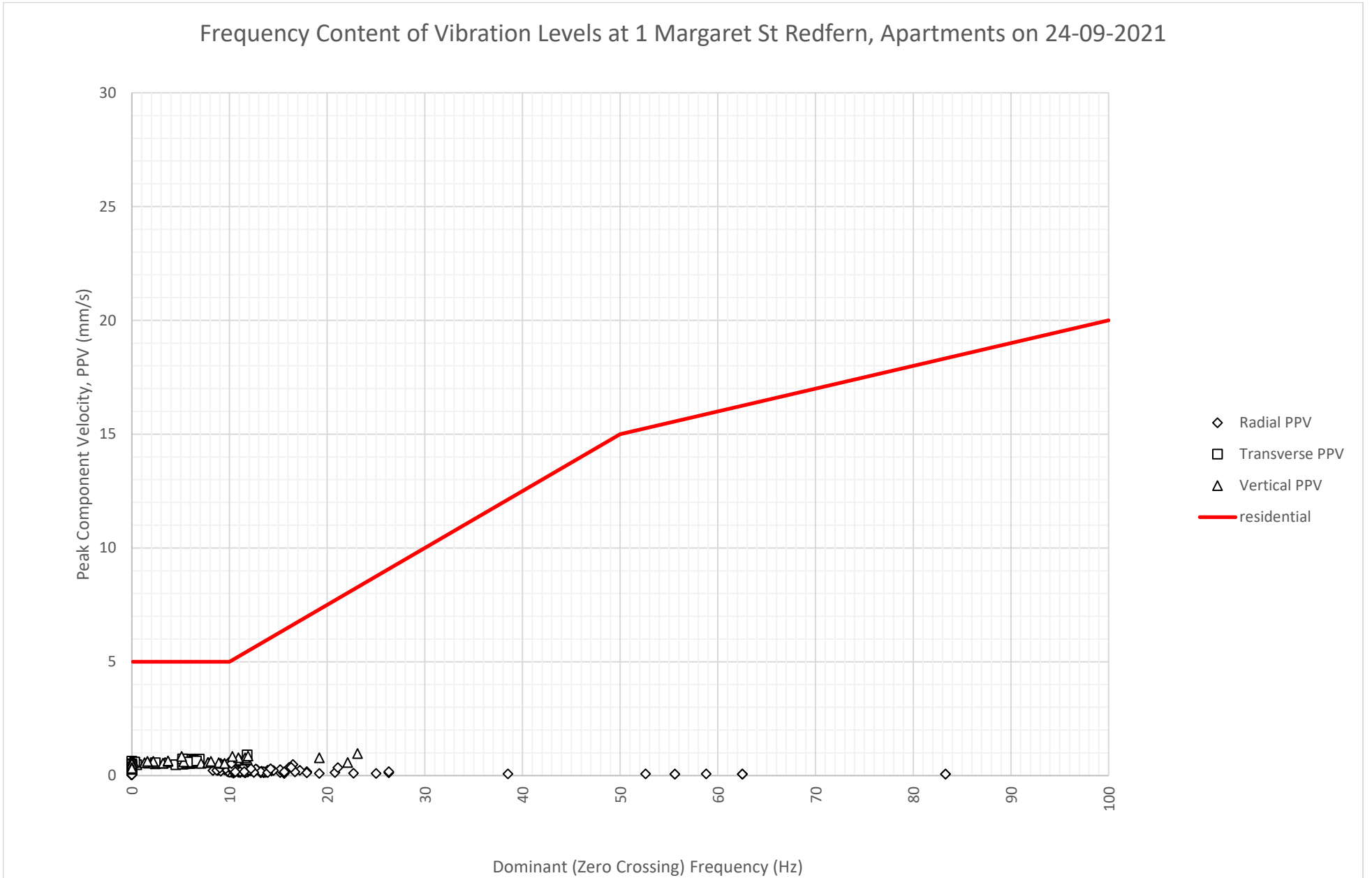
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St Redfern, Apartments on 24-09-2021
Peak Component Velocity, PPV (mm/s)
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25
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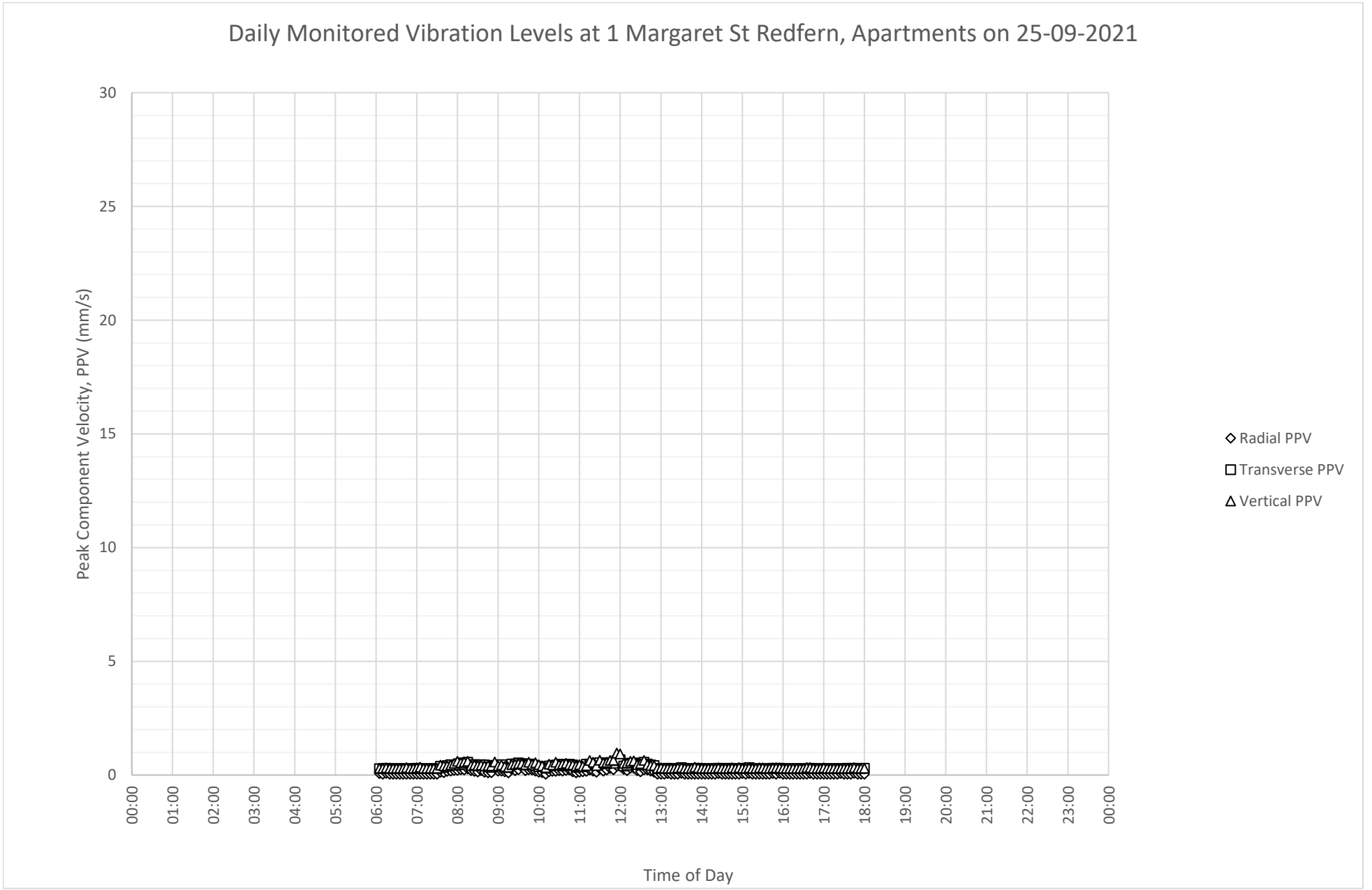
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential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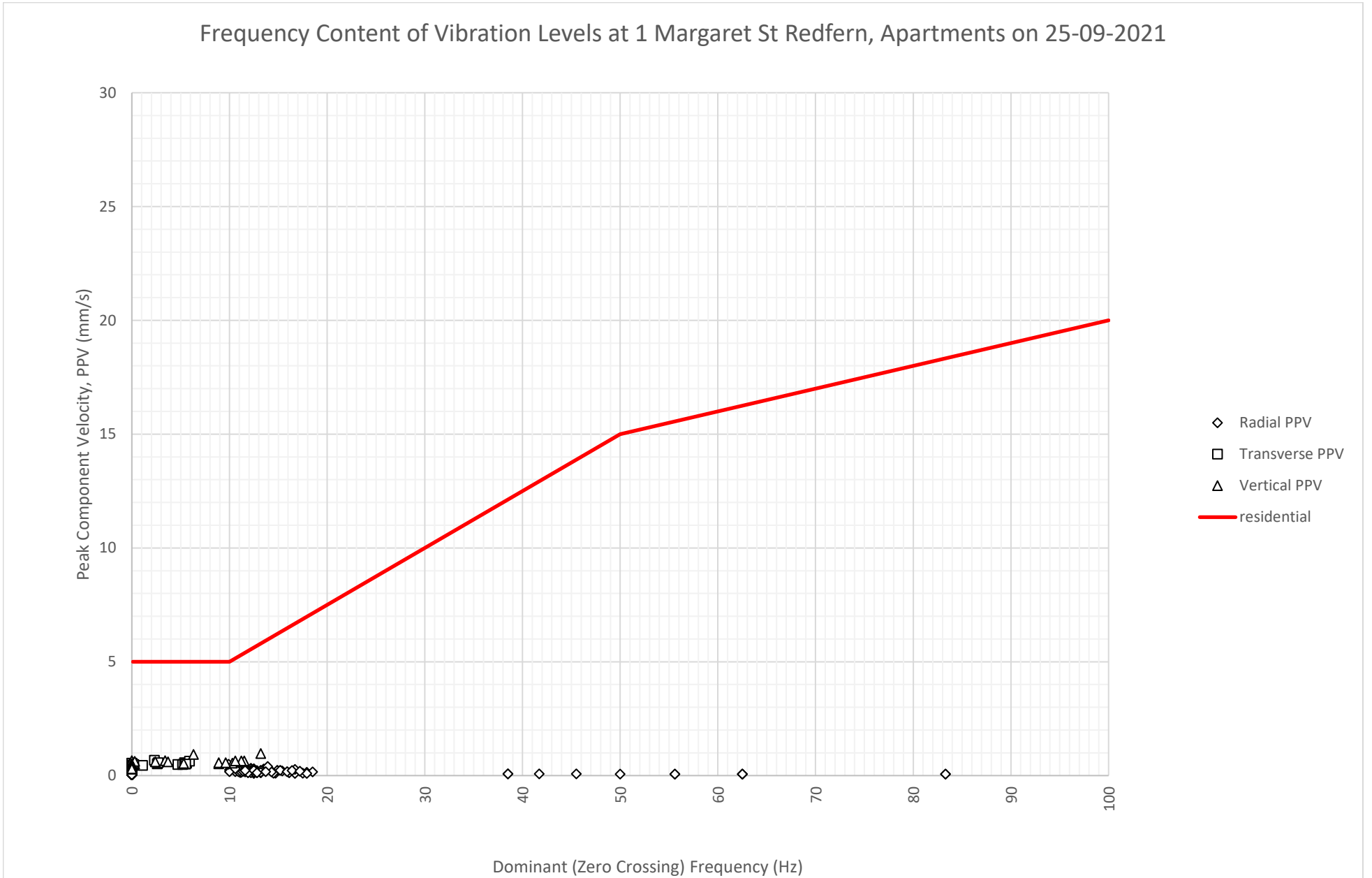
Time of Day
Radial PPV
Transverse PPV
Vertical PPV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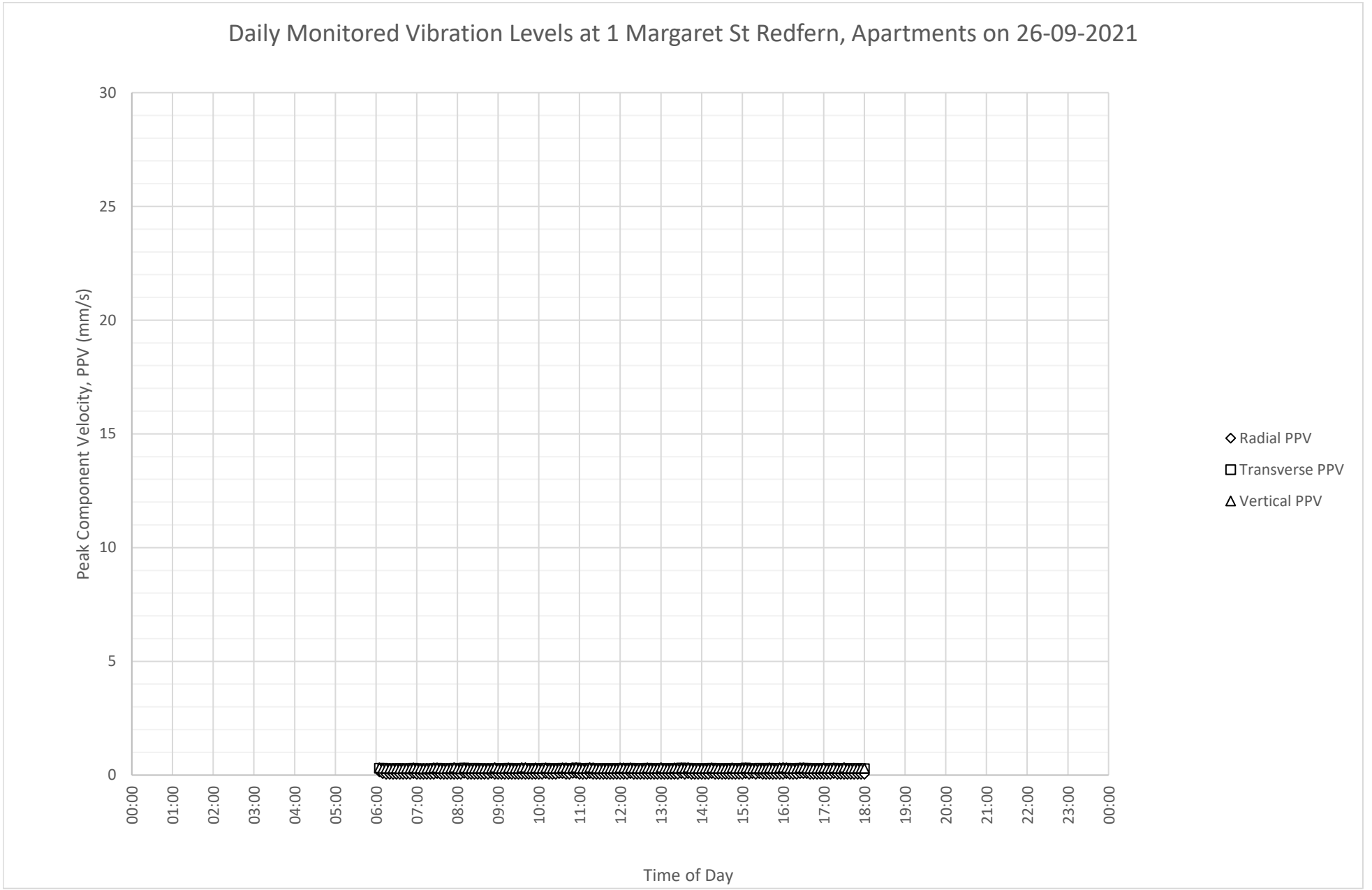
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential


Daily Monitored Vibration Levels at 1 Margaret St Redfern, Apartments on 26-09-2021
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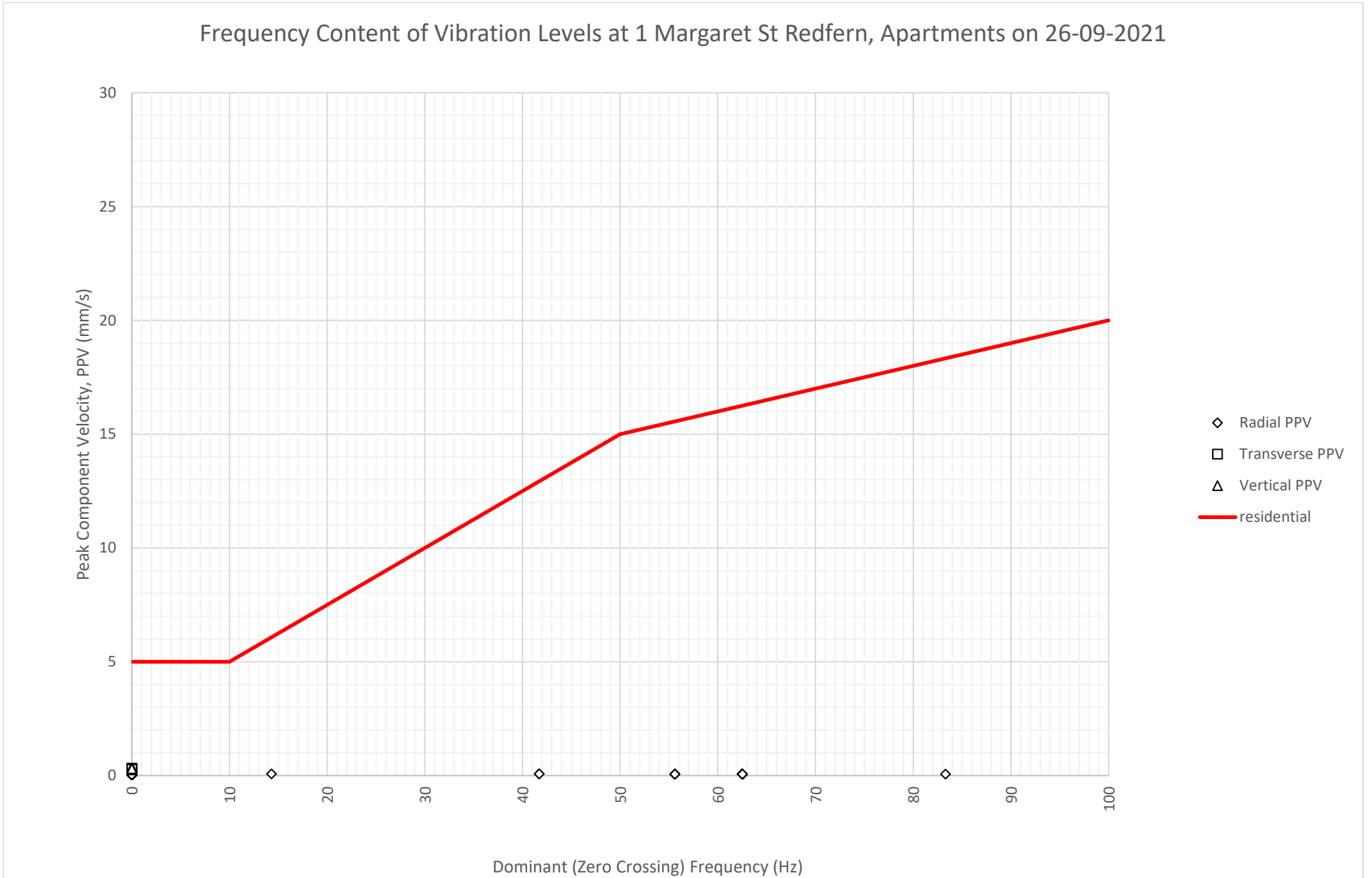
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St Redfern, Apartments on 26-09-2021
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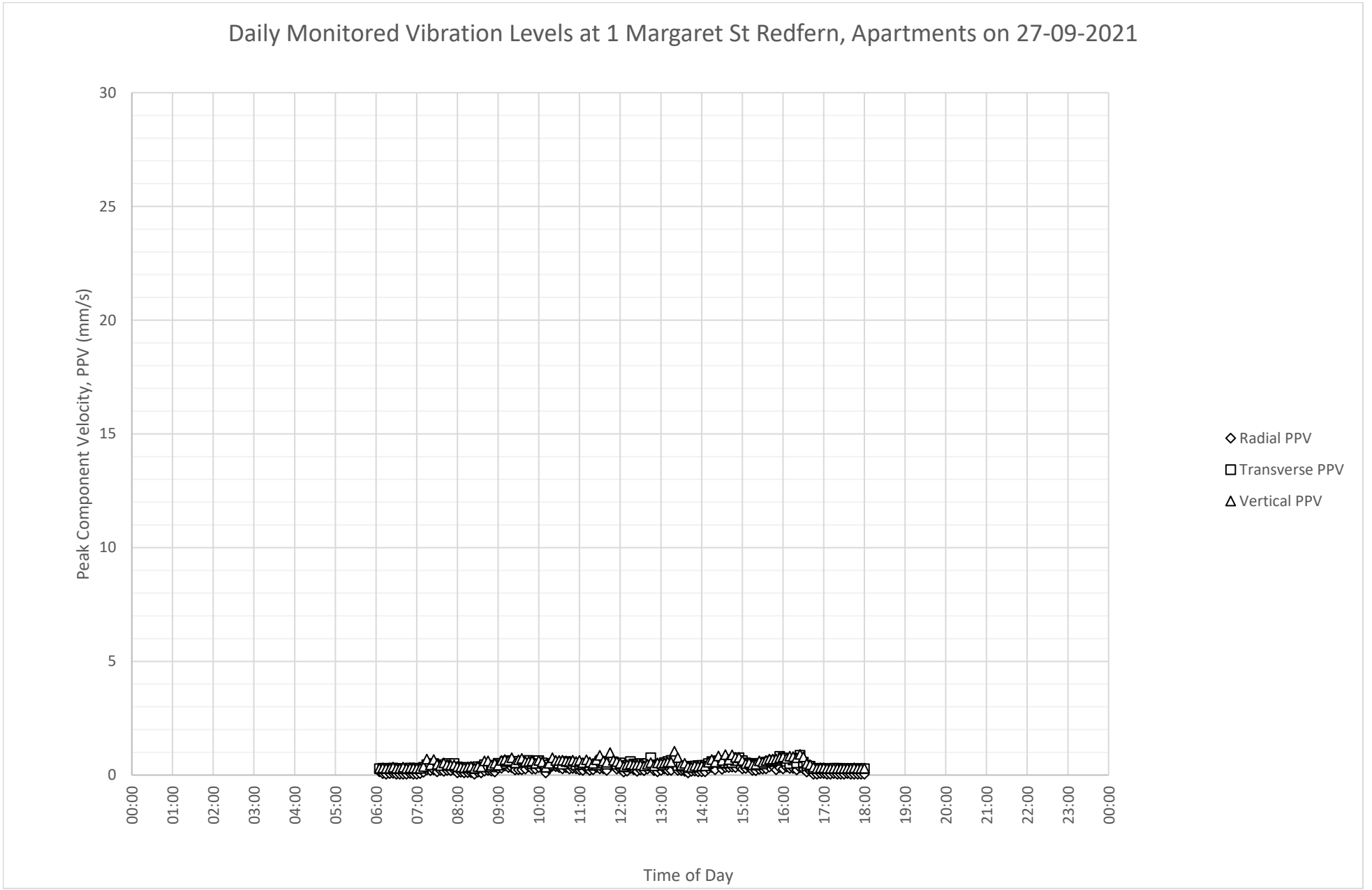
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential


Daily Monitored Vibration Levels at 1 Margaret St Redfern, Apartments on 27-09-2021
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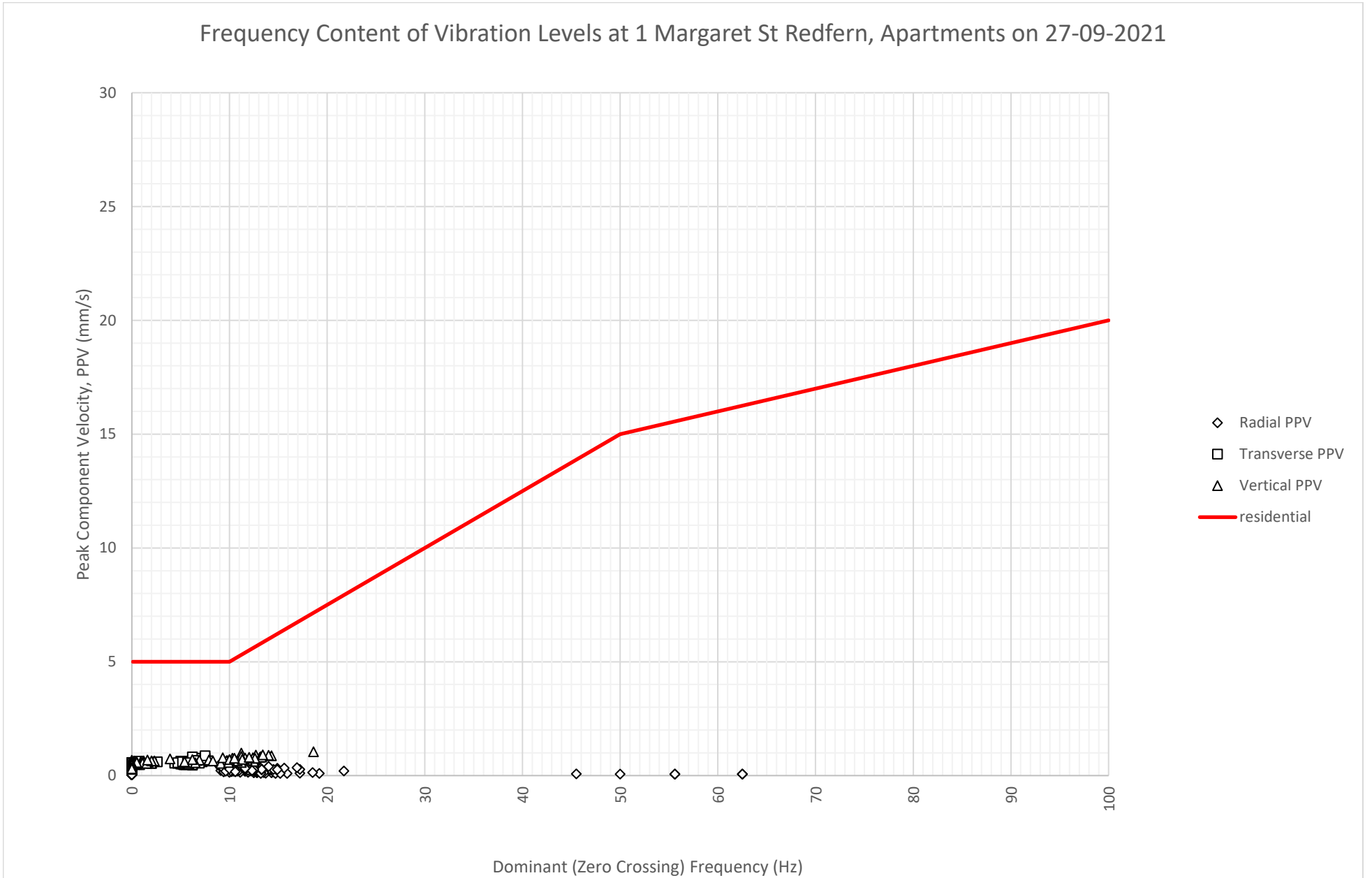
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St Redfern, Apartments on 27-09-2021
Peak Component Velocity, PPV (mm/s)
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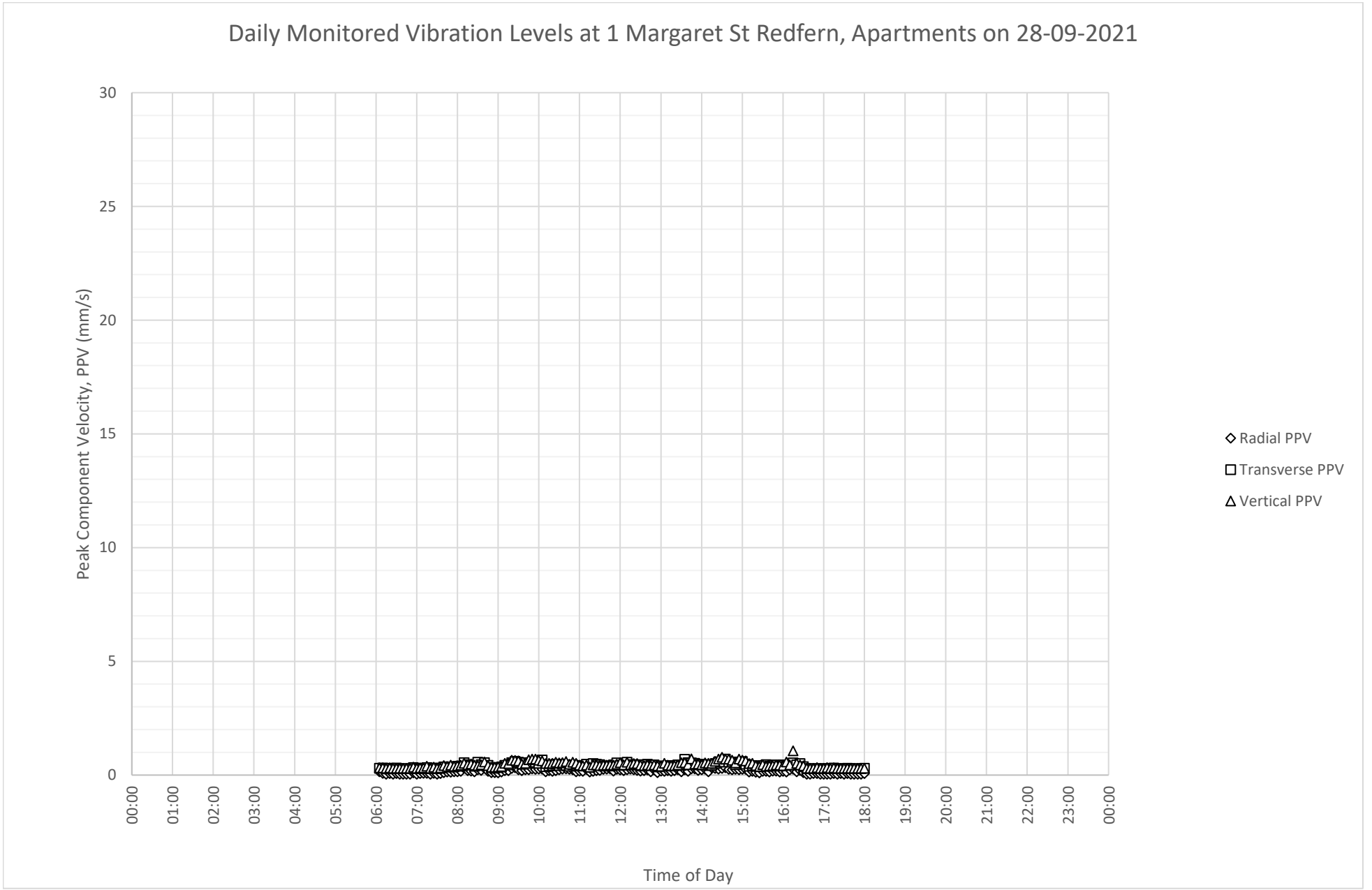
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential


Daily Monitored Vibration Levels at 1 Margaret St Redfern, Apartments on 28-09-2021
Peak Component Velocity, PPV (mm/s)
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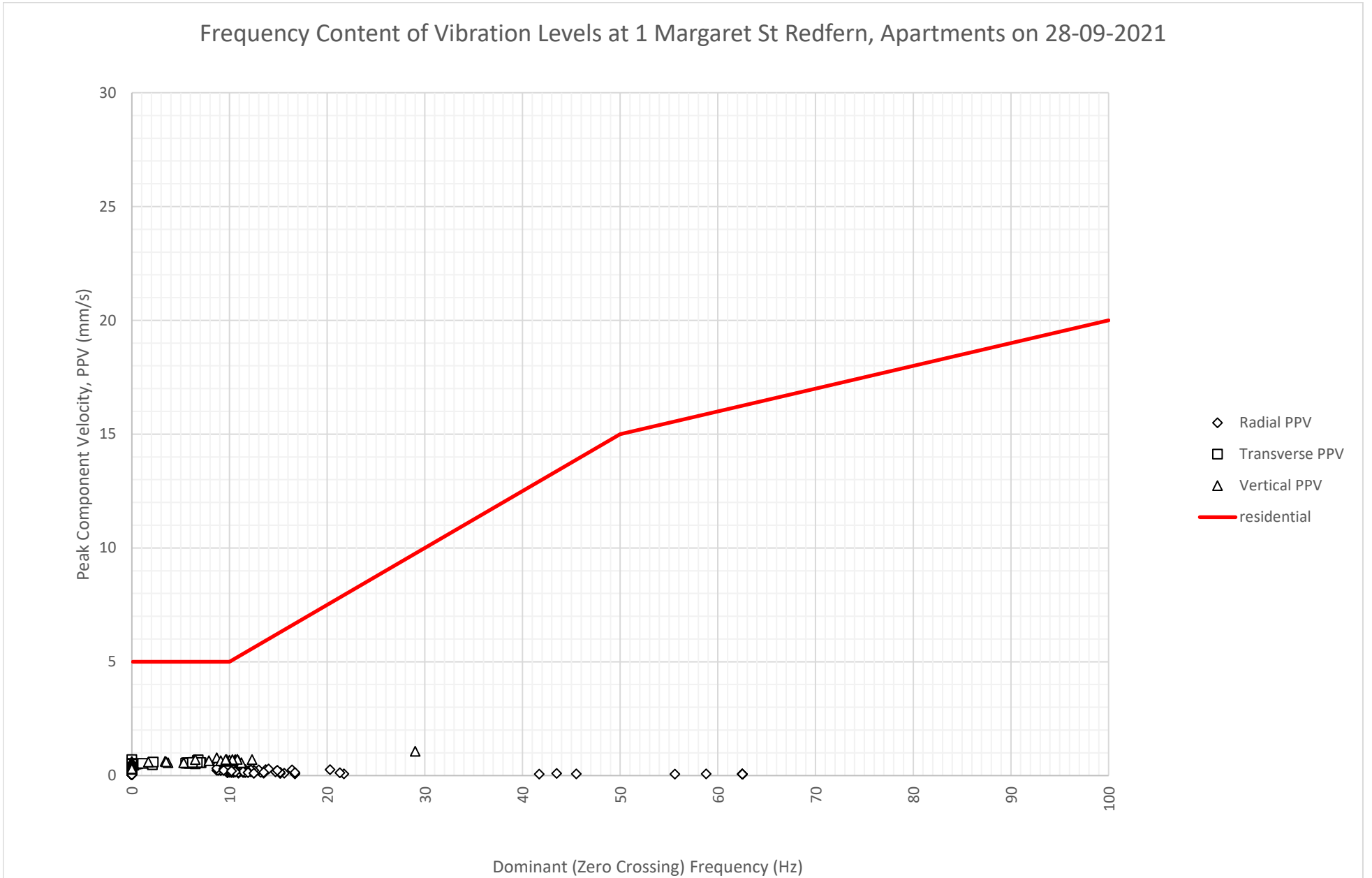
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St Redfern, Apartments on 28-09-2021
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Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
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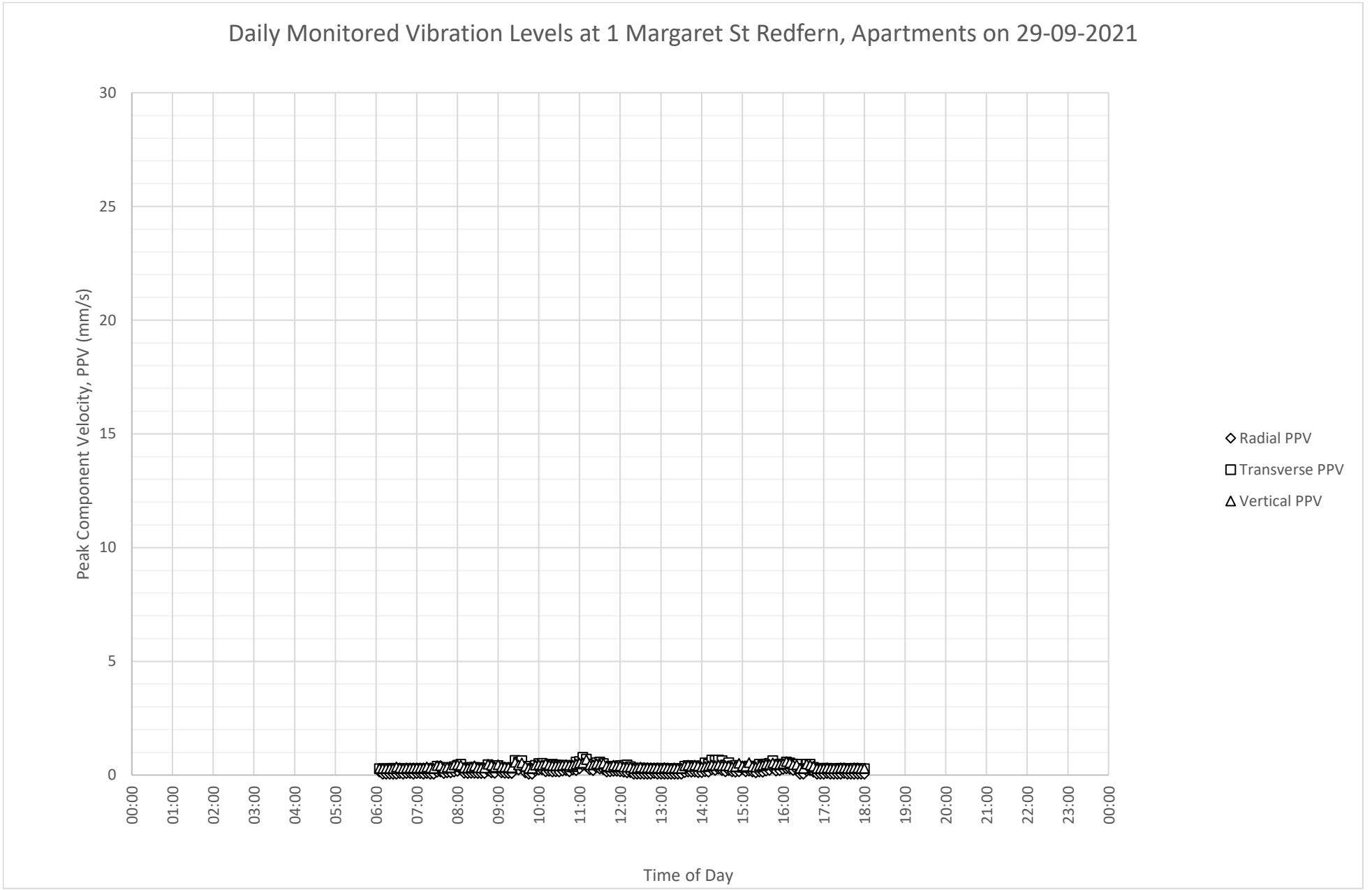
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Time of Day
Radial PPV
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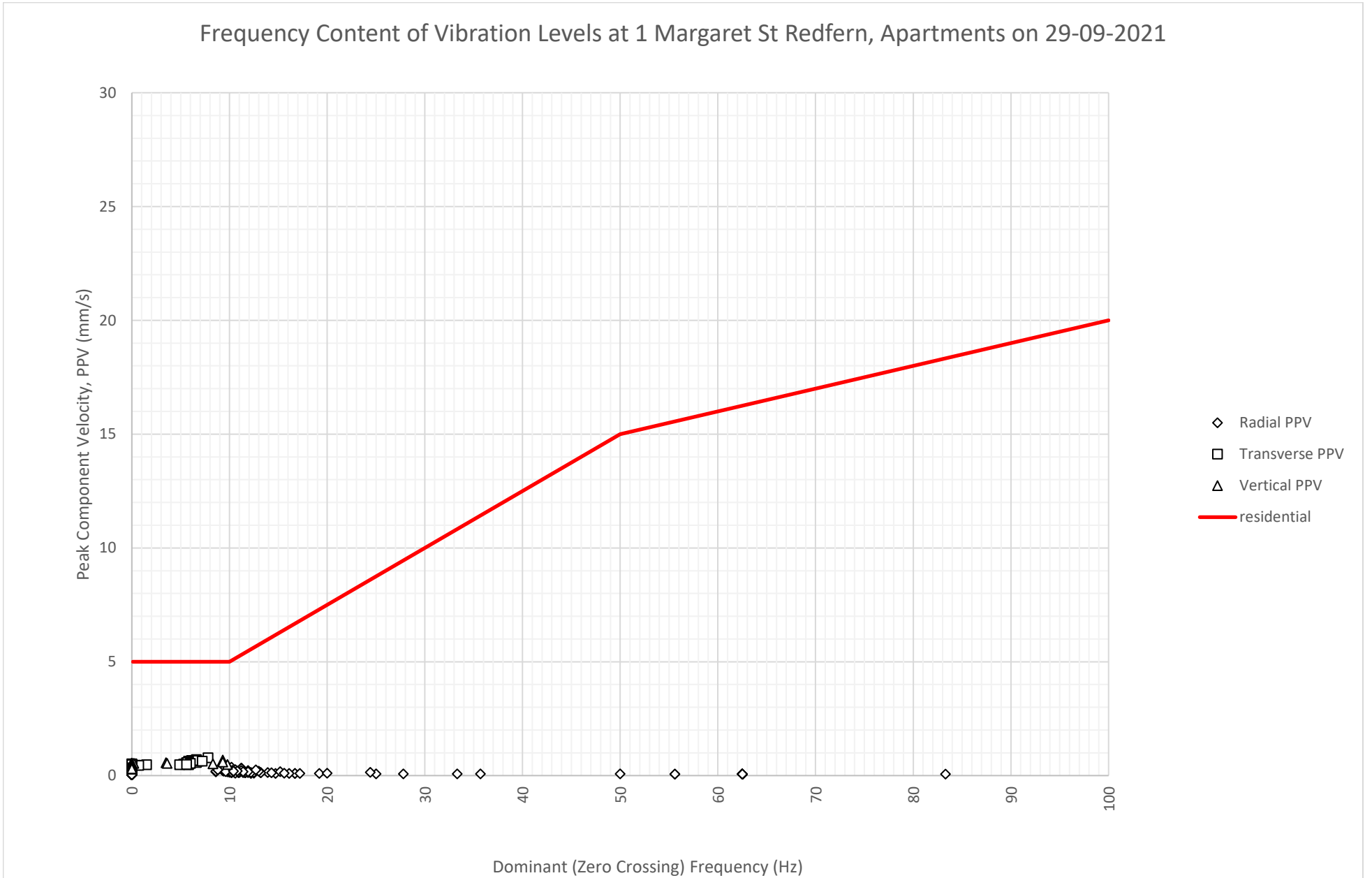
Frequency Content of Vibration Levels at 1 Margaret St Redfern, Apartments on 29-09-2021
Peak Component Velocity, PPV (mm/s)
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Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
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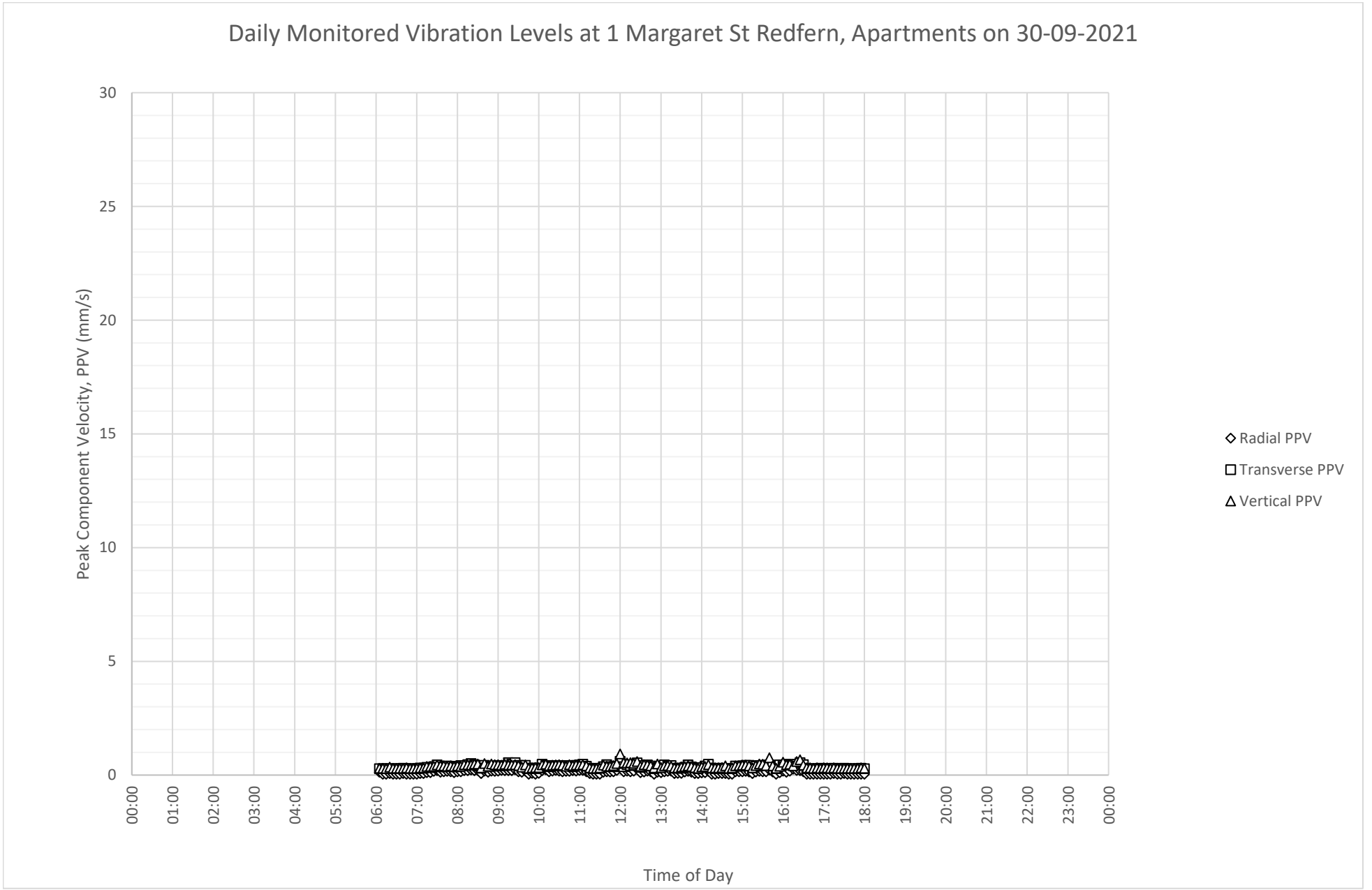
Daily Monitored Vibration Levels at 1 Margaret St Redfern, Apartments on 30-09-2021
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Time of Day
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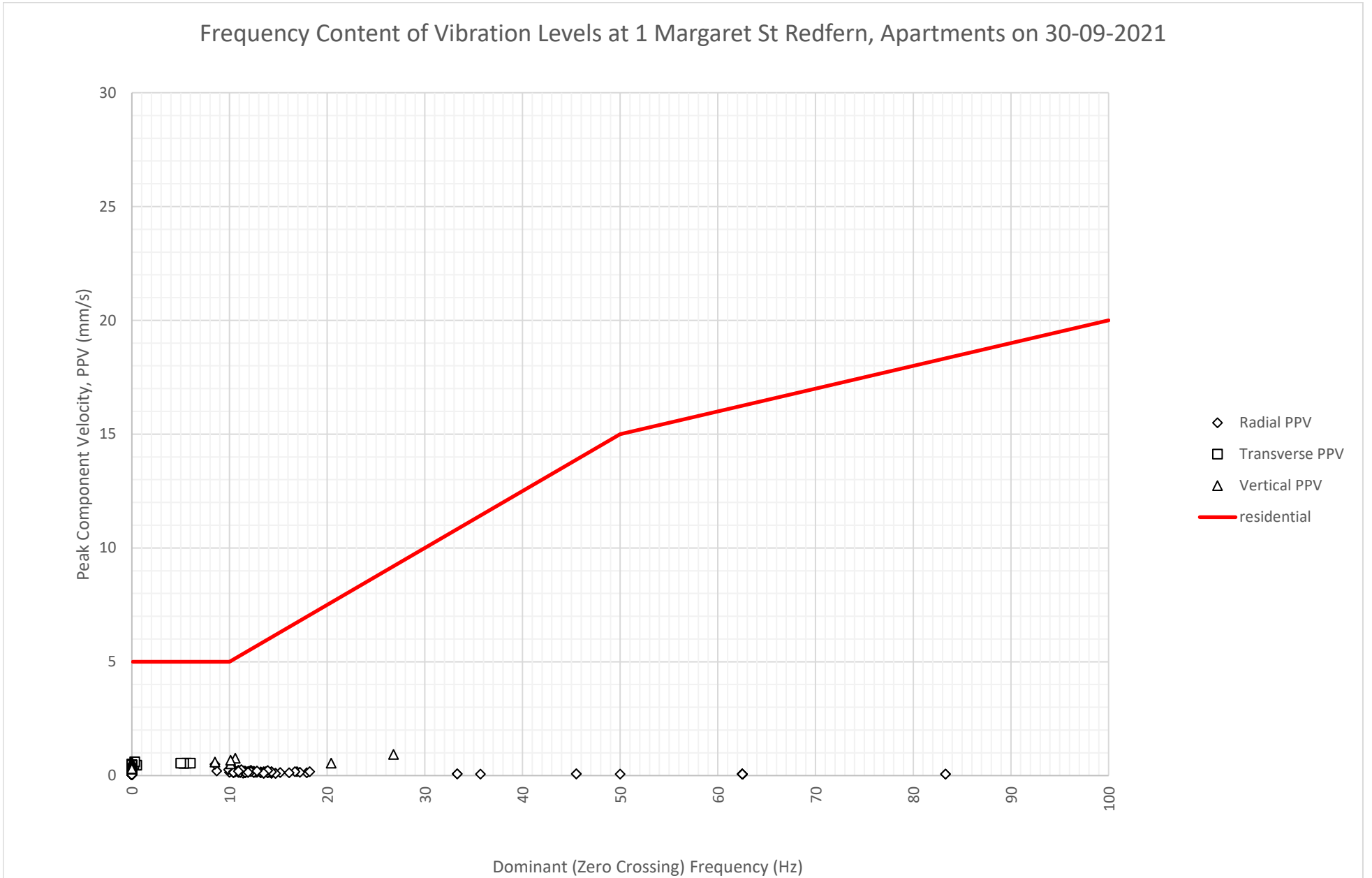
Vertical PPV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Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
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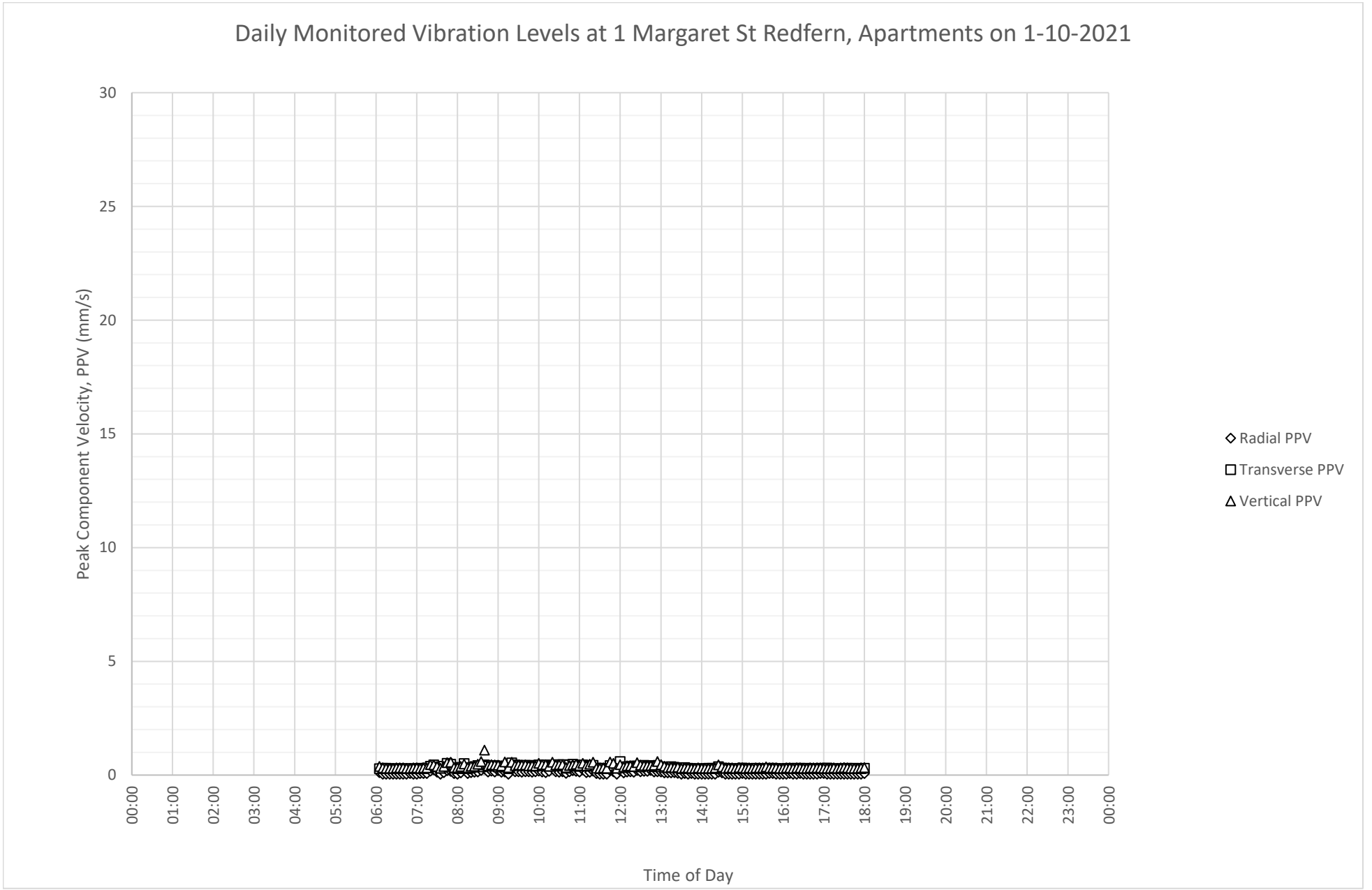
Daily Monitored Vibration Levels at 1 Margaret St Redfern, Apartments on 1-10-2021
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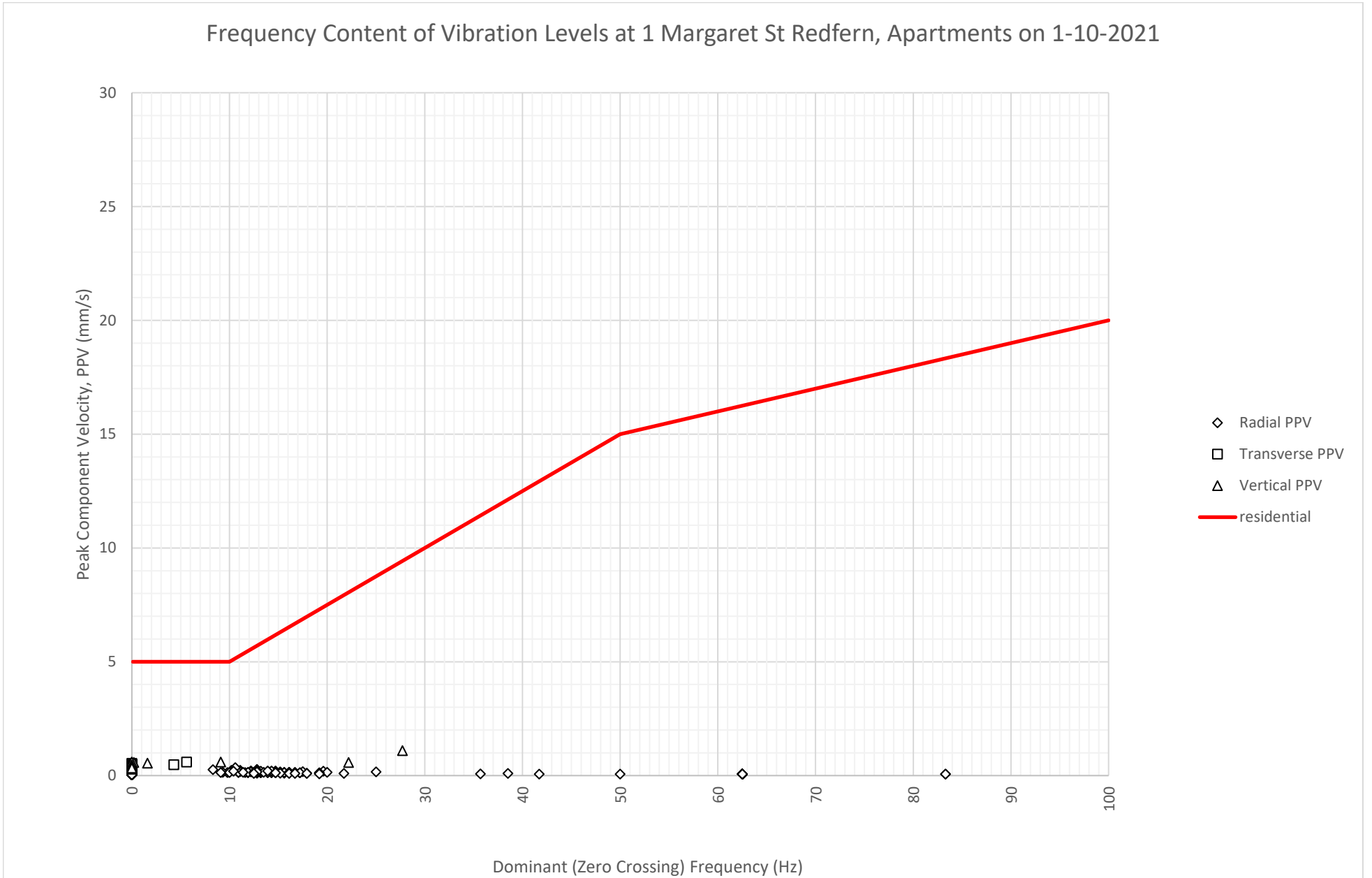
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St Redfern, Apartments on 1-10-2021
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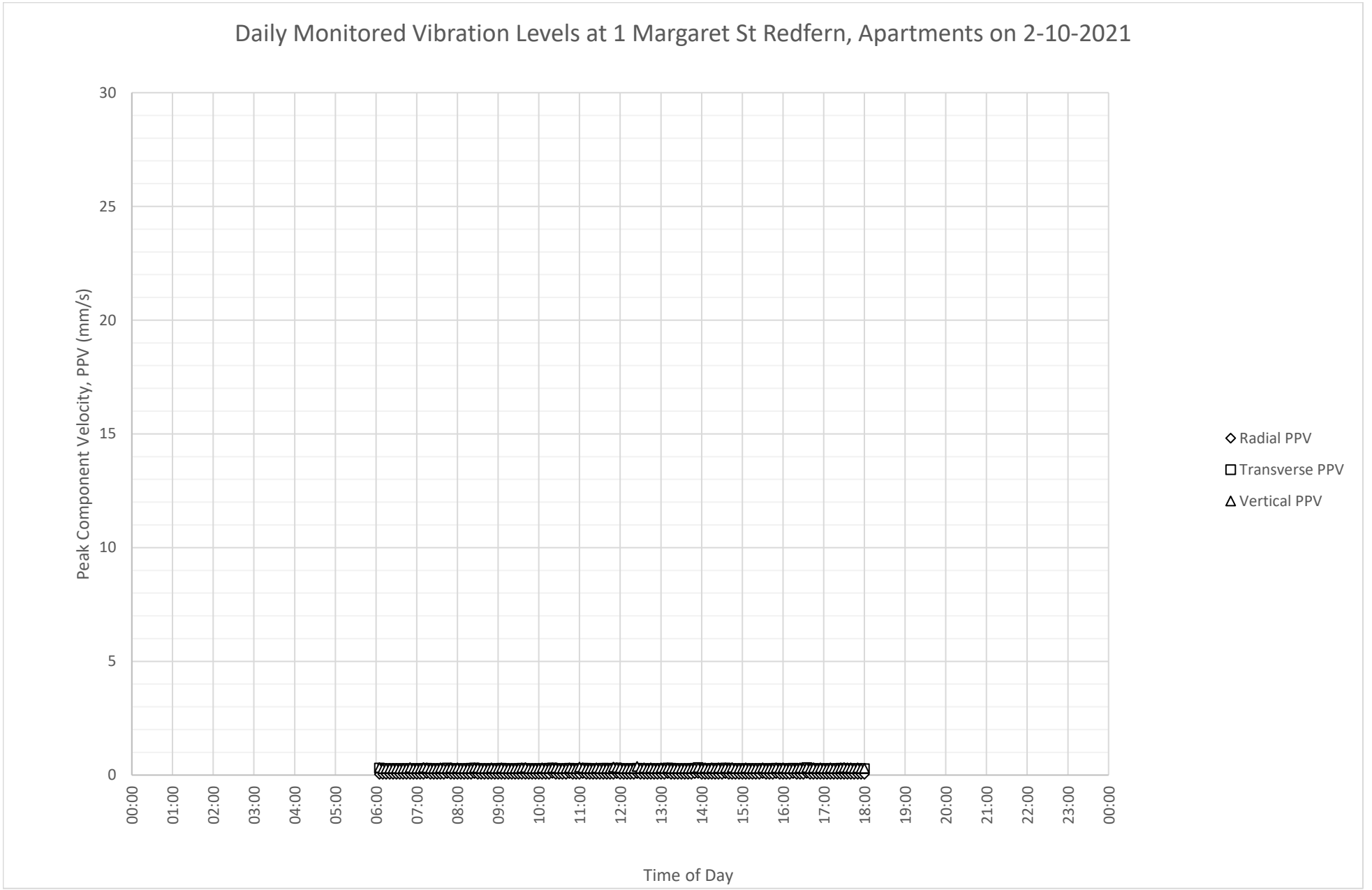
Radial PPV
Transverse PPV
Vertical PPV
residential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Peak Component Velocity, PPV (mm/s)
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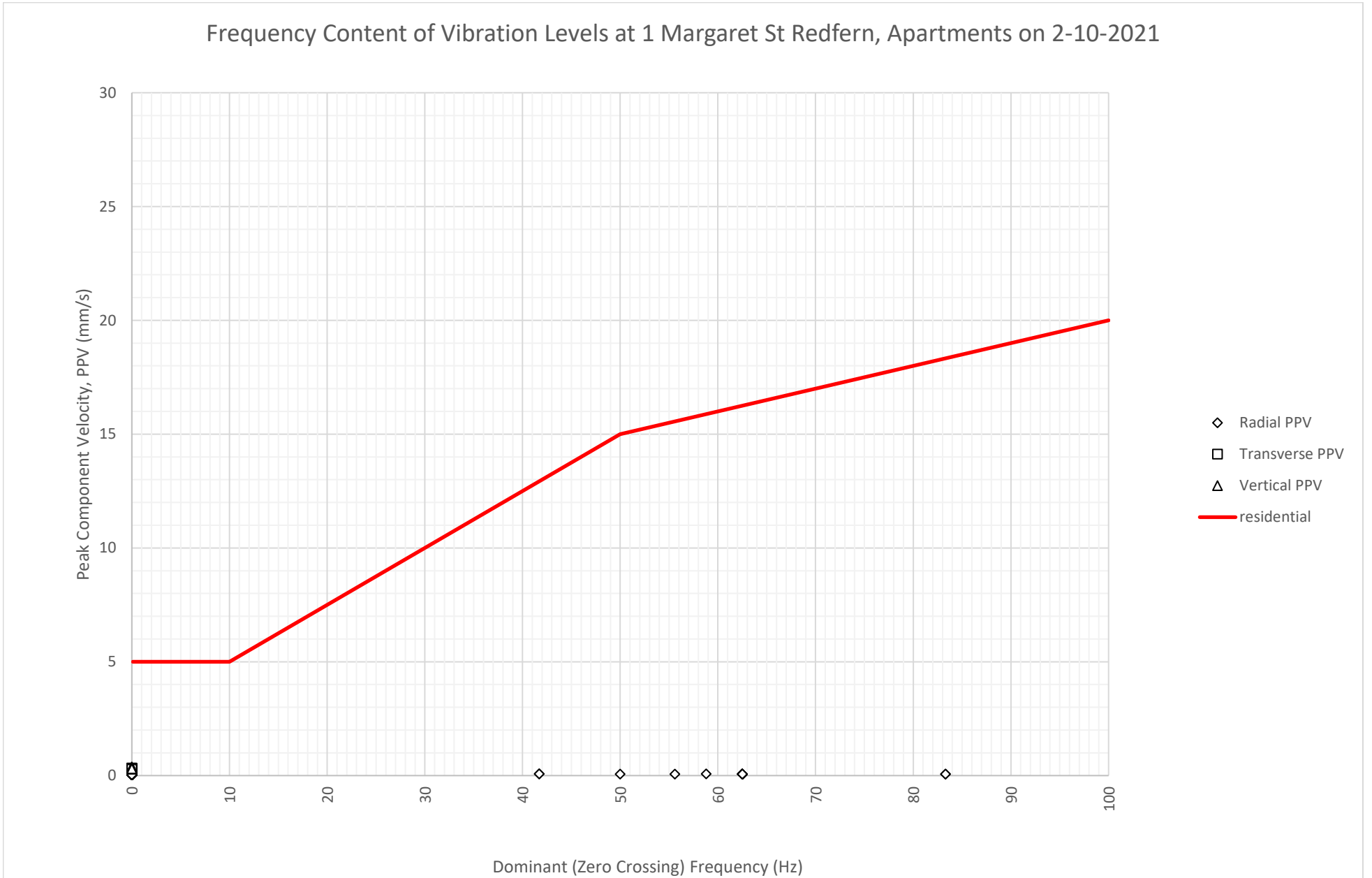
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St Redfern, Apartments on 2-10-2021
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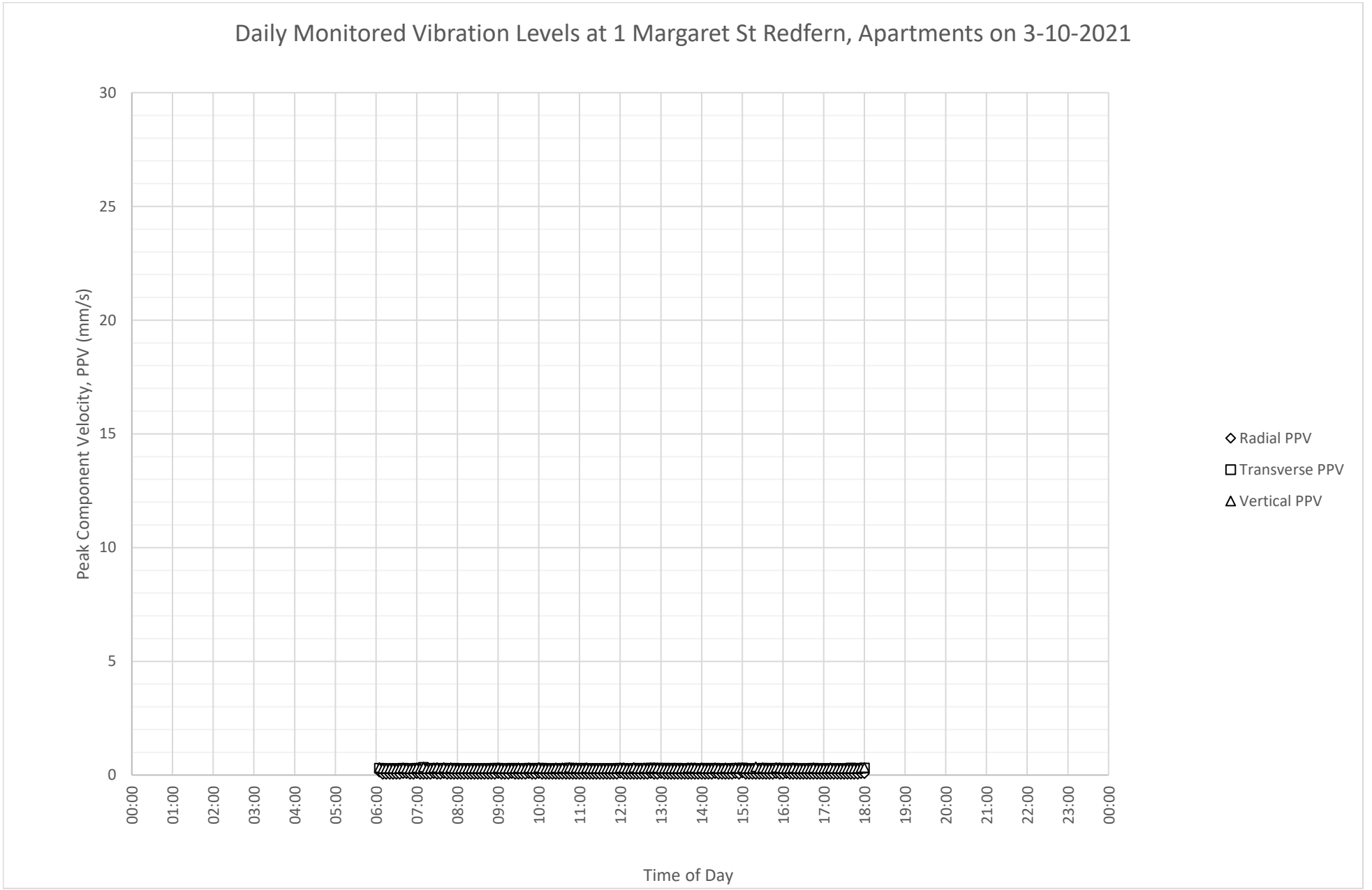
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential


Daily Monitored Vibration Levels at 1 Margaret St Redfern, Apartments on 3-10-2021
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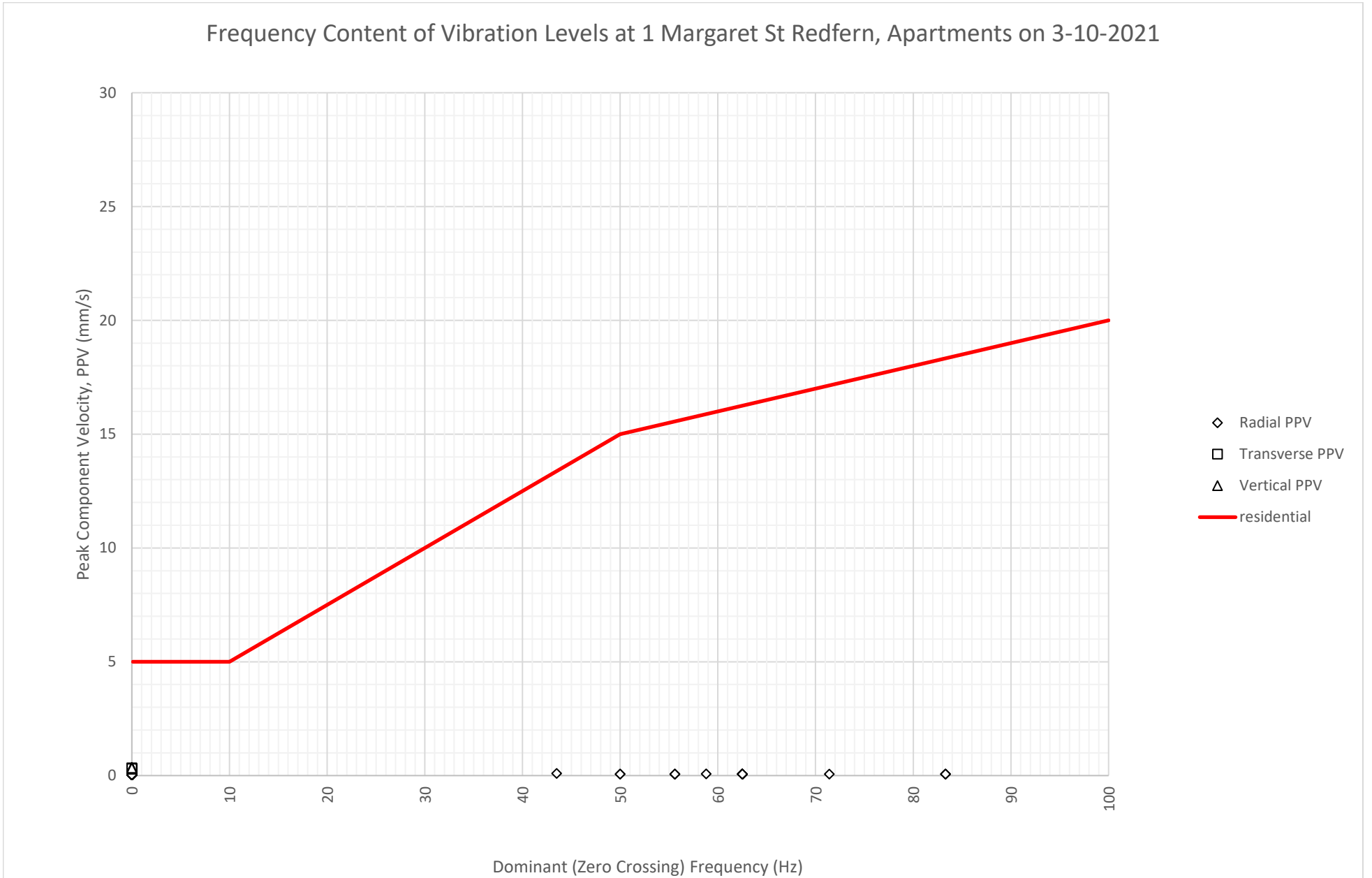
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St Redfern, Apartments on 3-10-2021
Peak Component Velocity, PPV (mm/s)
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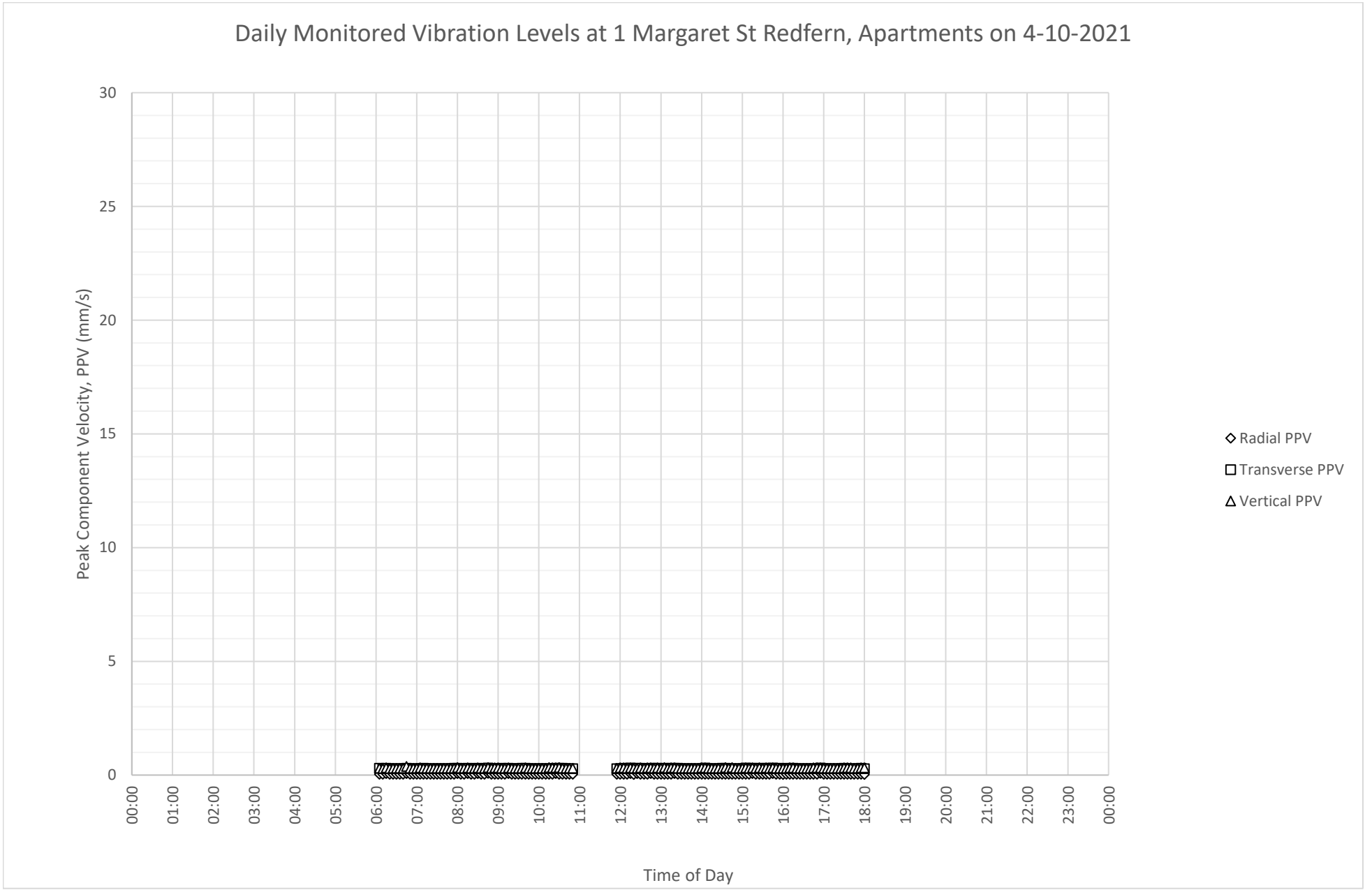
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential


Daily Monitored Vibration Levels at 1 Margaret St Redfern, Apartments on 4-10-2021
Peak Component Velocity, PPV (mm/s)
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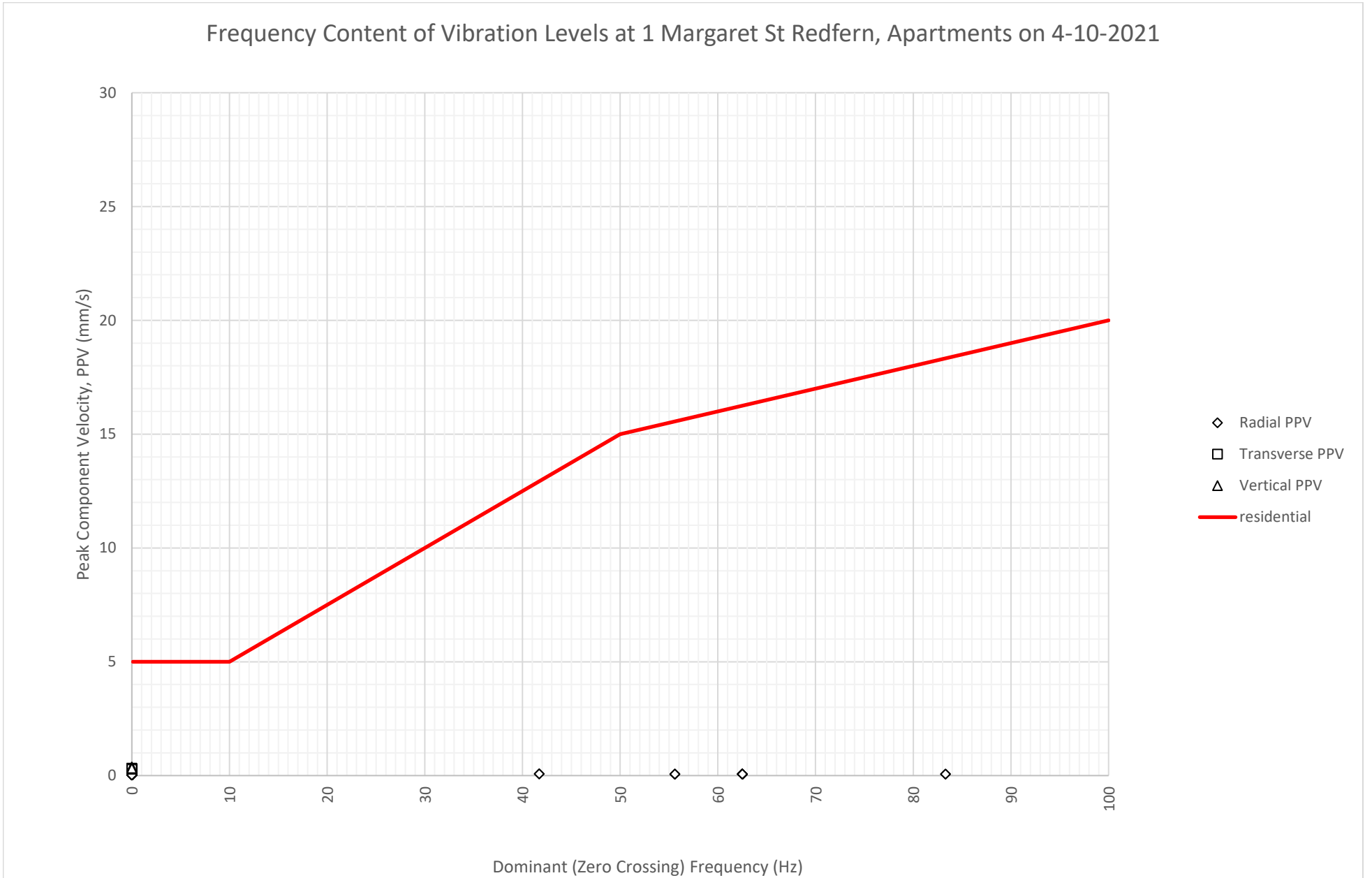
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St Redfern, Apartments on 4-10-2021
Peak Component Velocity, PPV (mm/s)
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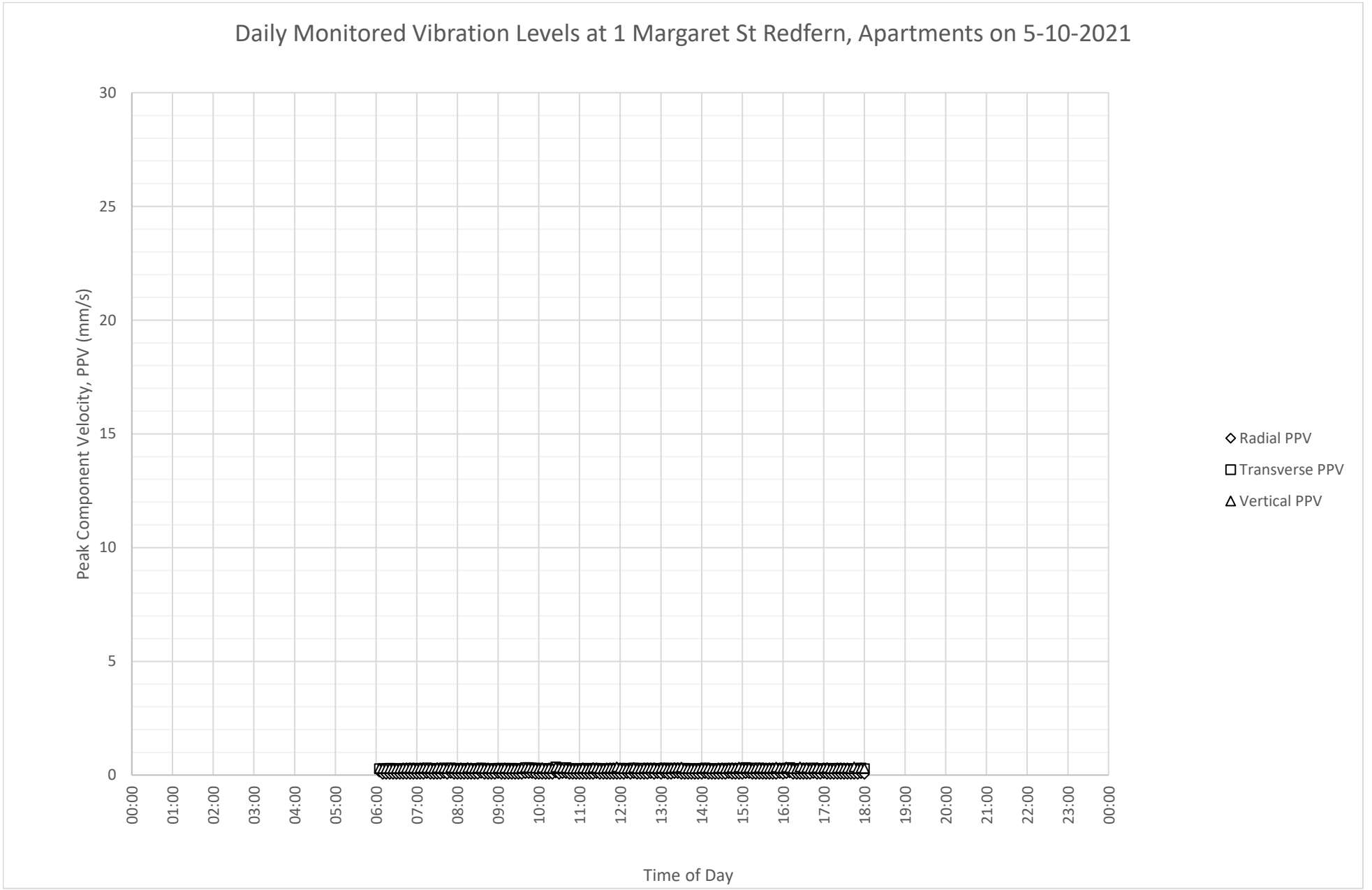
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential


Daily Monitored Vibration Levels at 1 Margaret St Redfern, Apartments on 5-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
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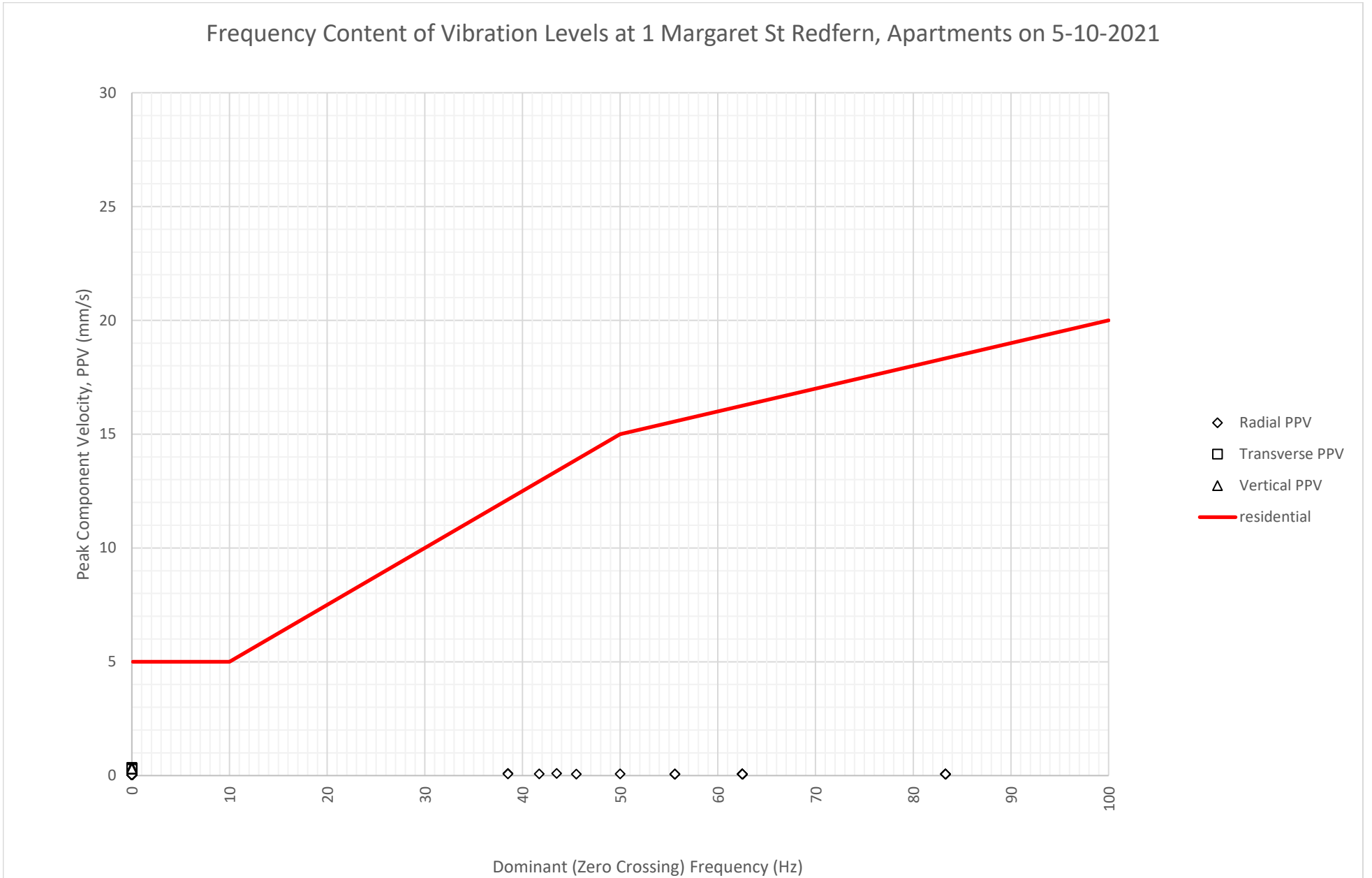
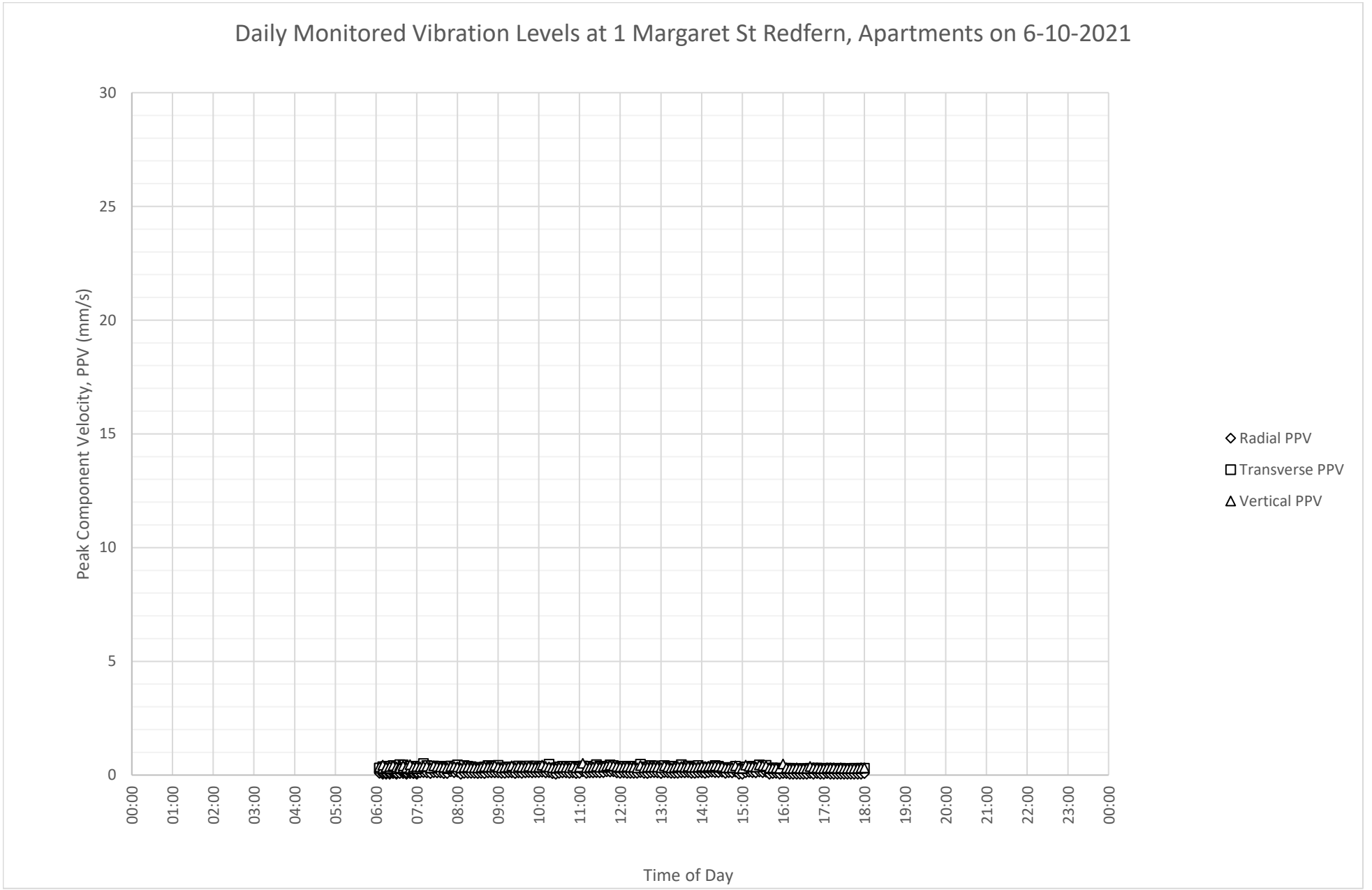
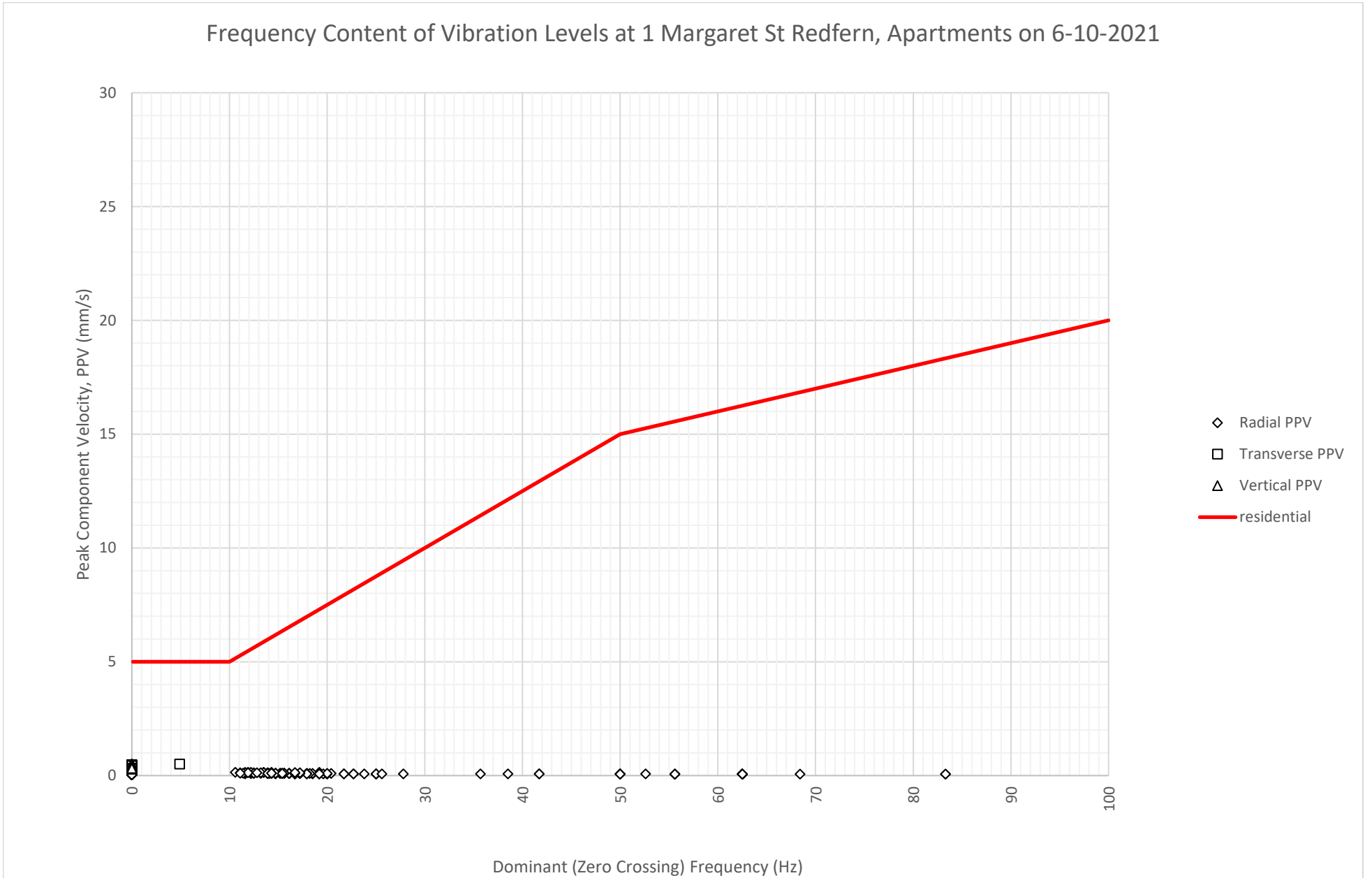
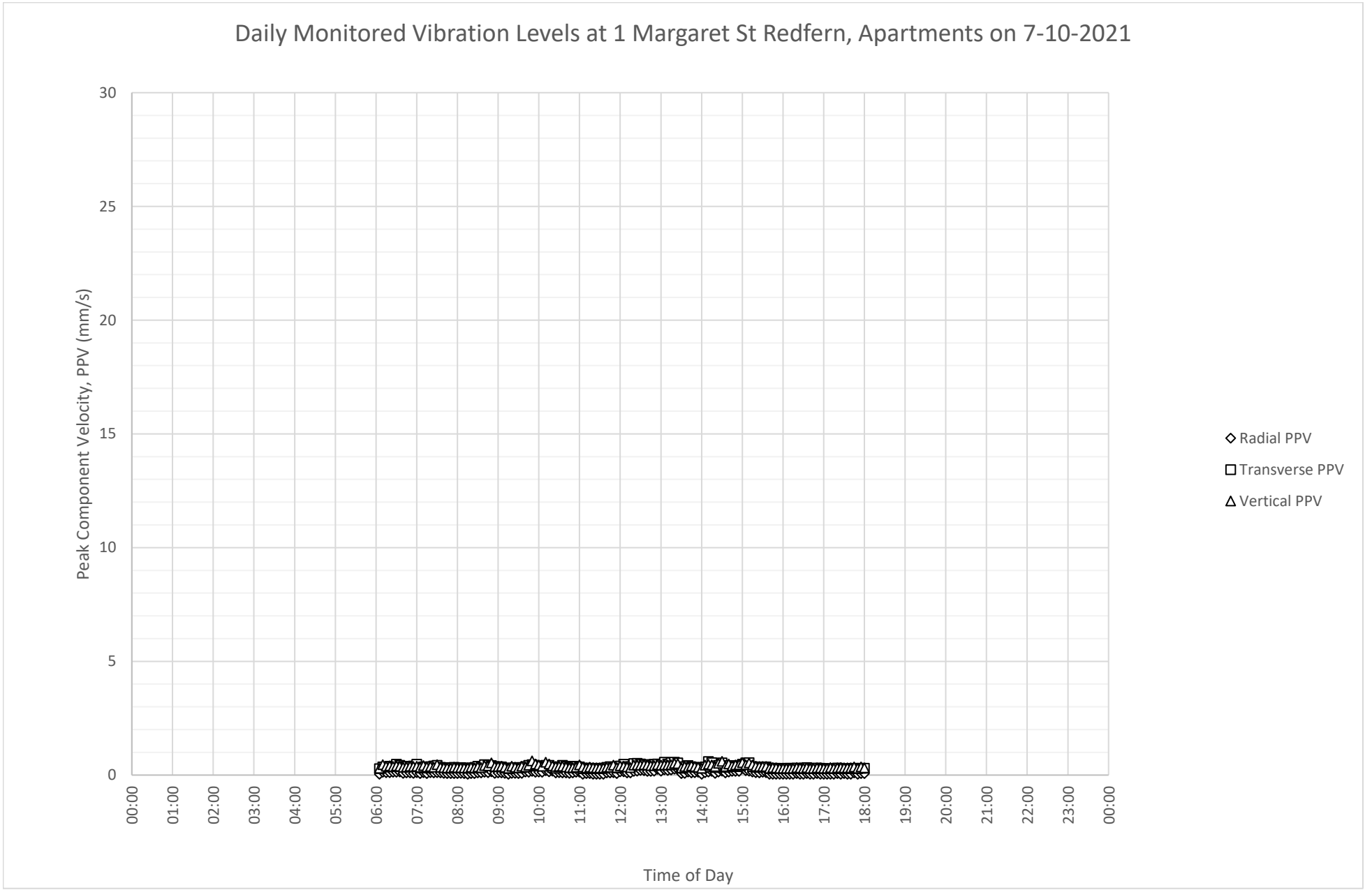
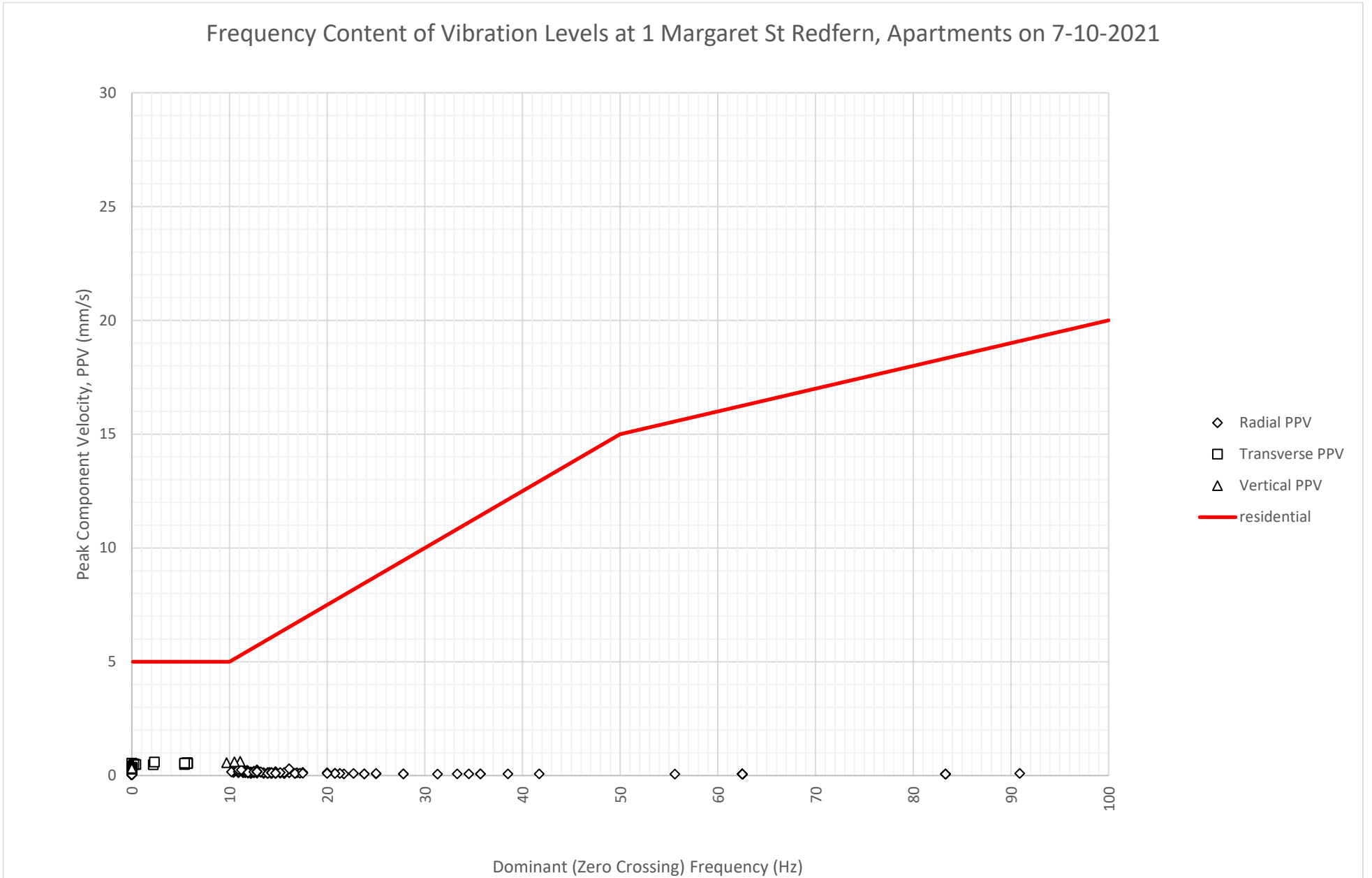
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

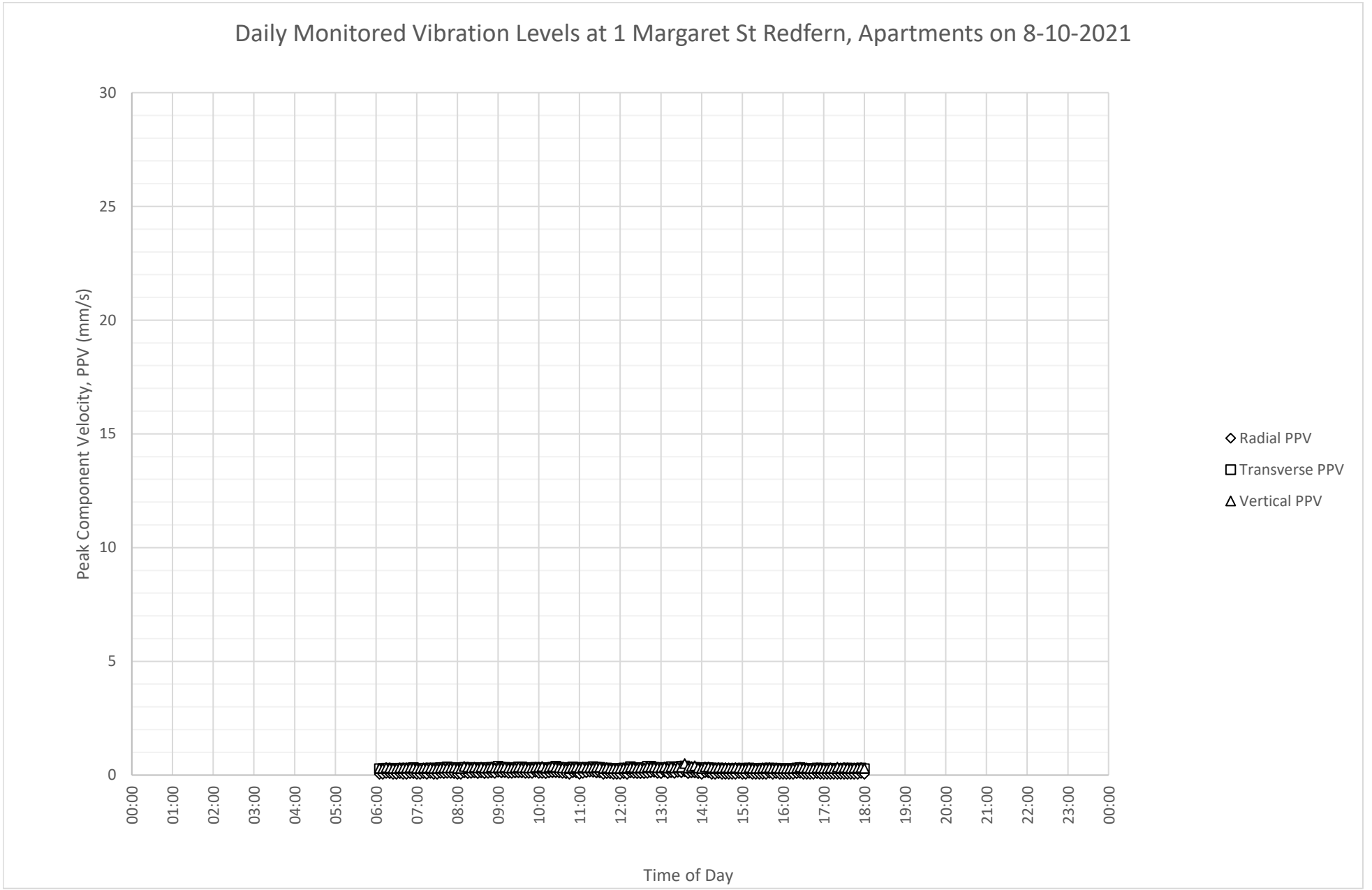

Frequency Content of Vibration Levels at 1 Margaret St Redfern, Apartments on 5-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential

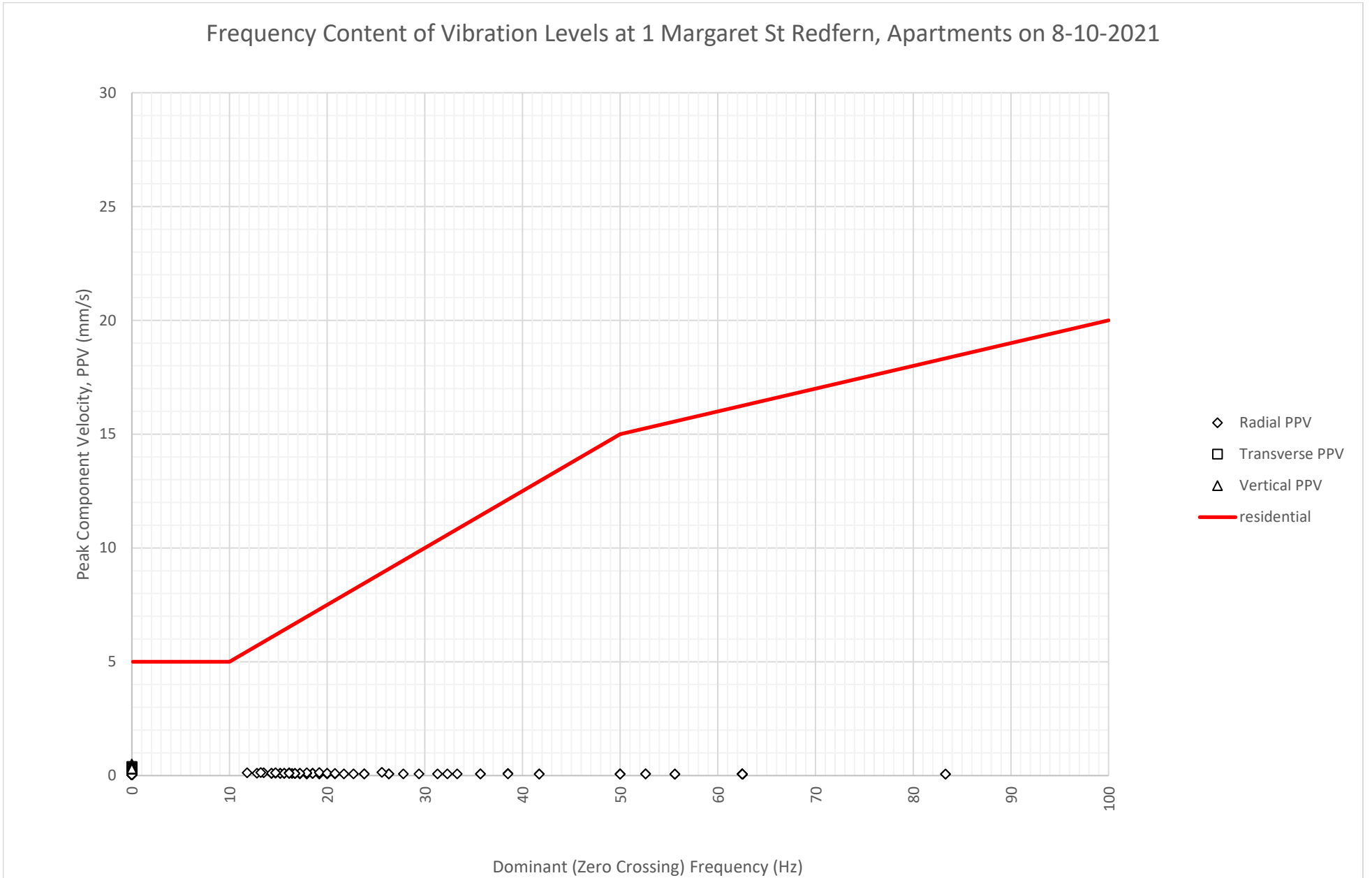

Daily Monitored Vibration Levels at 1 Margaret St Redfern, Apartments on 6-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

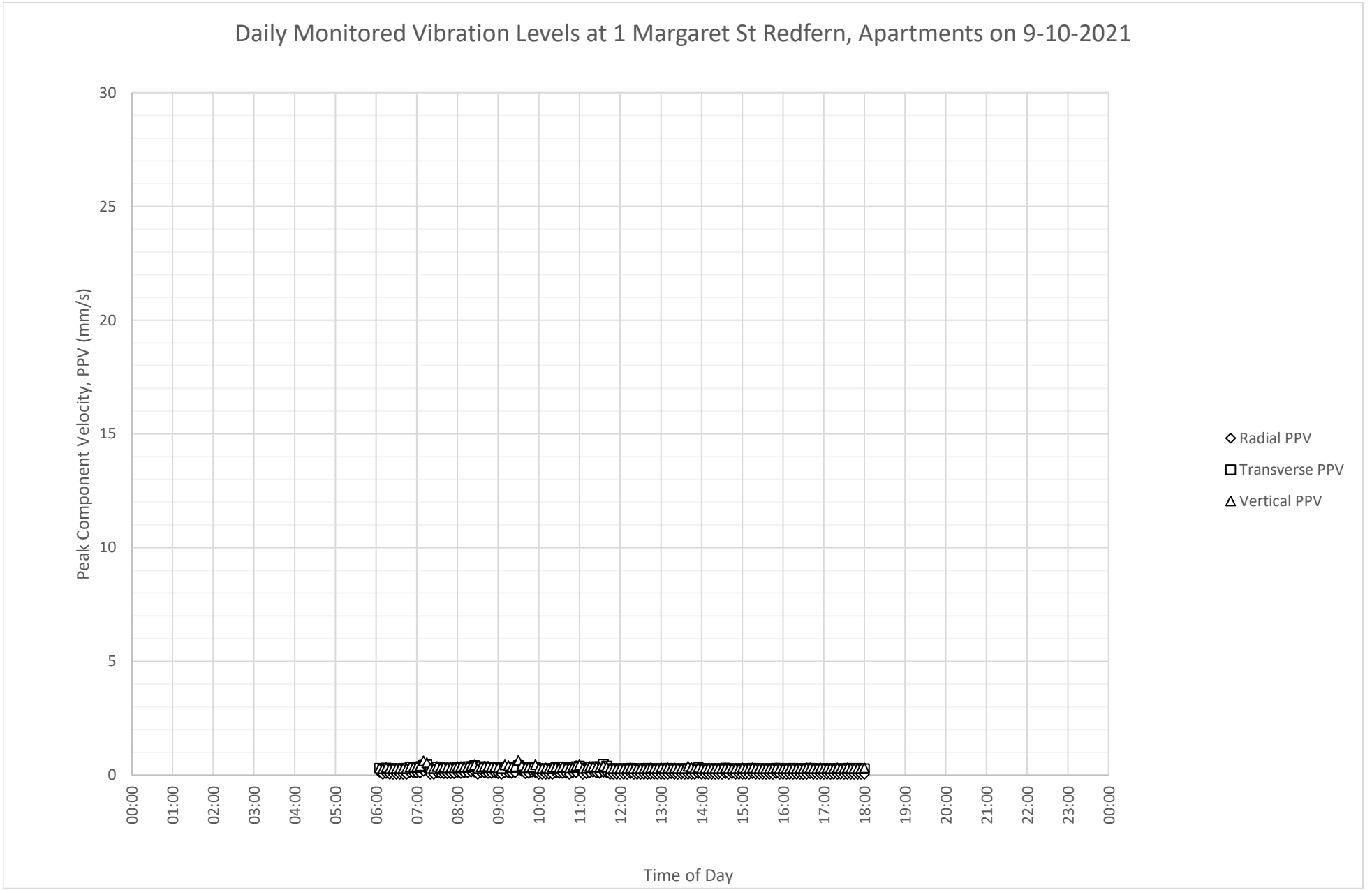

Frequency Content of Vibration Levels at 1 Margaret St Redfern, Apartments on 6-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential


Daily Monitored Vibration Levels at 1 Margaret St Redfern, Apartments on 7-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St Redfern, Apartments on 7-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential


Daily Monitored Vibration Levels at 1 Margaret St Redfern, Apartments on 8-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St Redfern, Apartments on 8-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential


Daily Monitored Vibration Levels at 1 Margaret St Redfern, Apartments on 9-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
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13:00
14:00
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16:00
17:00
18:00
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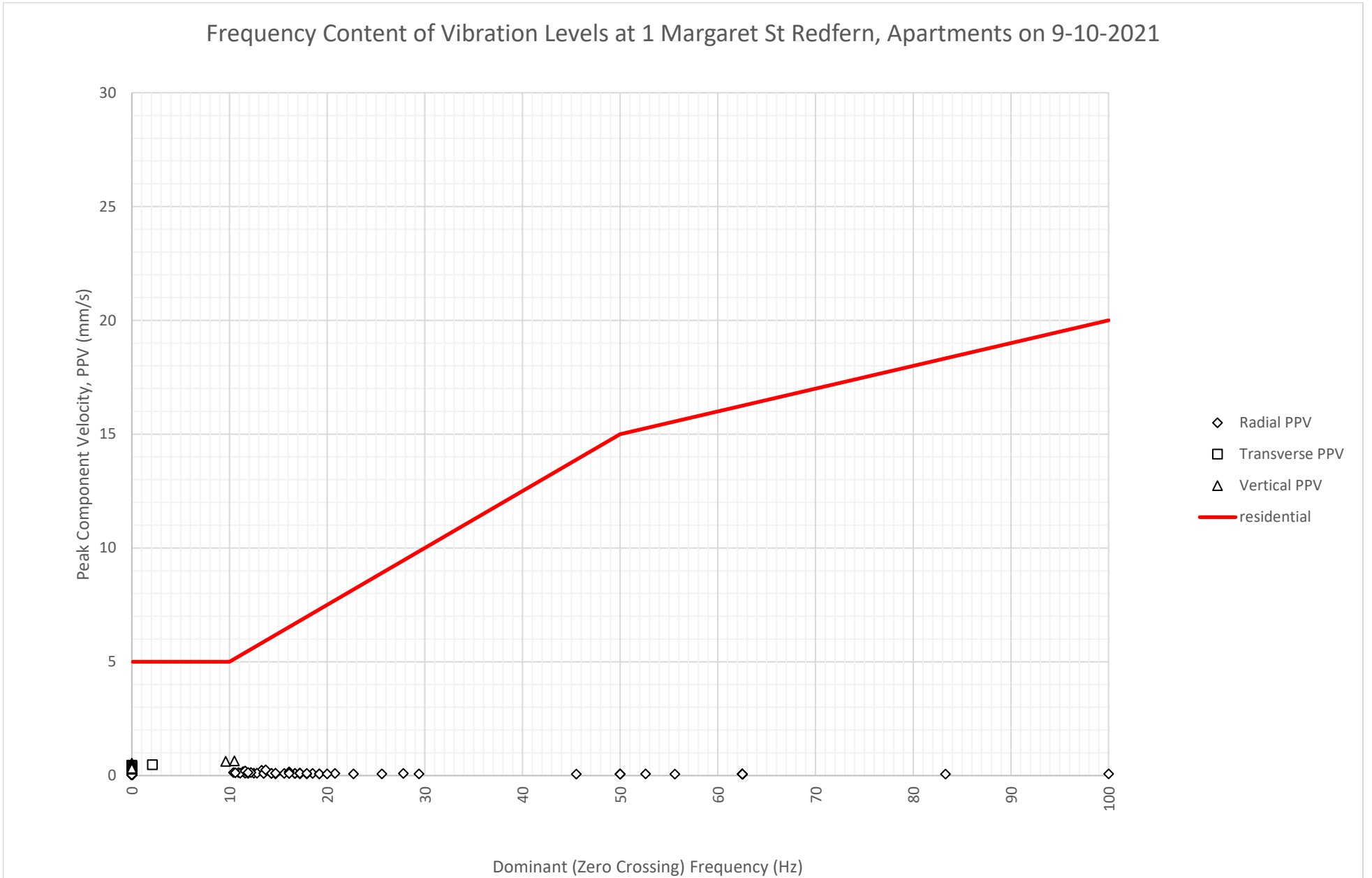
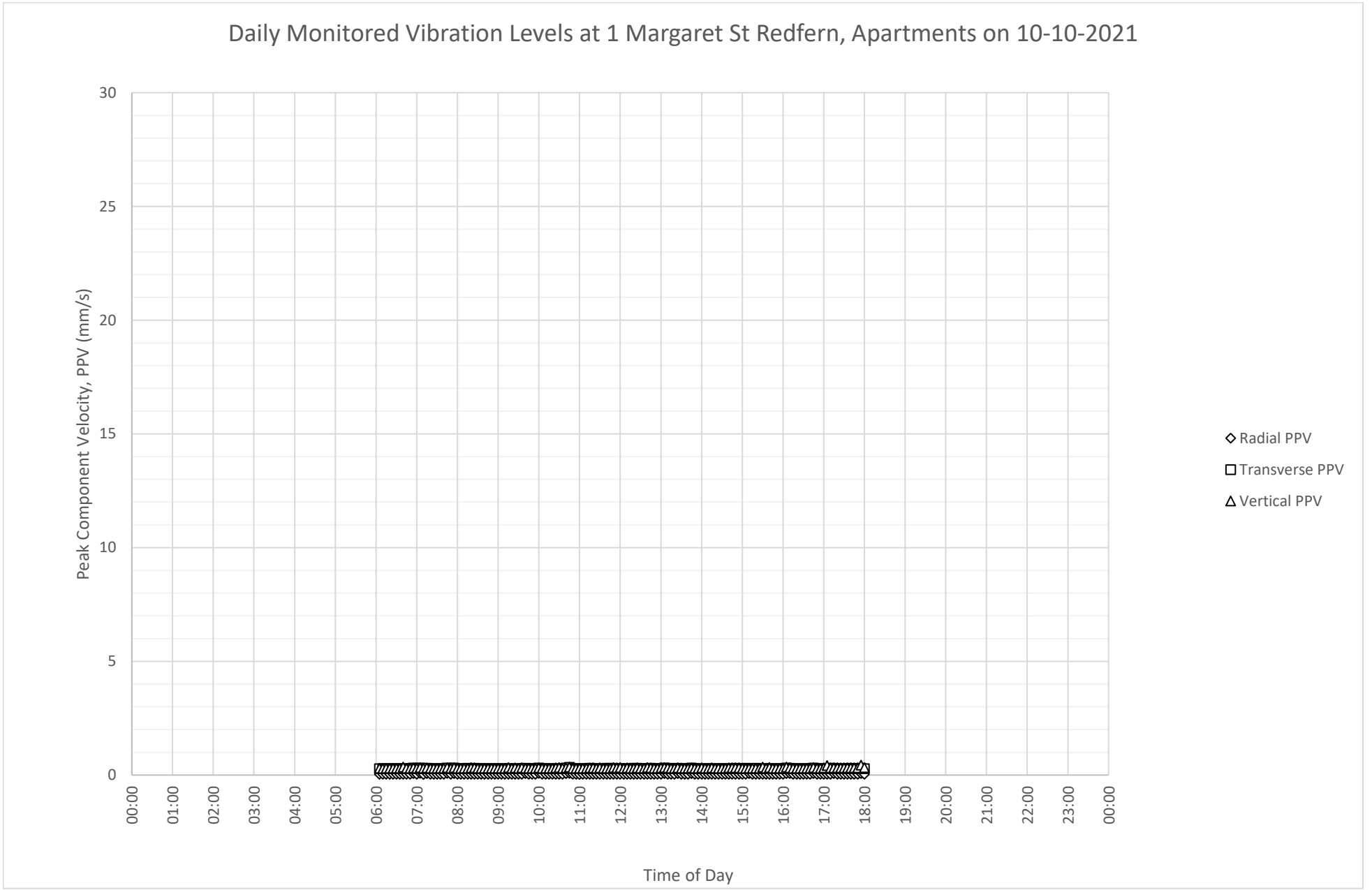
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St Redfern, Apartments on 9-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential


Daily Monitored Vibration Levels at 1 Margaret St Redfern, Apartments on 10-10-2021
Peak Component Velocity, PPV (mm/s)
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25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
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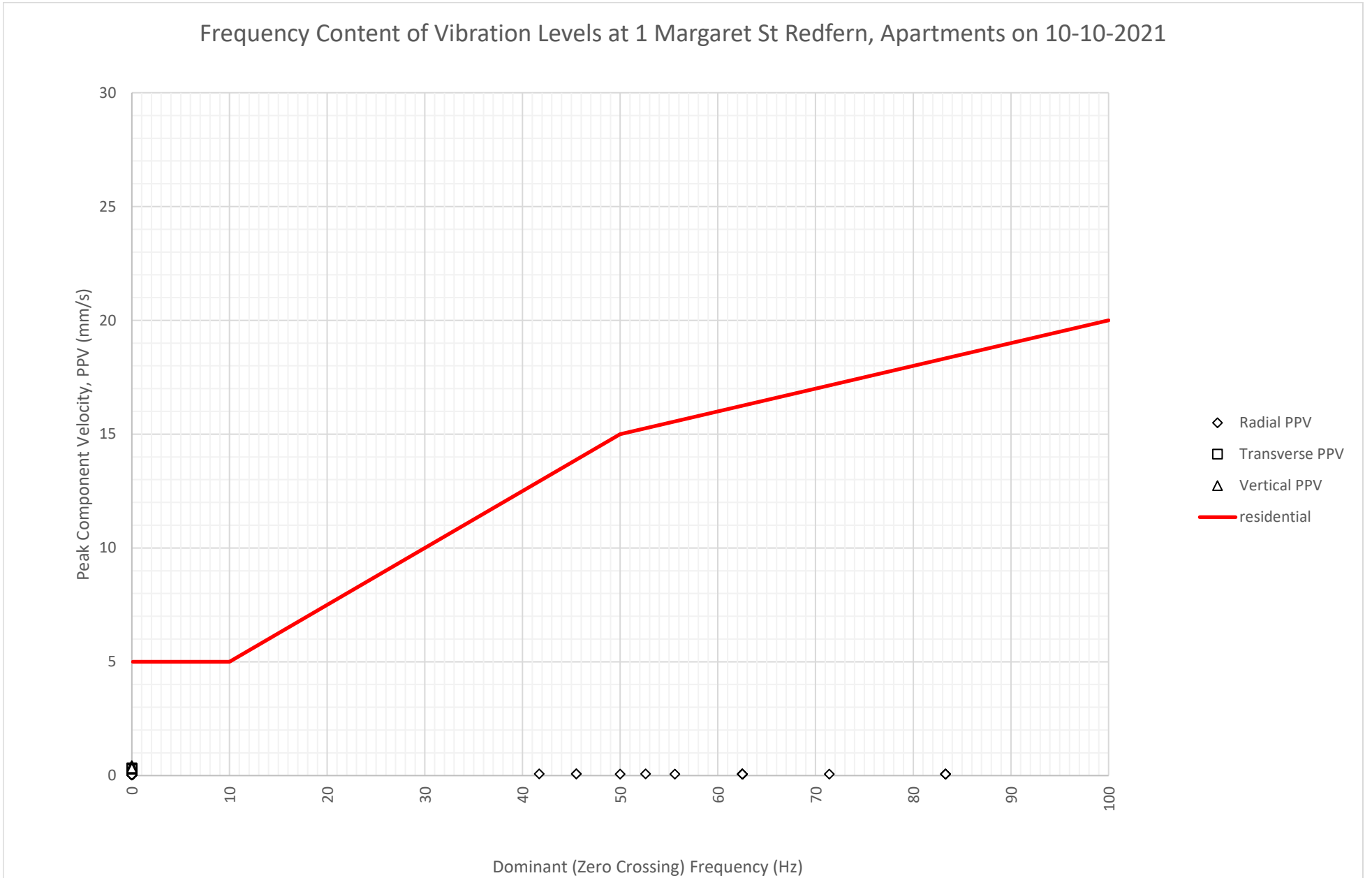
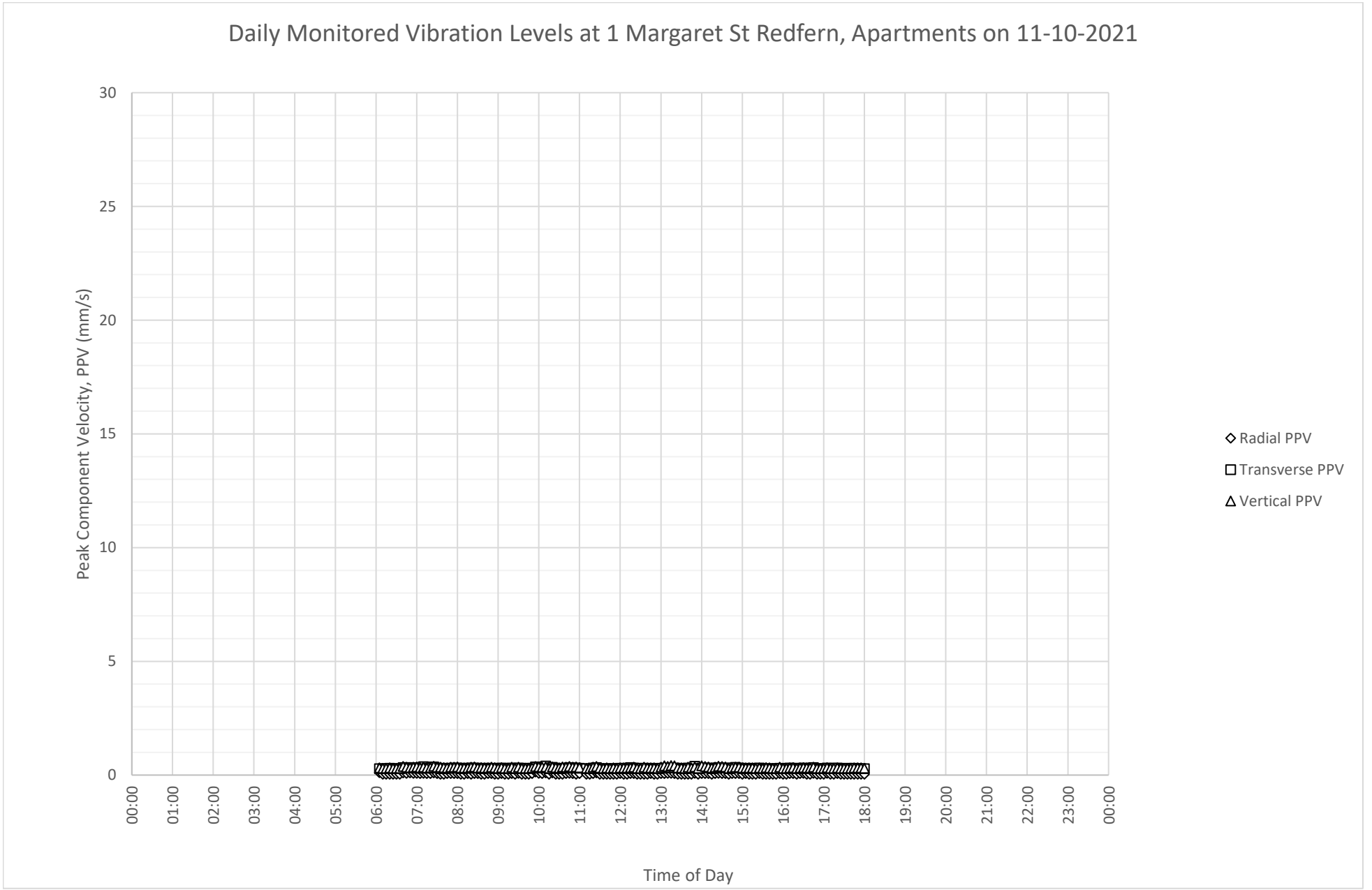
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St Redfern, Apartments on 10-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential


Daily Monitored Vibration Levels at 1 Margaret St Redfern, Apartments on 11-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
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13:00
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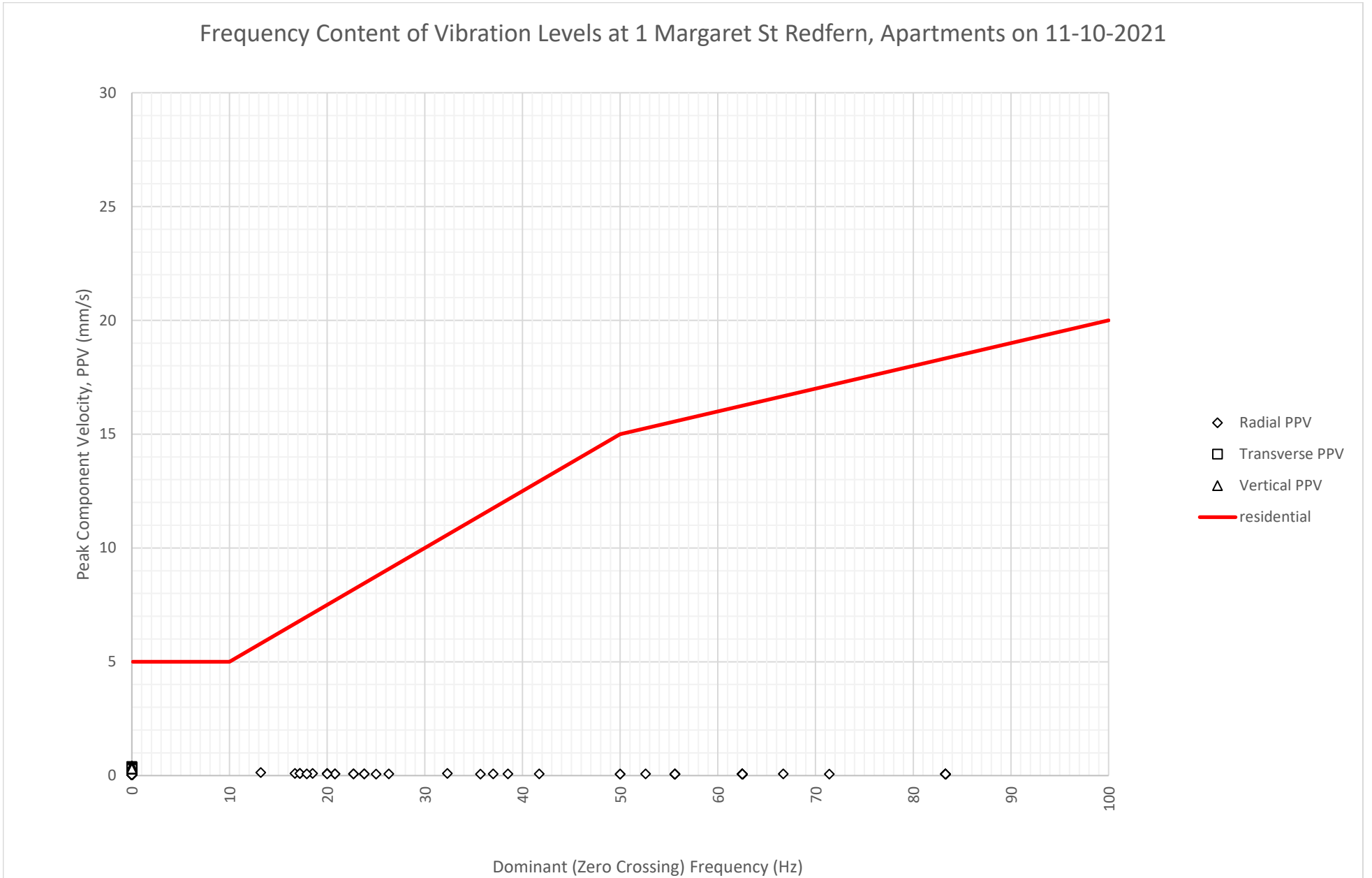
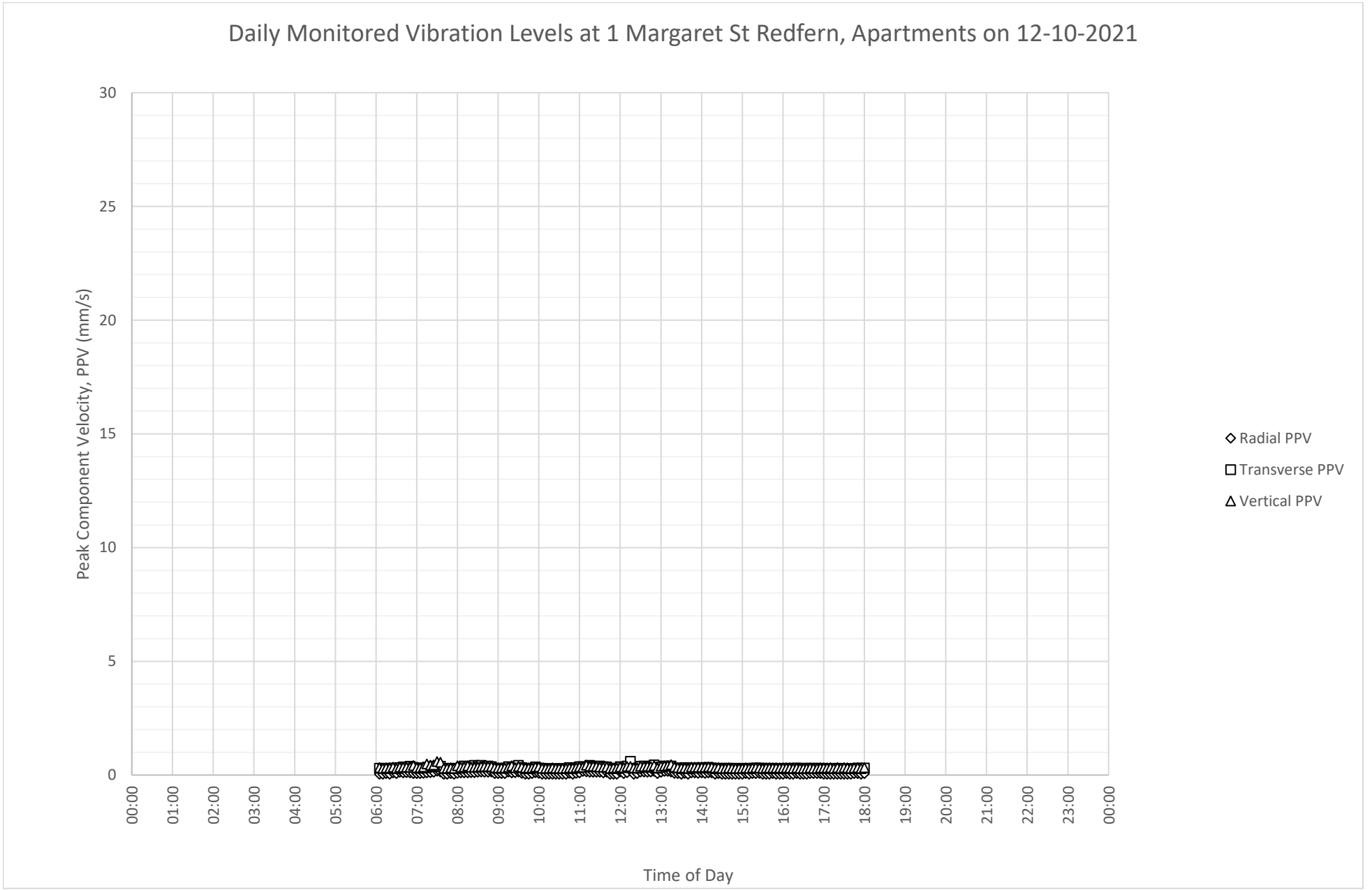
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St Redfern, Apartments on 11-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential


Daily Monitored Vibration Levels at 1 Margaret St Redfern, Apartments on 12-10-2021
Peak Component Velocity, PPV (mm/s)
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25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
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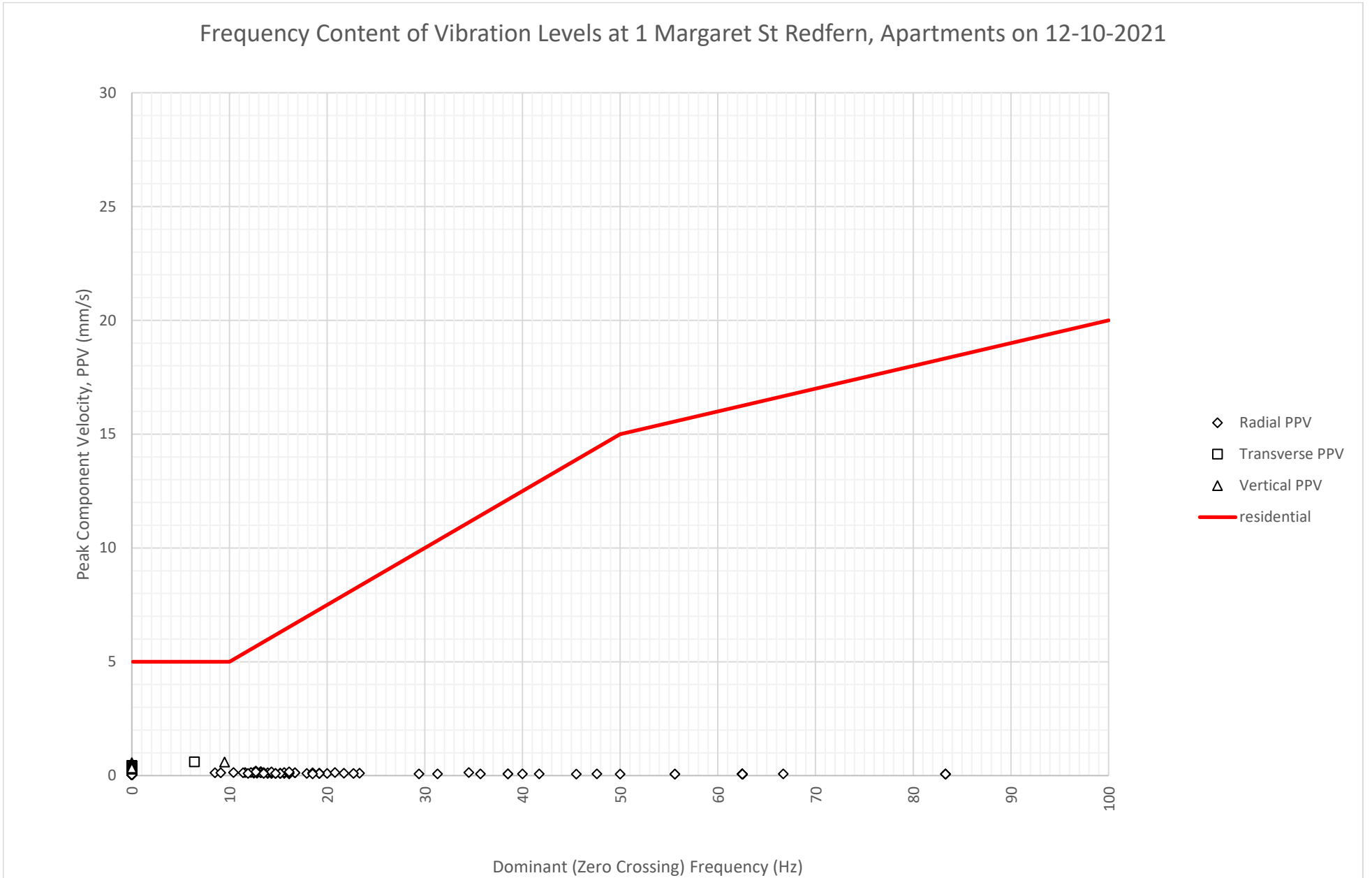
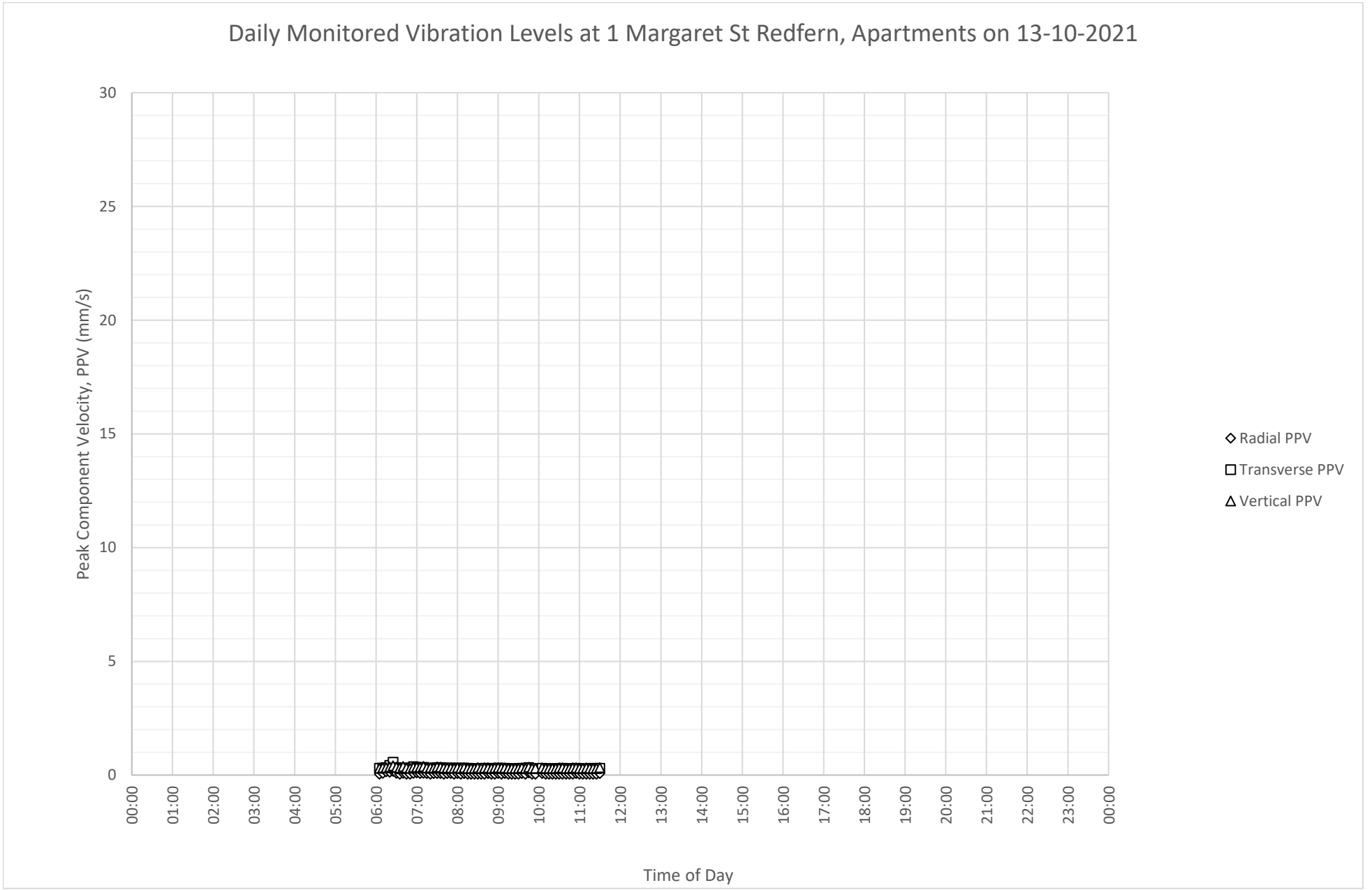
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St Redfern, Apartments on 12-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential


Daily Monitored Vibration Levels at 1 Margaret St Redfern, Apartments on 13-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
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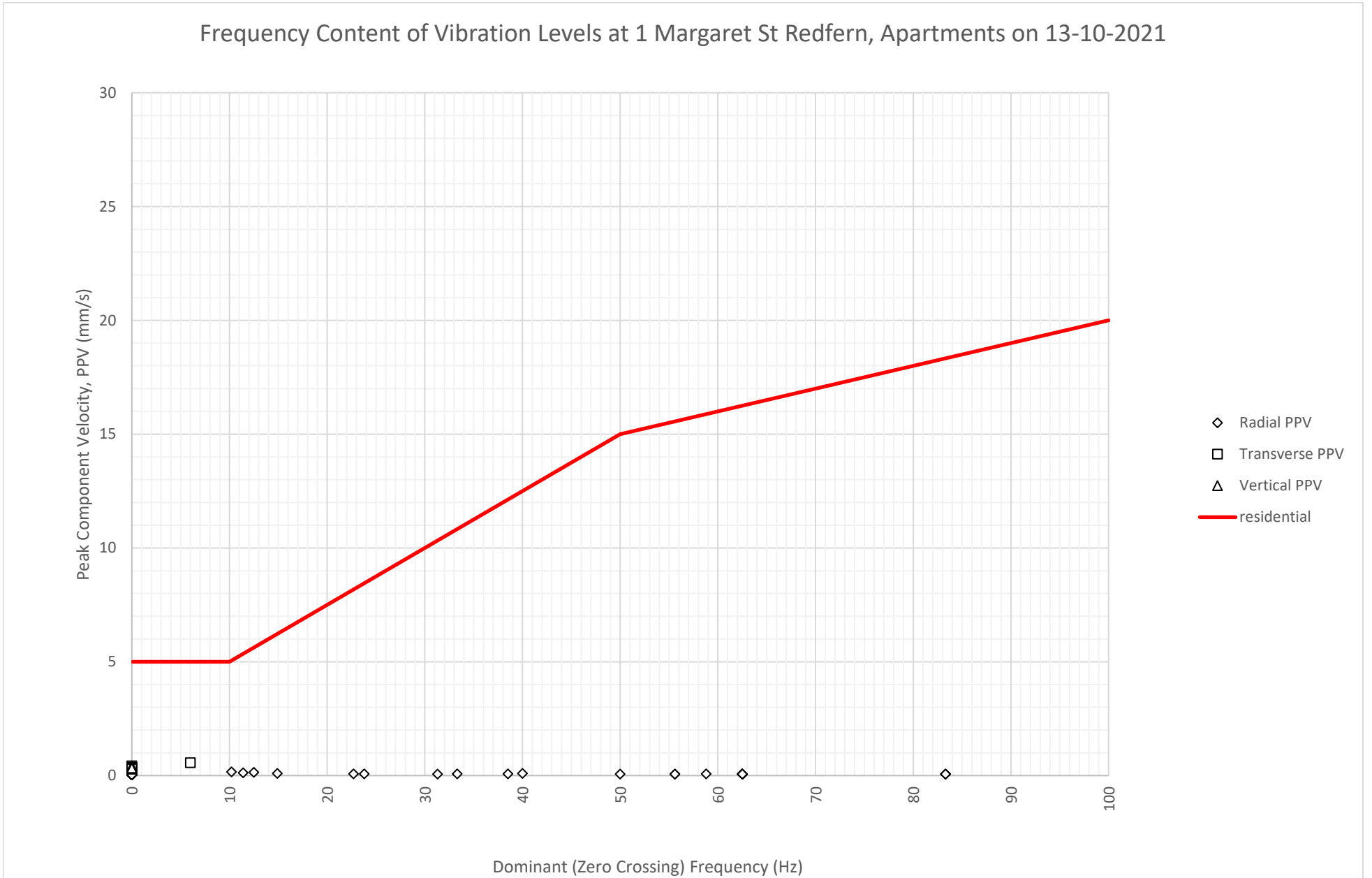
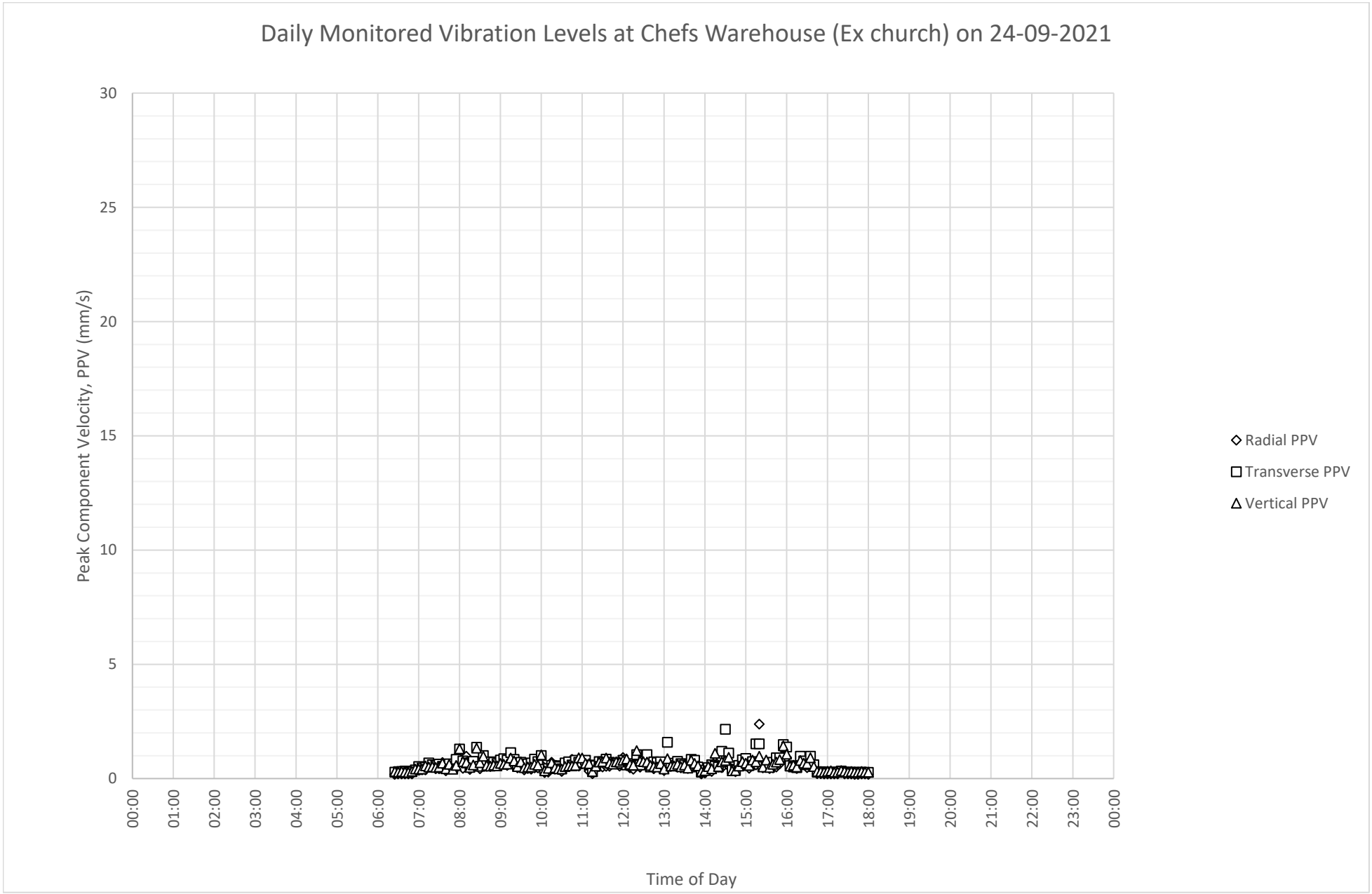
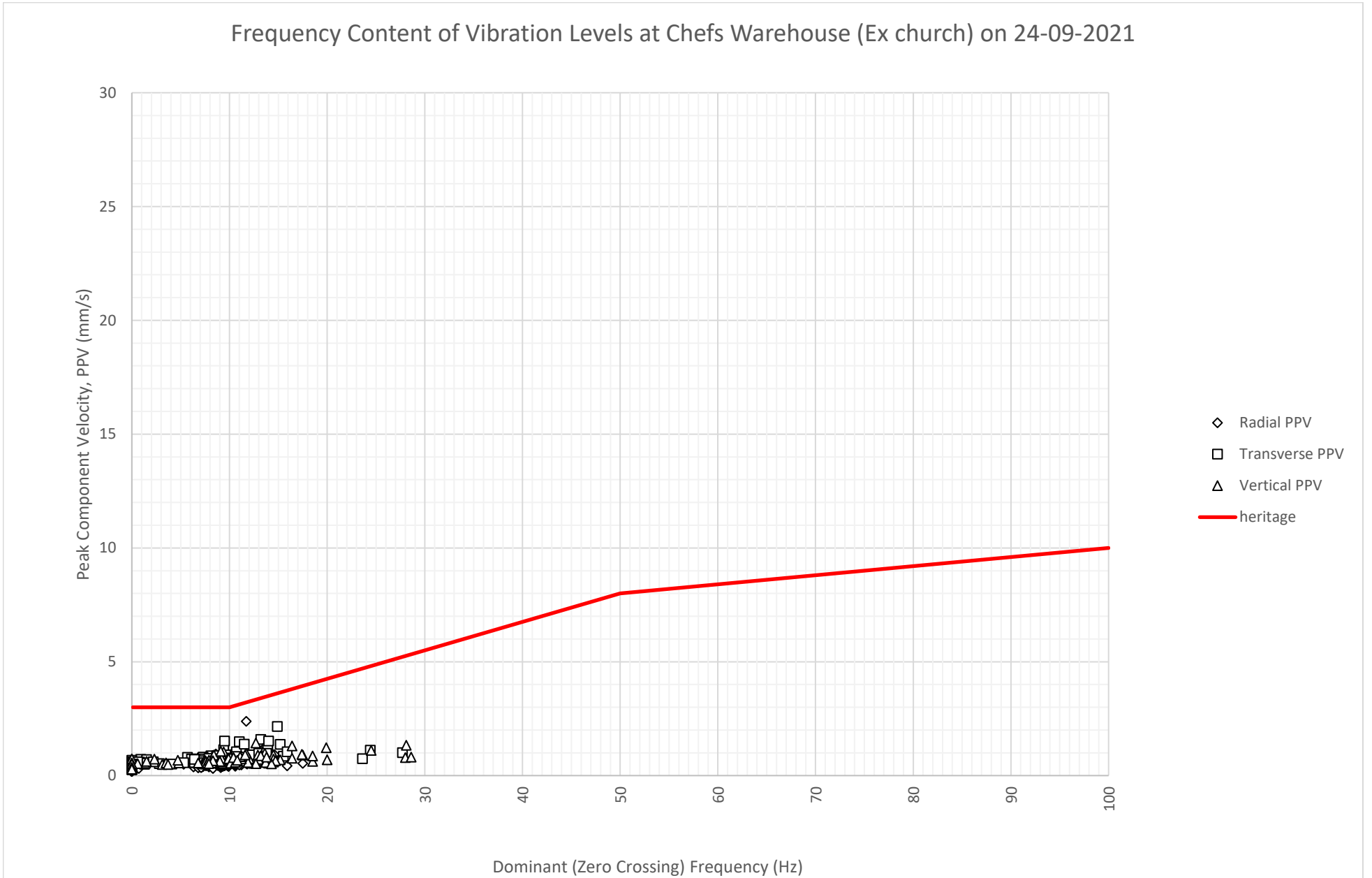
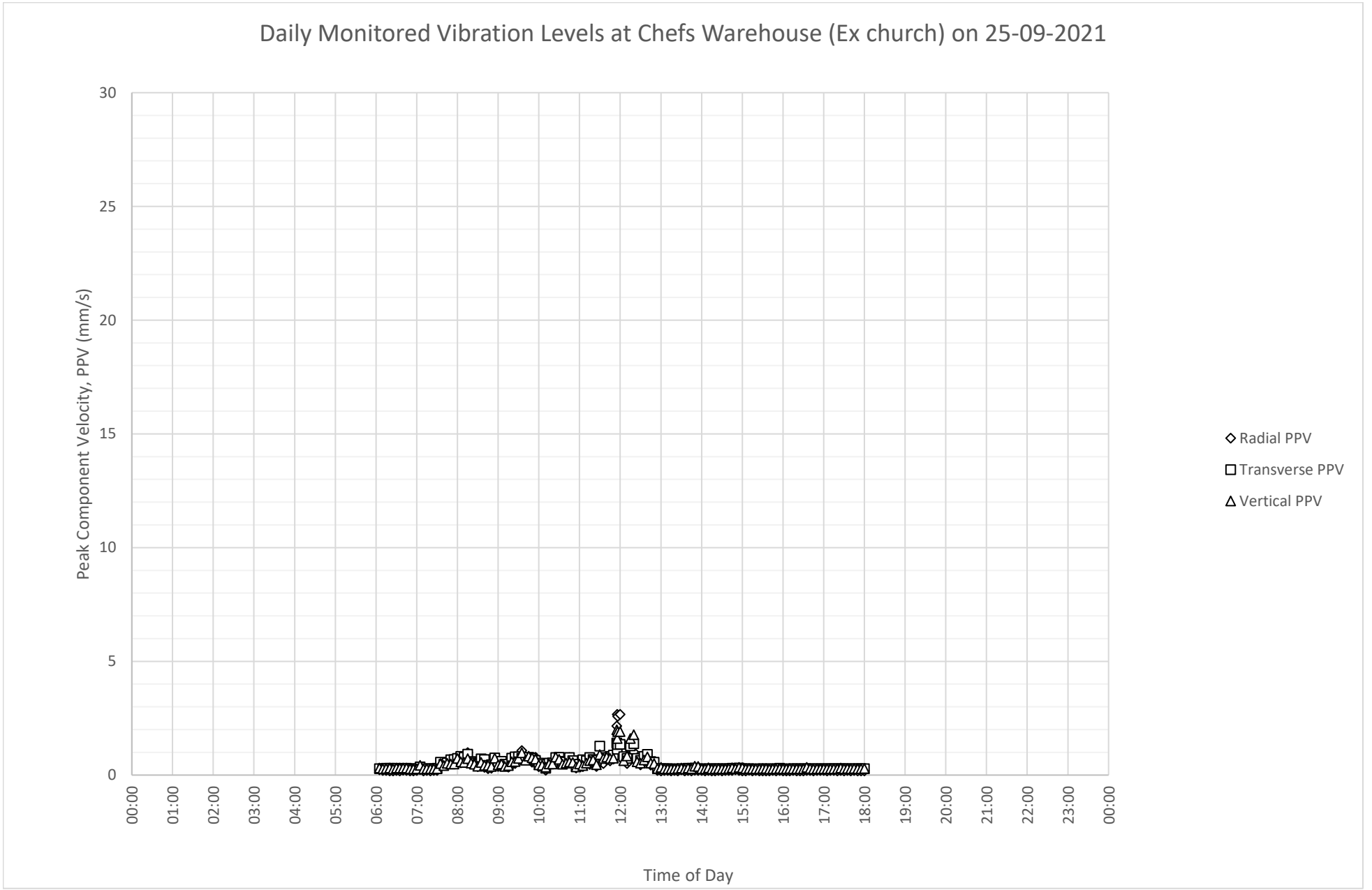
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St Redfern, Apartments on 13-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential

APPENDIX 2 – VIBRATION MONITORING DATA – RECEIVER 2-EX CHURCH


Daily Monitored Vibration Levels at Chefs Warehouse (Ex church) on 24-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chefs Warehouse (Ex church) on 24-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (Ex church) on 25-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
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13:00
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15:00
16:00
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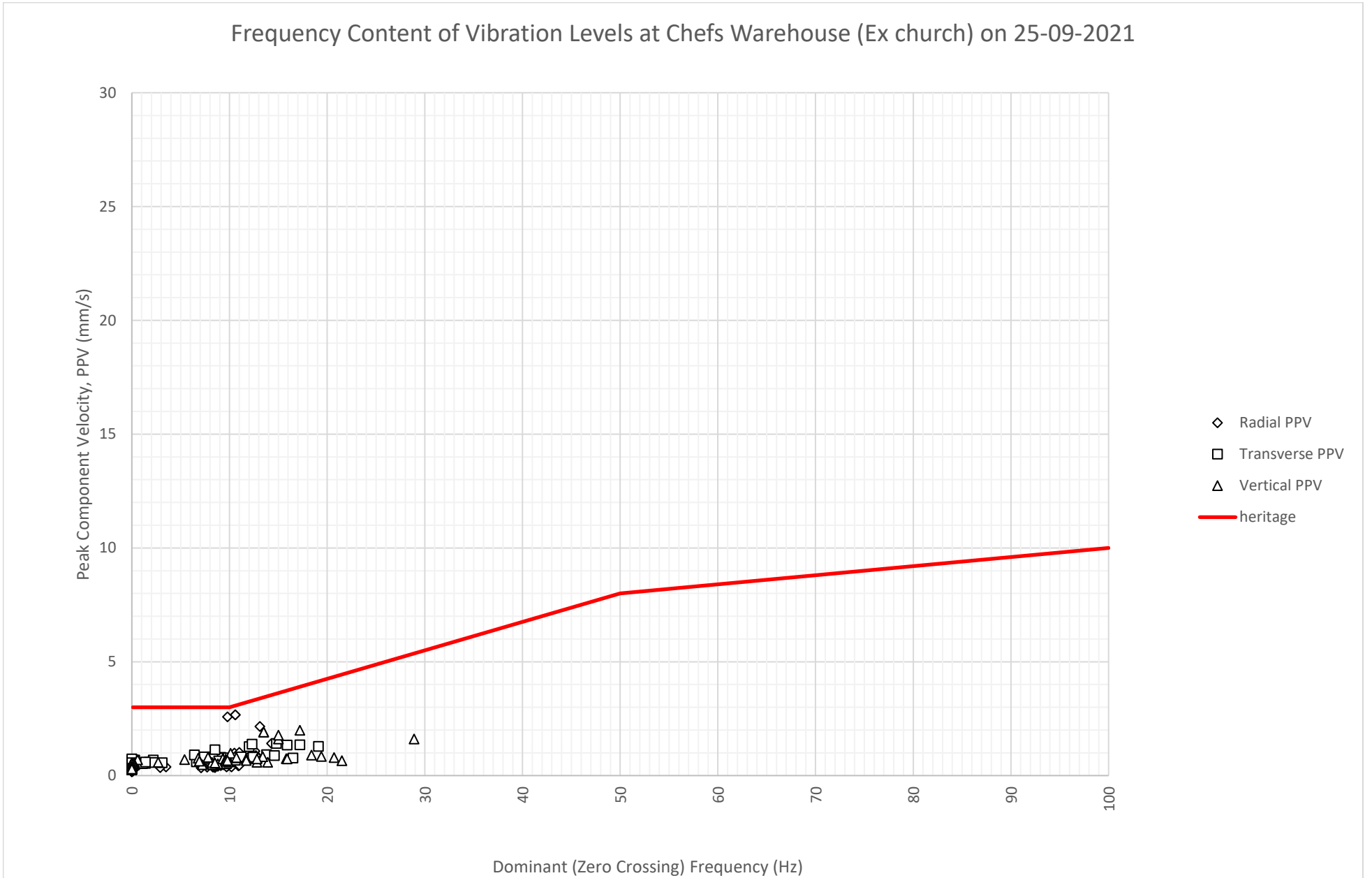
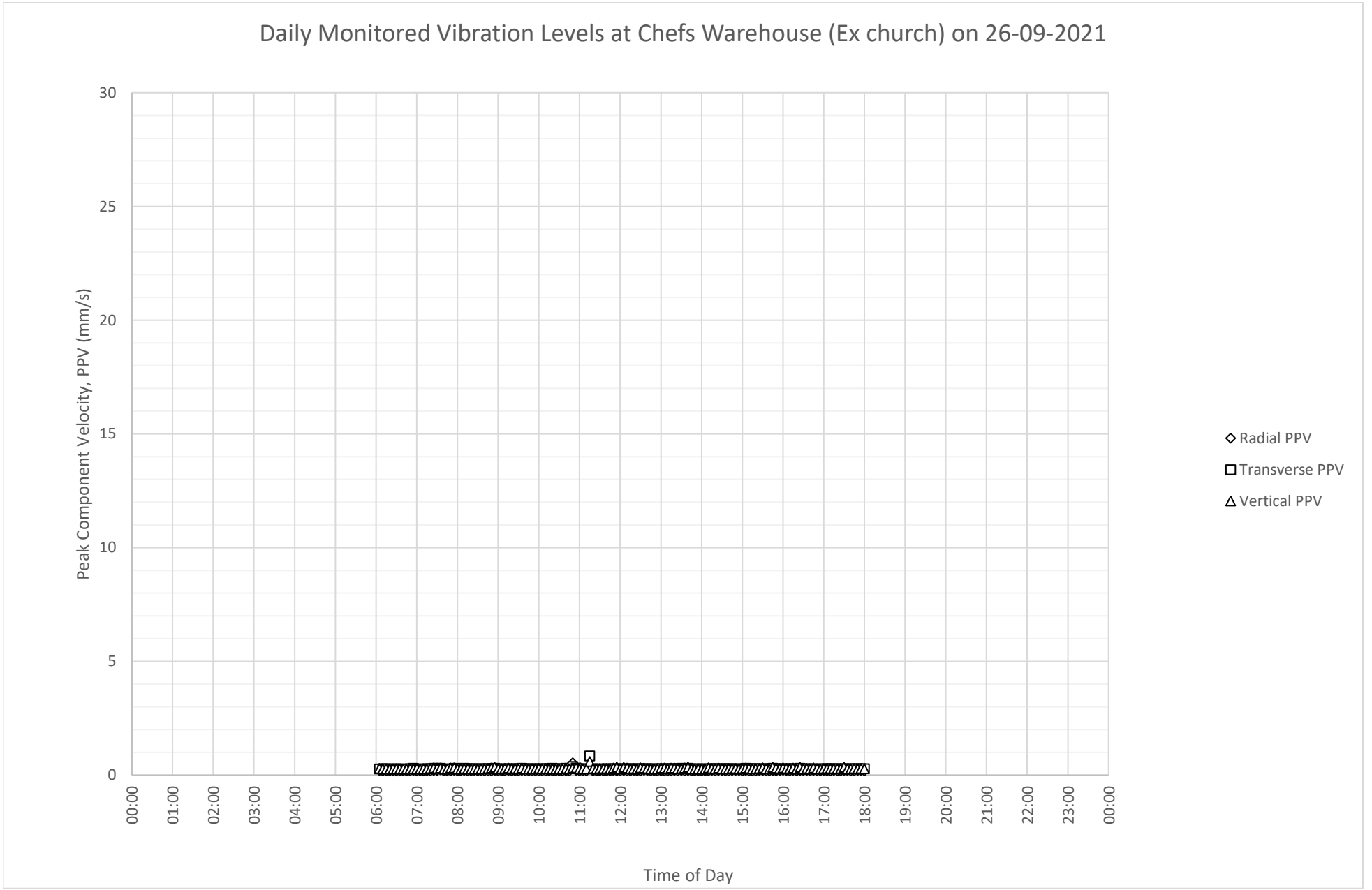
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chefs Warehouse (Ex church) on 25-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (Ex church) on 26-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
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12:00
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15:00
16:00
17:00
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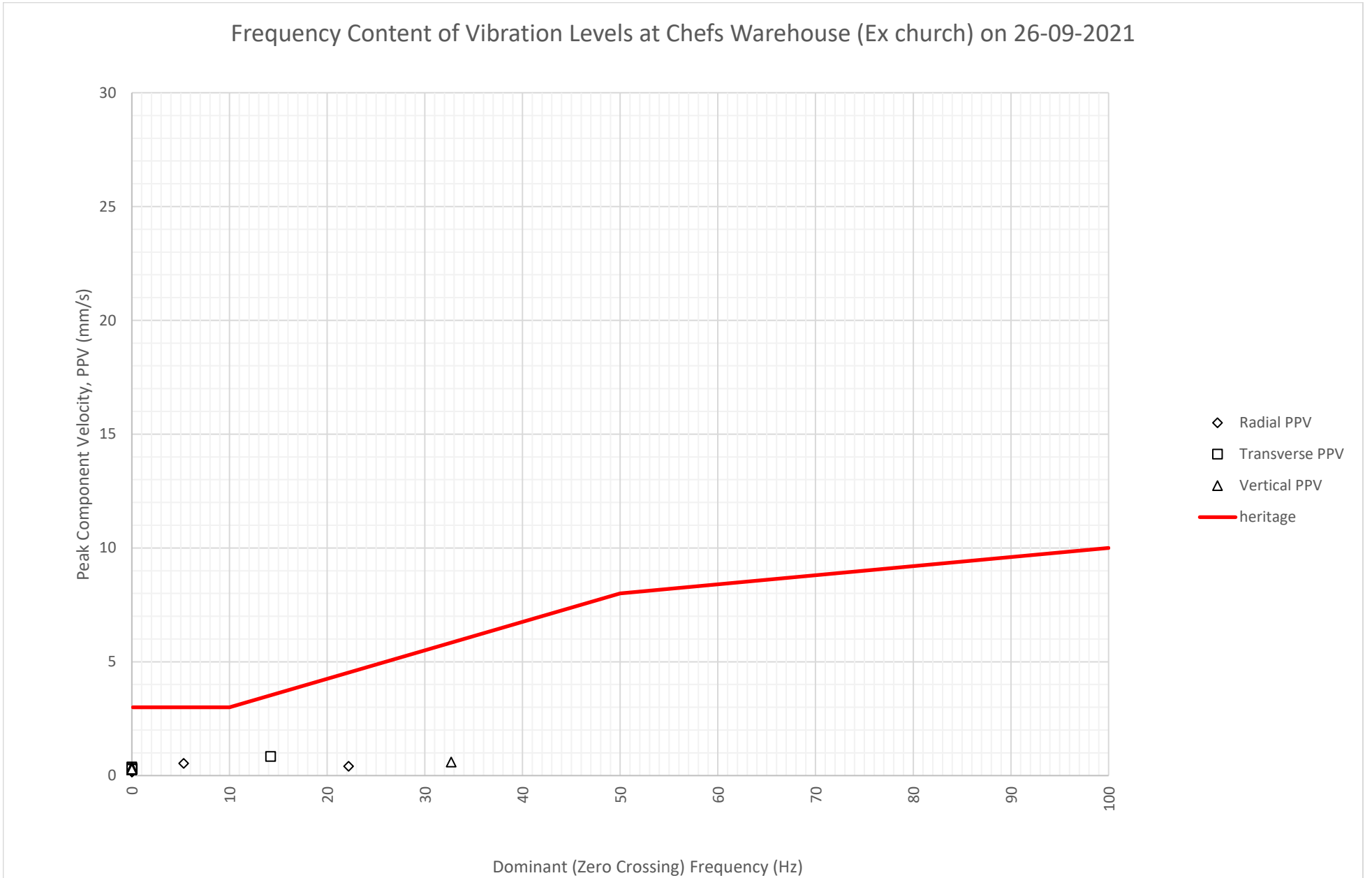
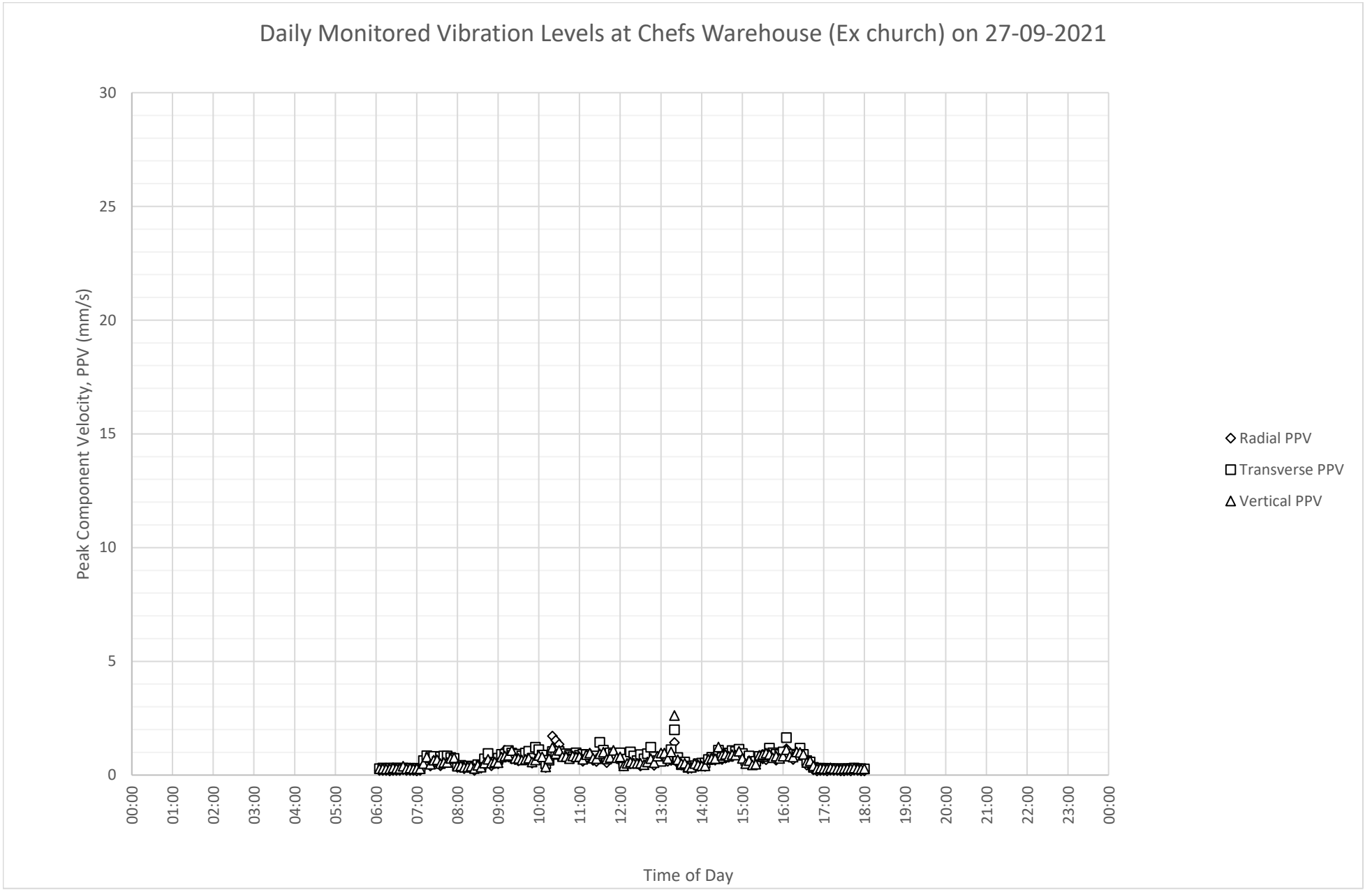
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chefs Warehouse (Ex church) on 26-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (Ex church) on 27-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
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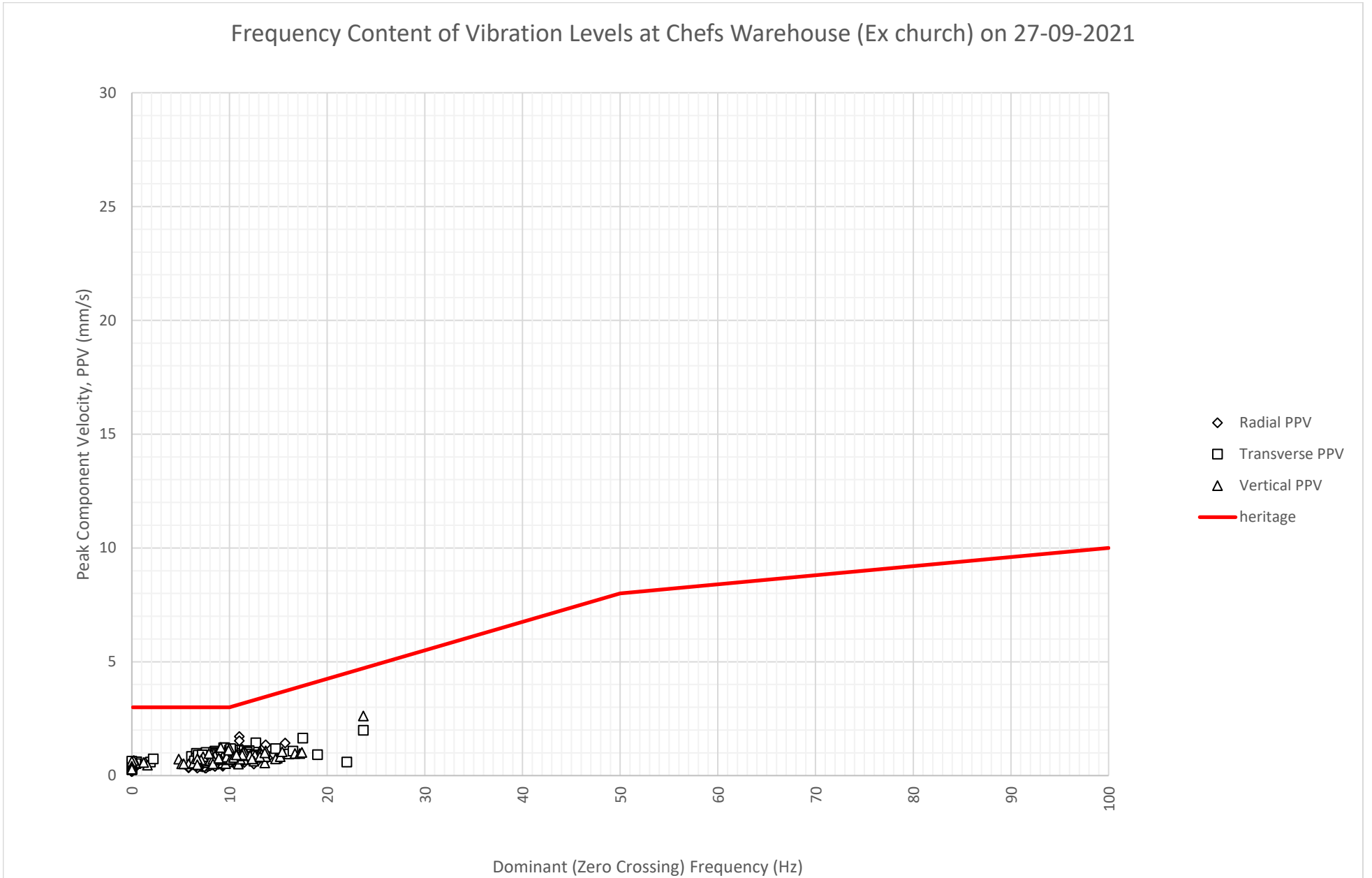
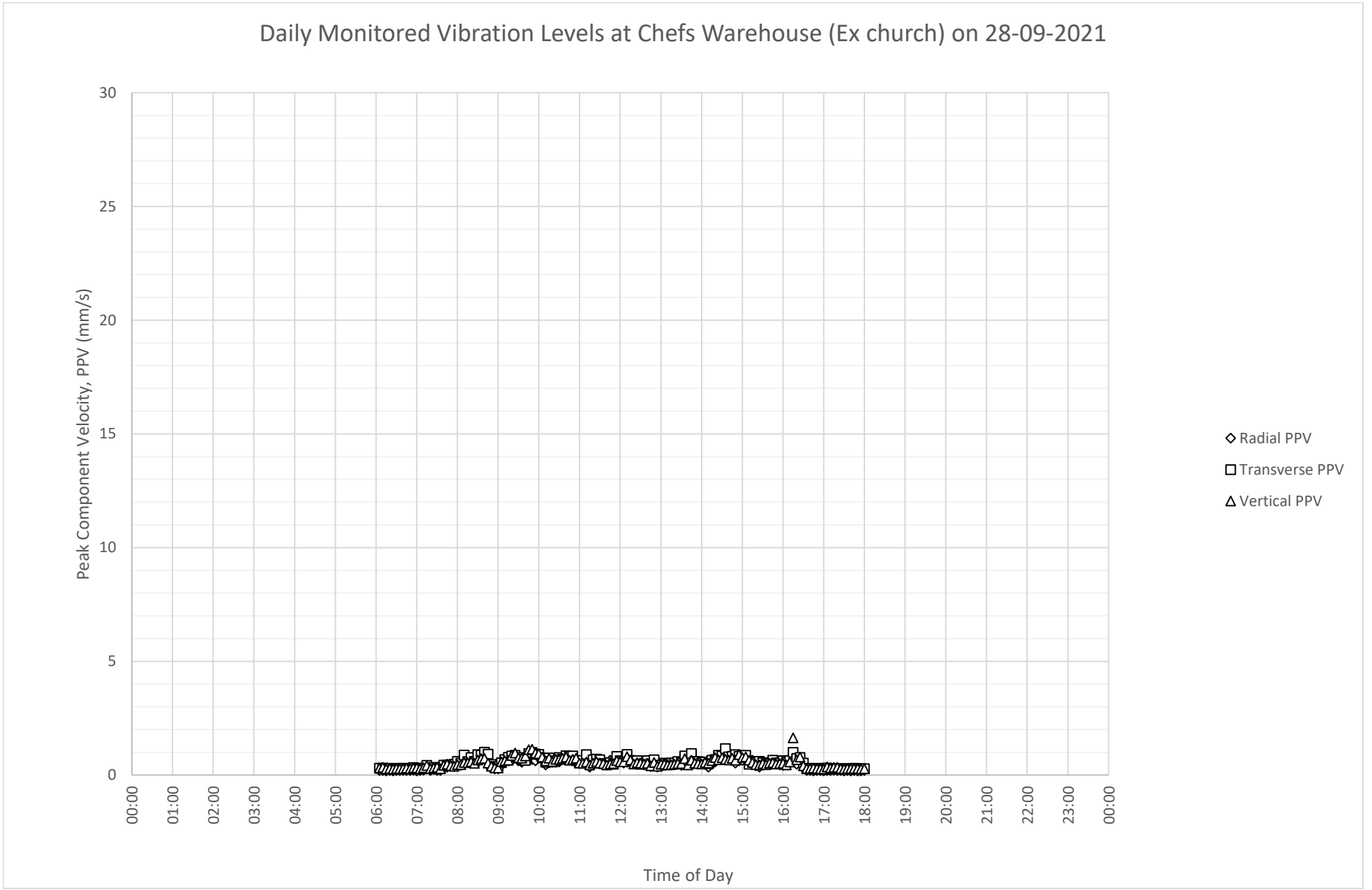
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chefs Warehouse (Ex church) on 27-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (Ex church) on 28-09-2021
Peak Component Velocity, PPV (mm/s)
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15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
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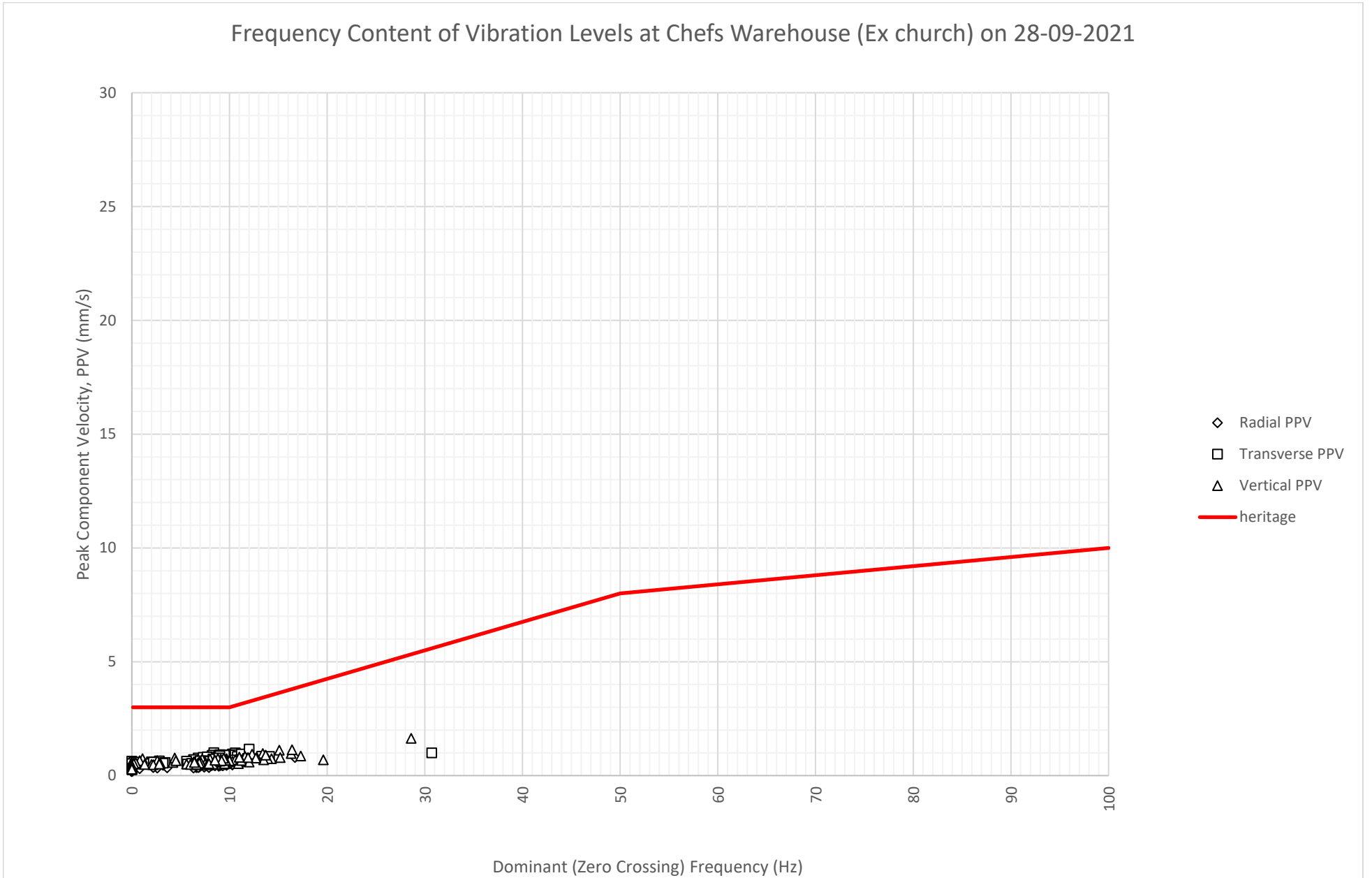
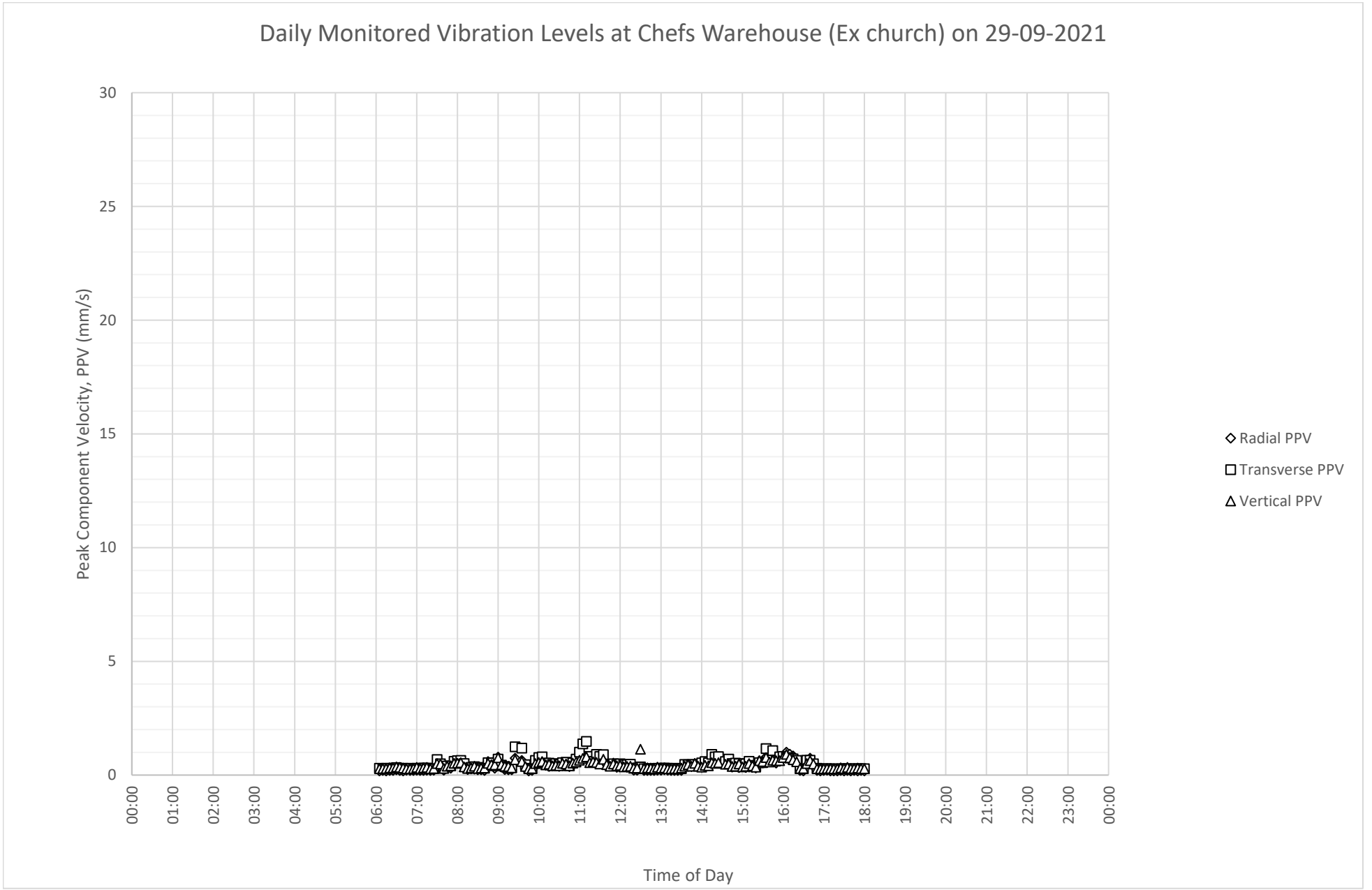
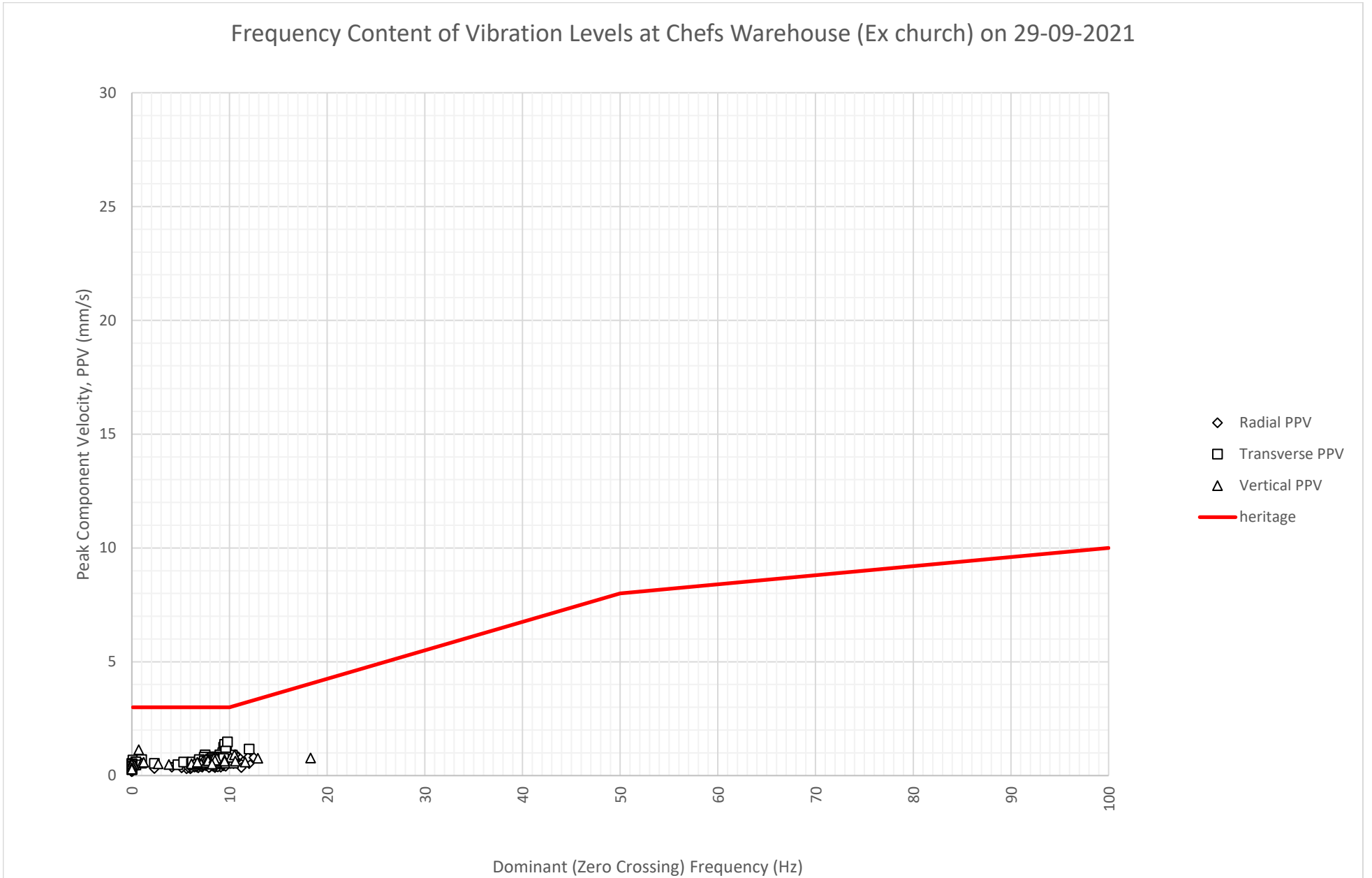
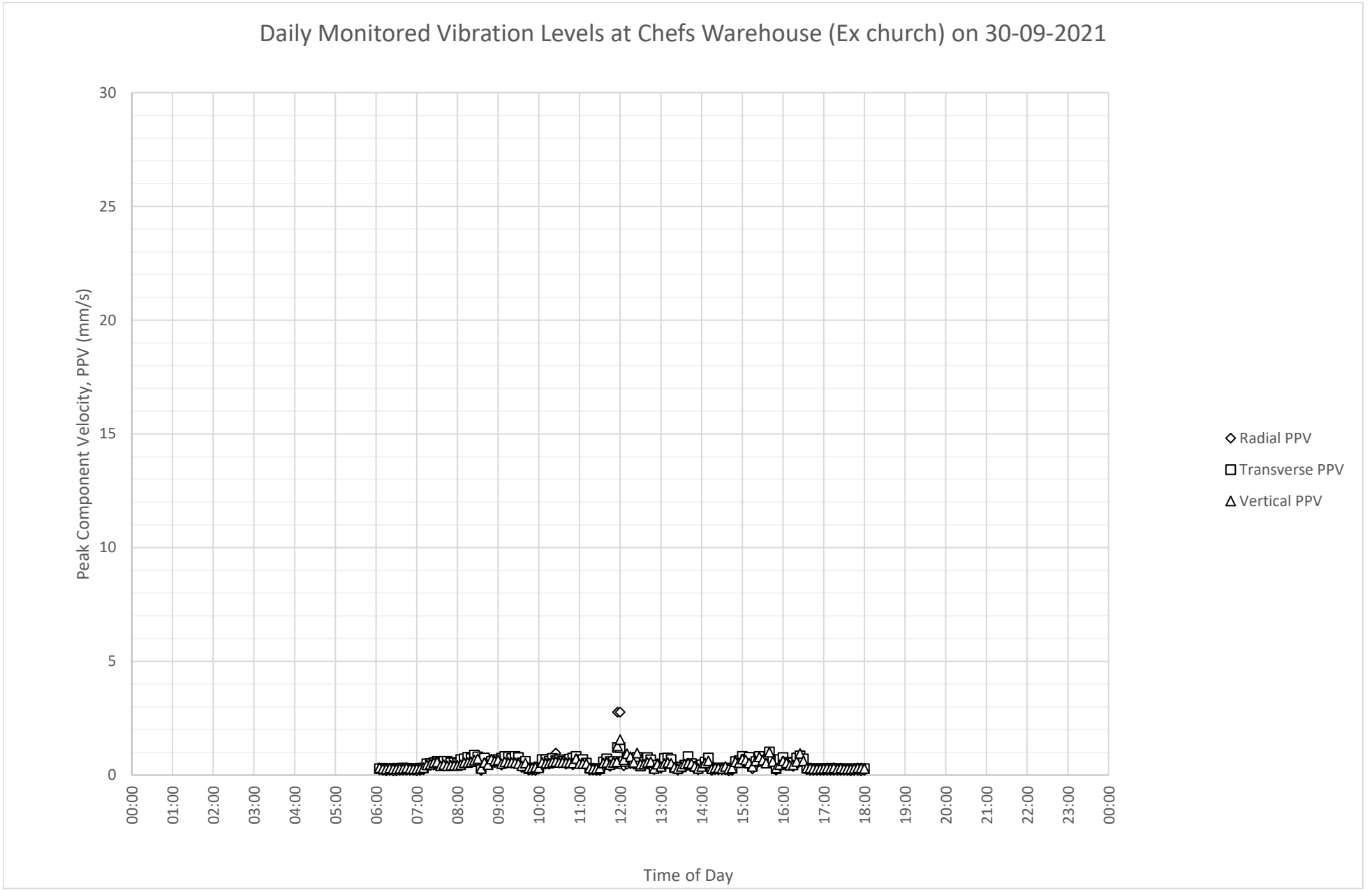
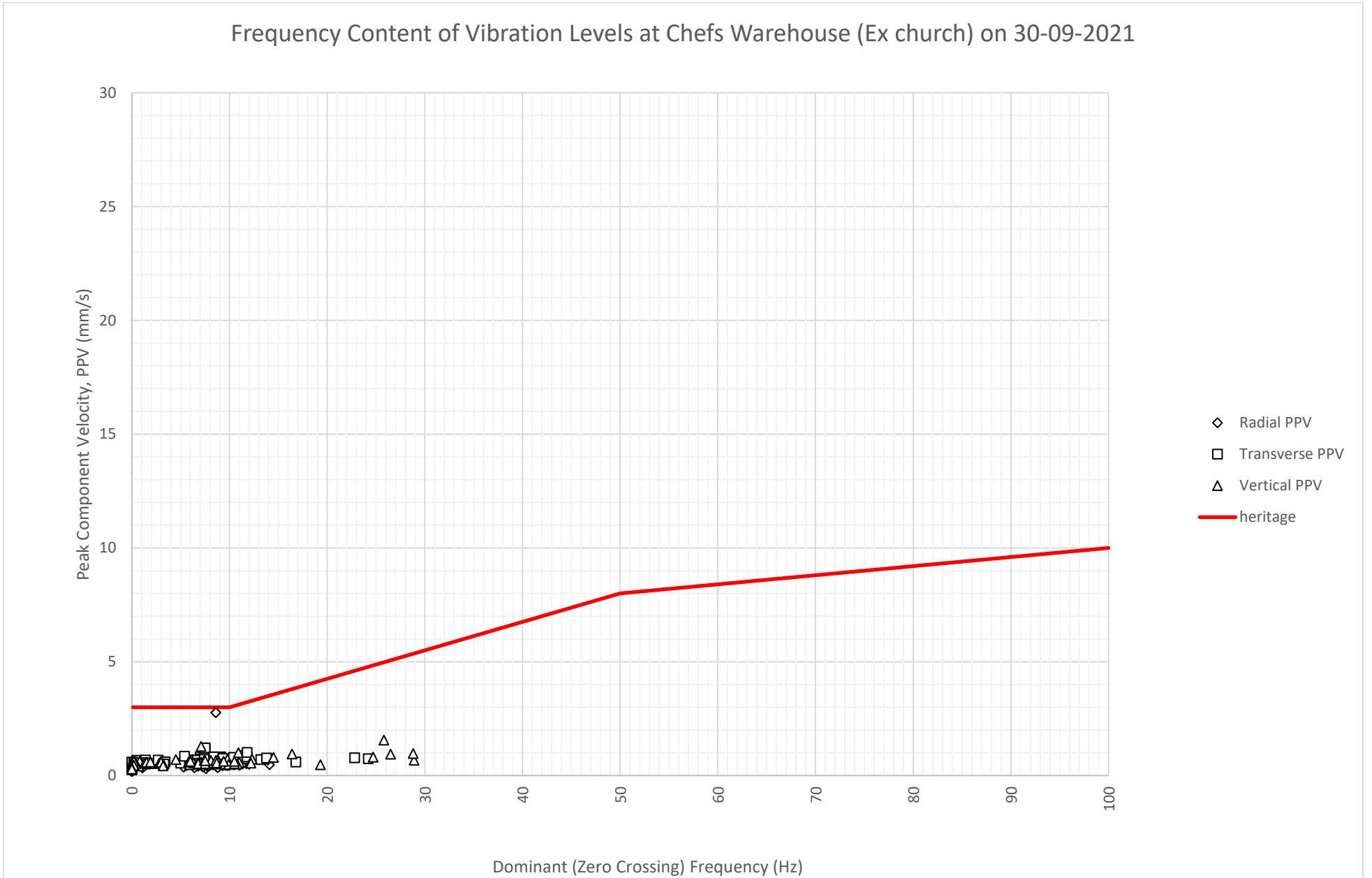
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

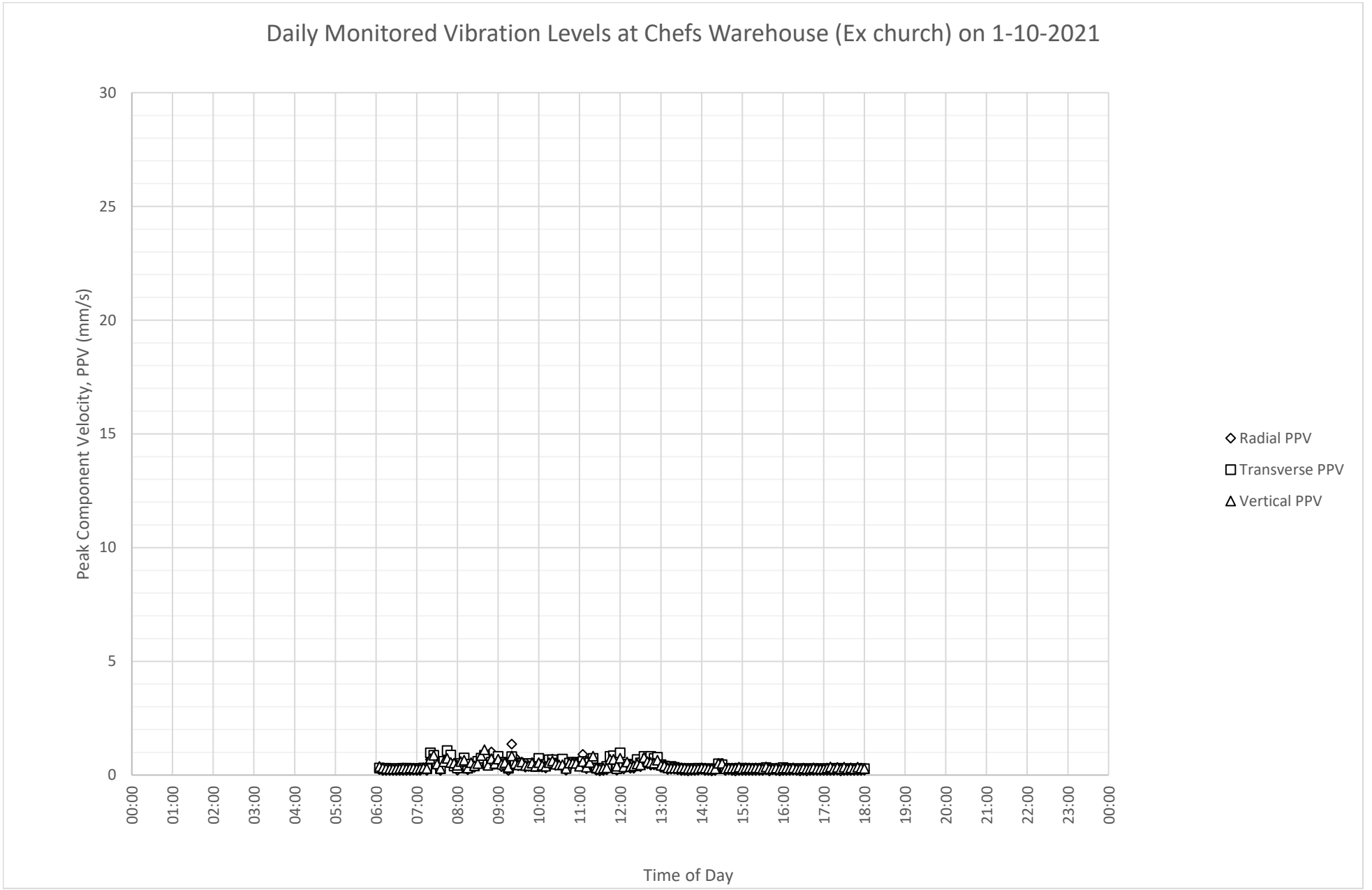

Frequency Content of Vibration Levels at Chefs Warehouse (Ex church) on 28-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage

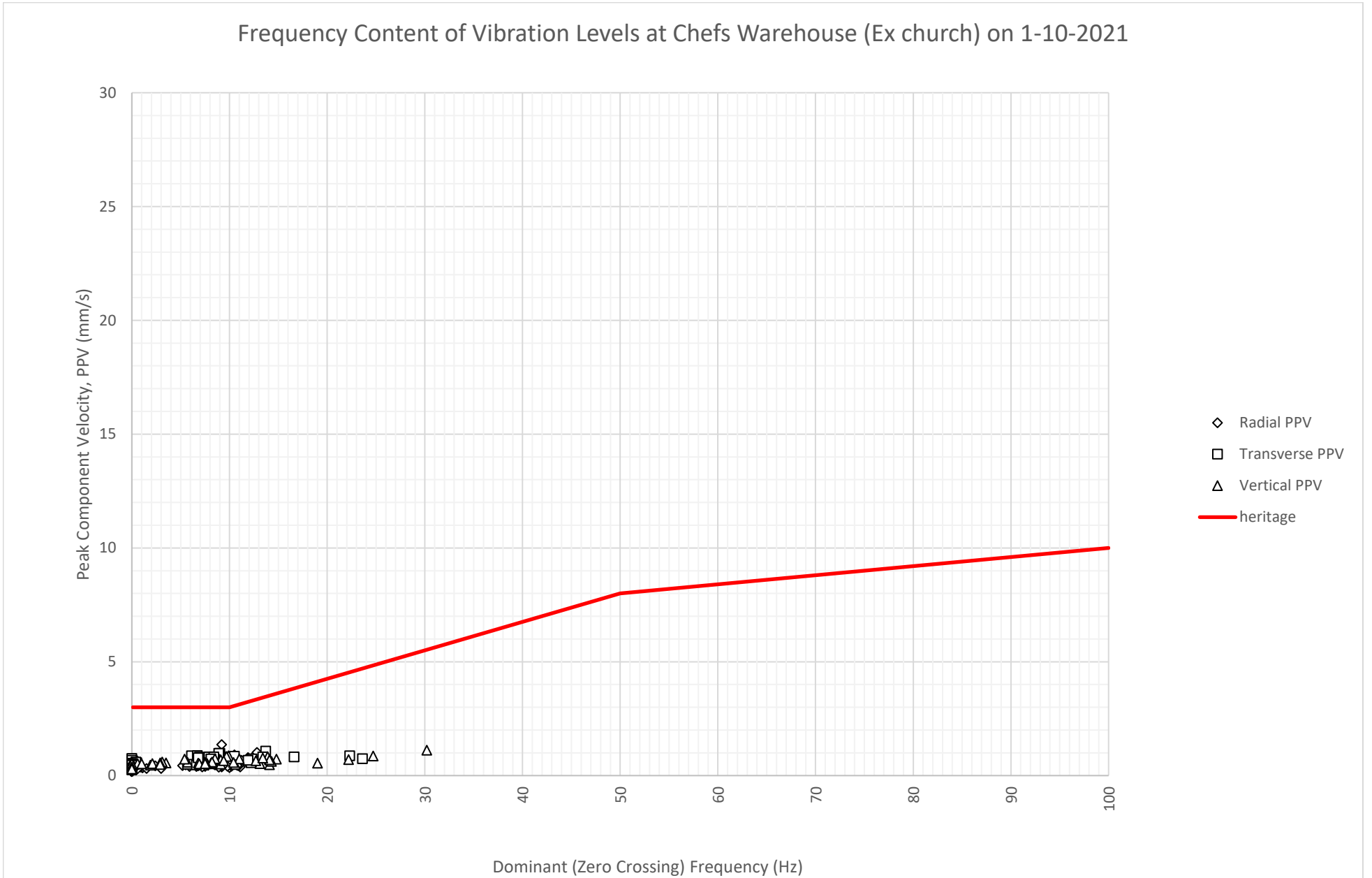

Daily Monitored Vibration Levels at Chefs Warehouse (Ex church) on 29-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

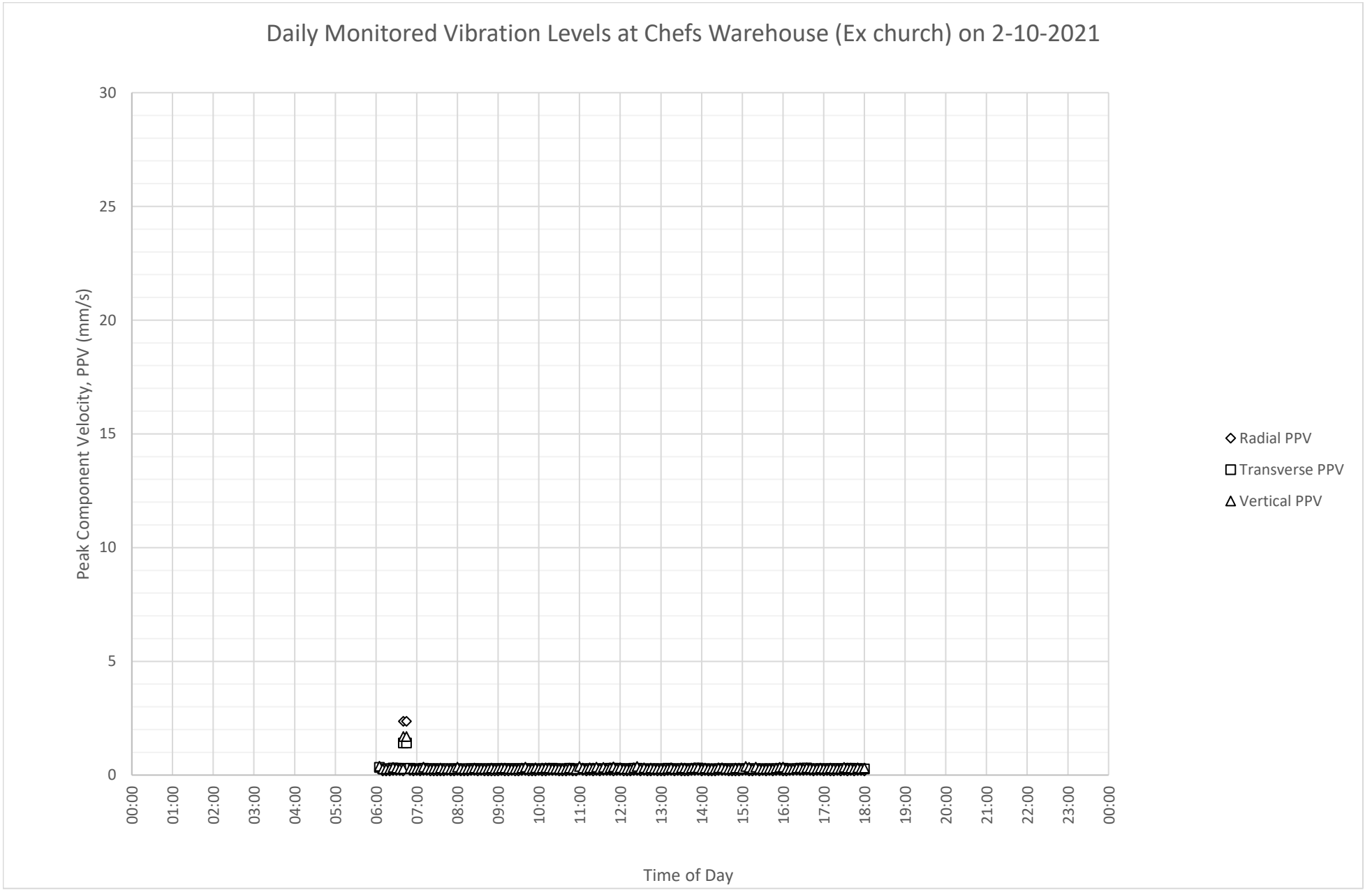

Frequency Content of Vibration Levels at Chefs Warehouse (Ex church) on 29-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage

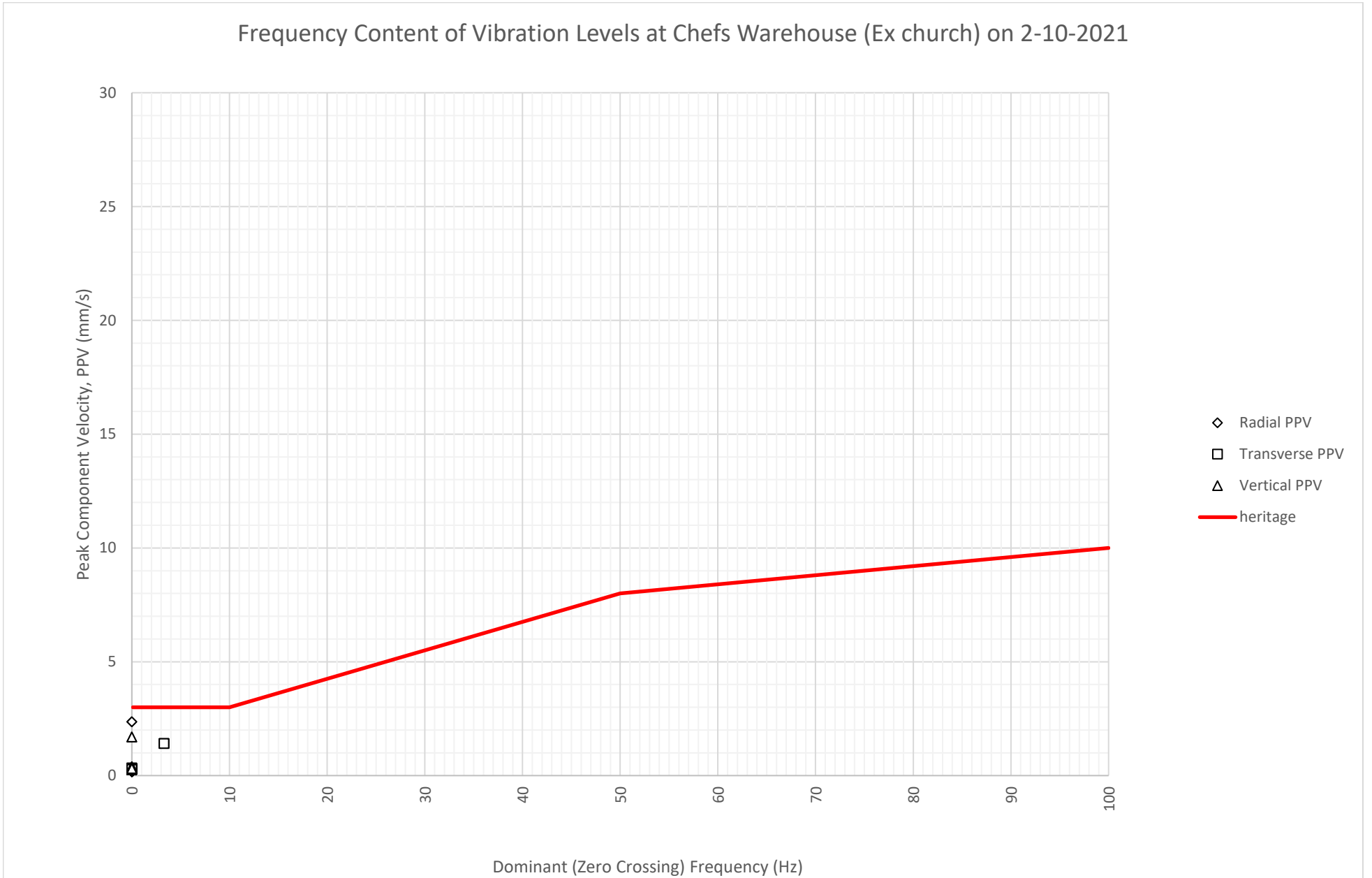

Daily Monitored Vibration Levels at Chefs Warehouse (Ex church) on 30-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

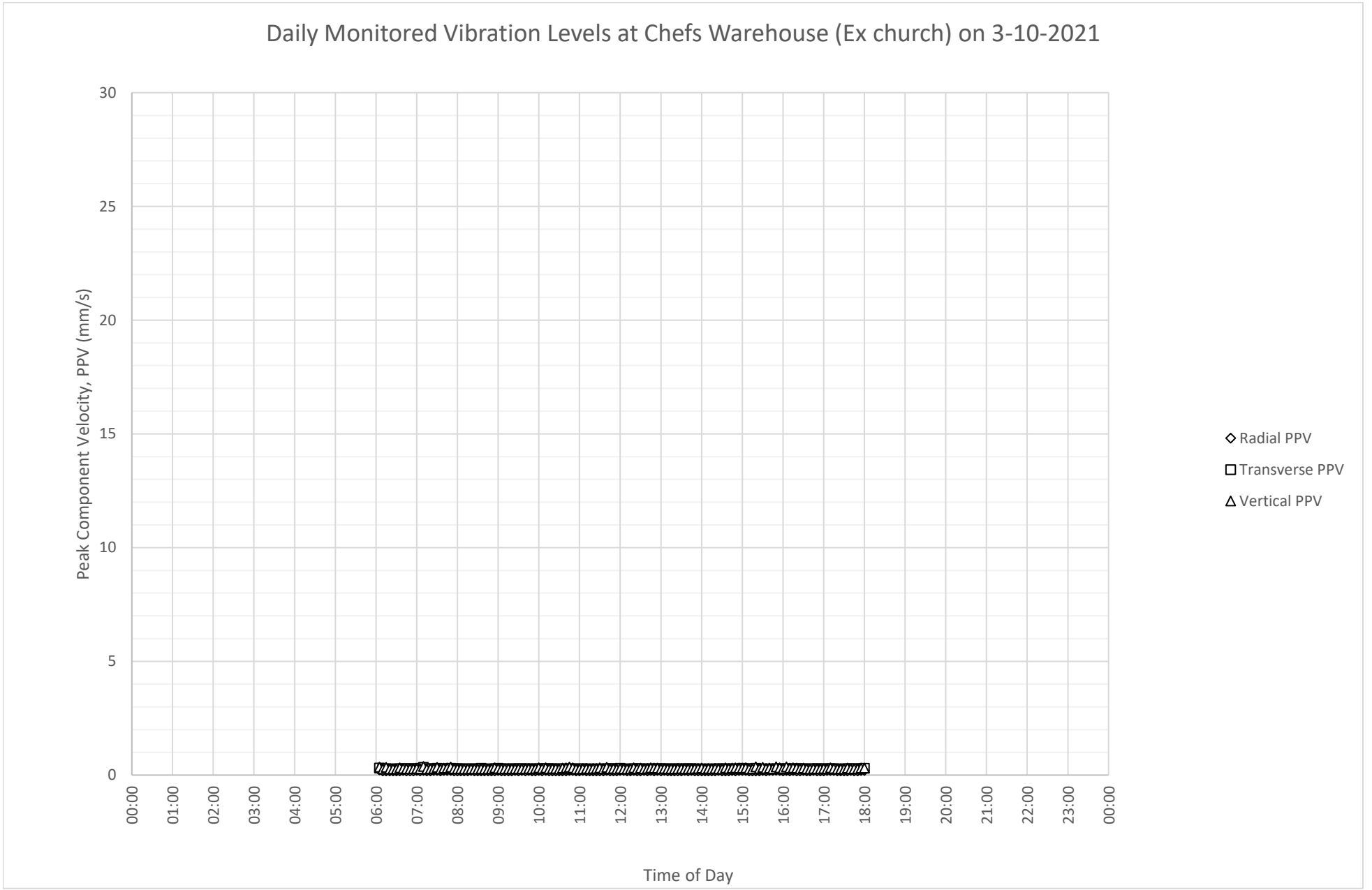

Frequency Content of Vibration Levels at Chefs Warehouse (Ex church) on 30-09-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage

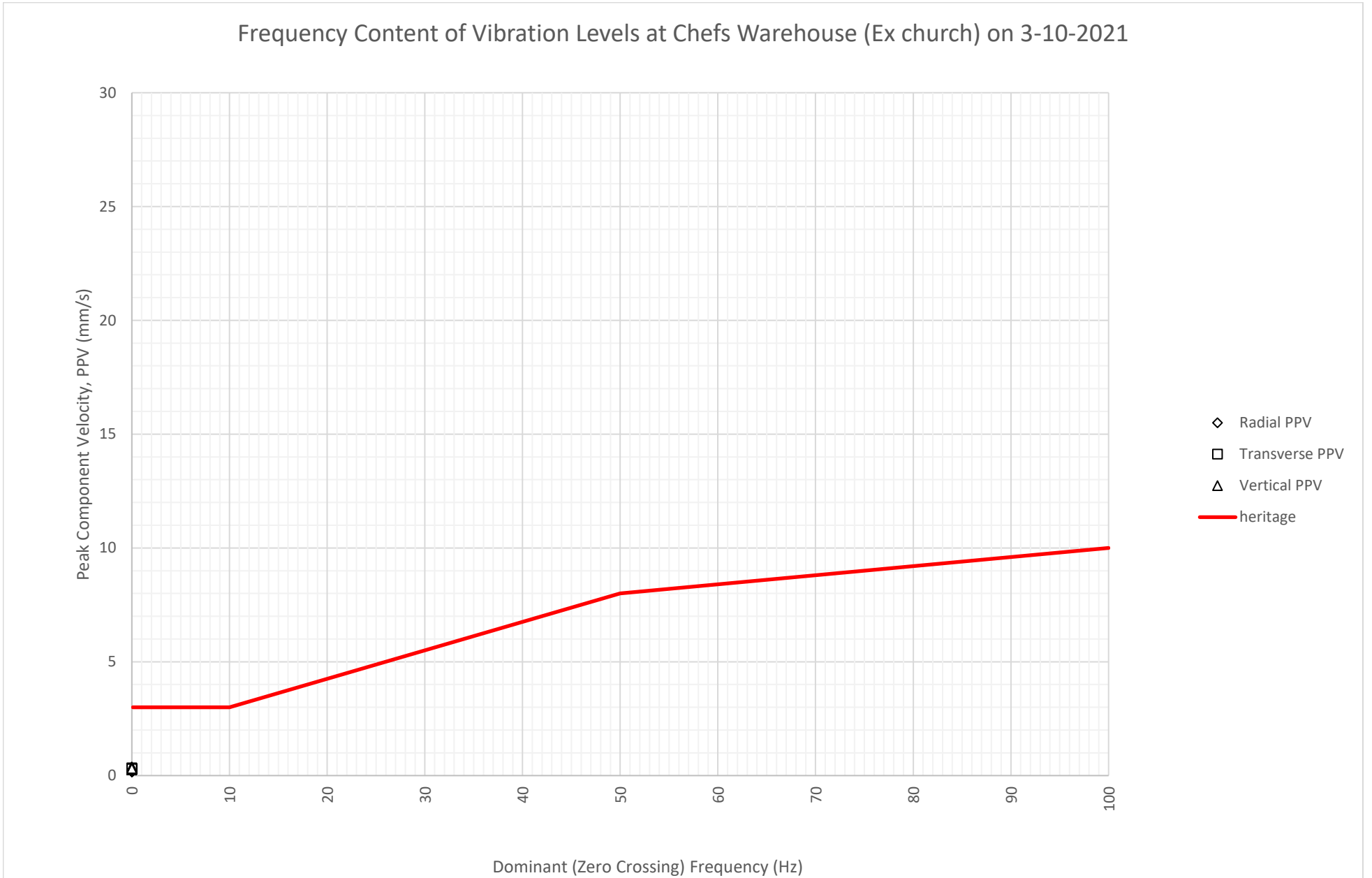

Daily Monitored Vibration Levels at Chefs Warehouse (Ex church) on 1-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

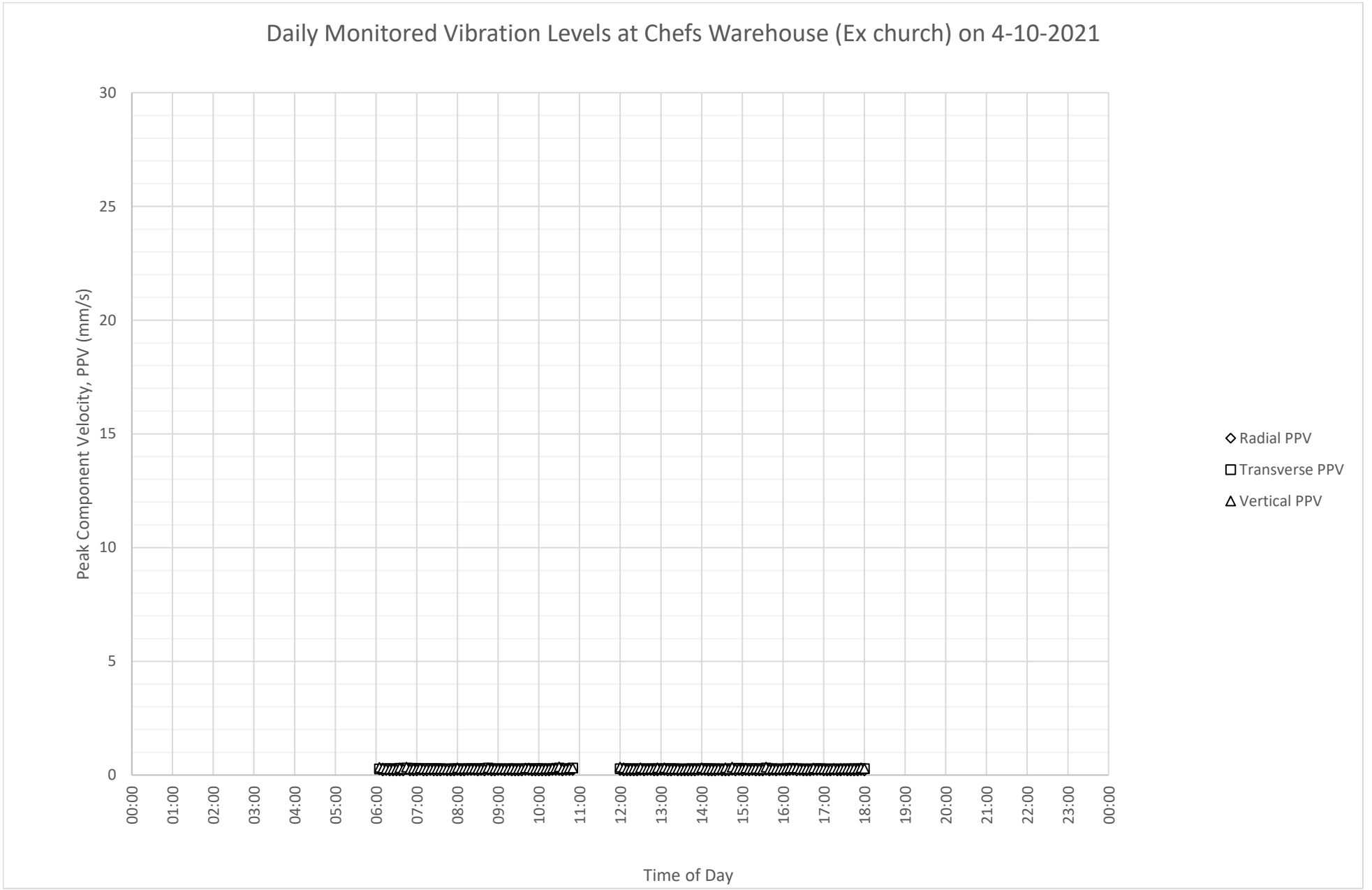

Frequency Content of Vibration Levels at Chefs Warehouse (Ex church) on 1-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage

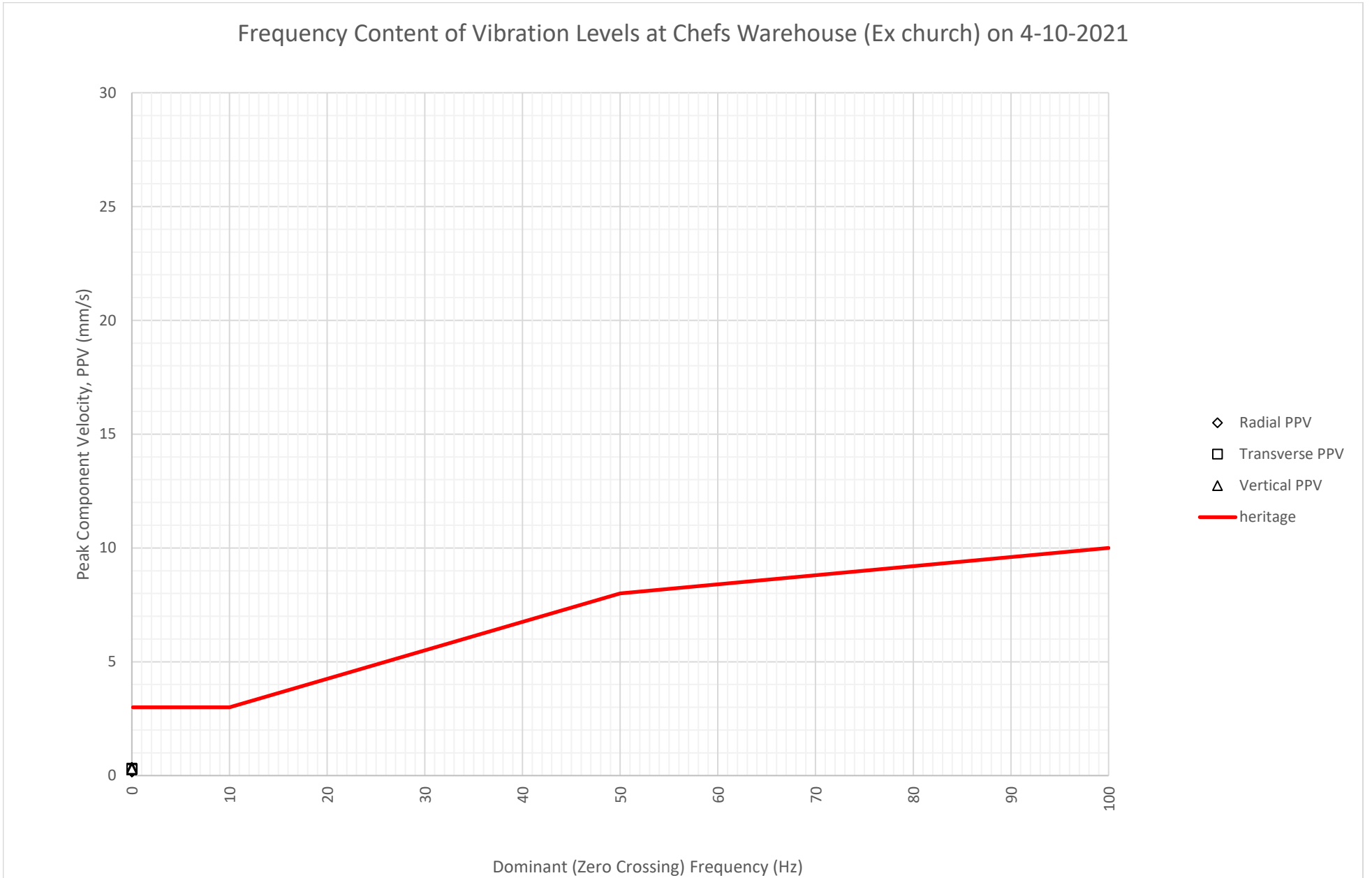

Daily Monitored Vibration Levels at Chefs Warehouse (Ex church) on 2-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

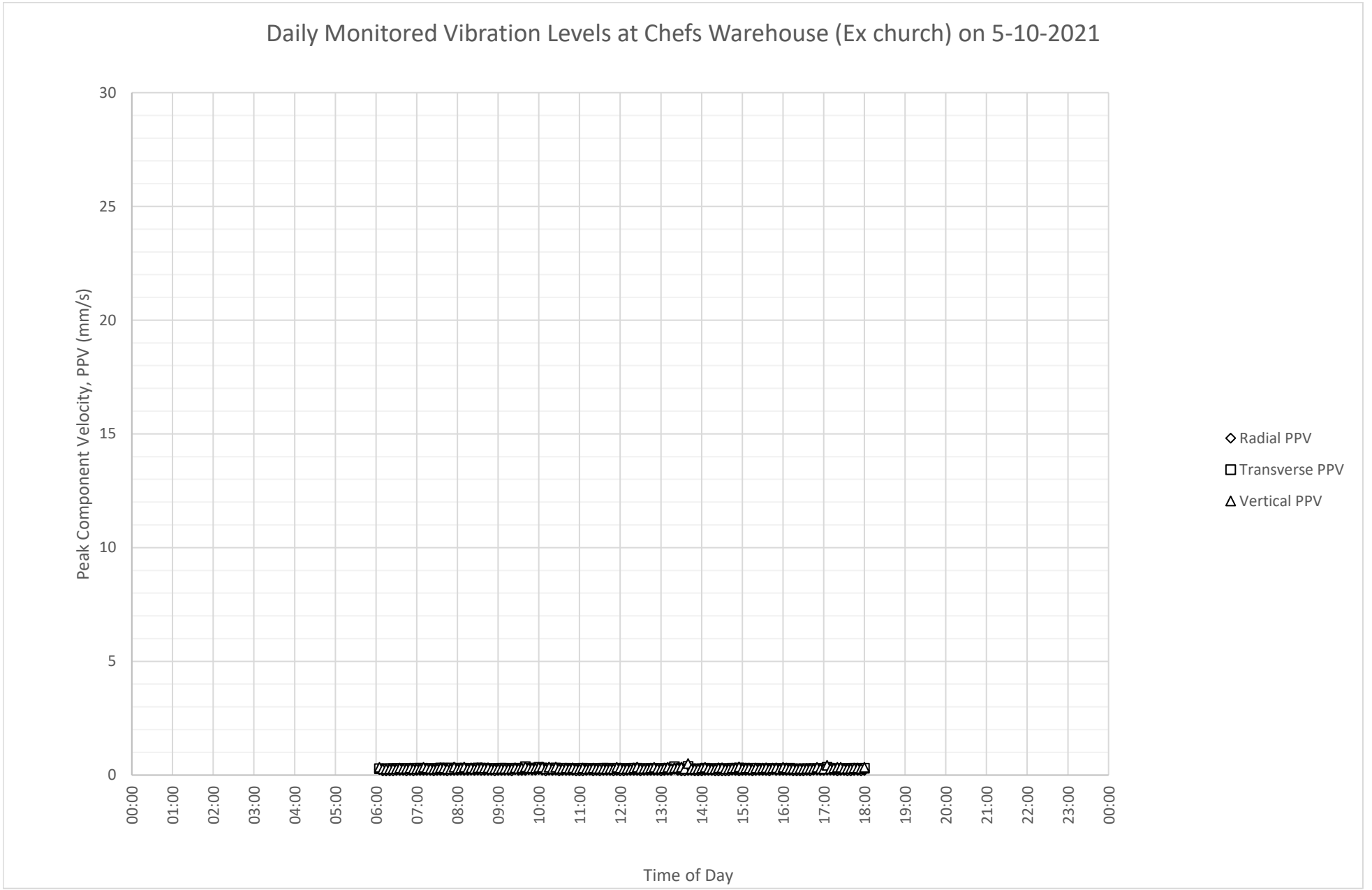

Frequency Content of Vibration Levels at Chefs Warehouse (Ex church) on 2-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage

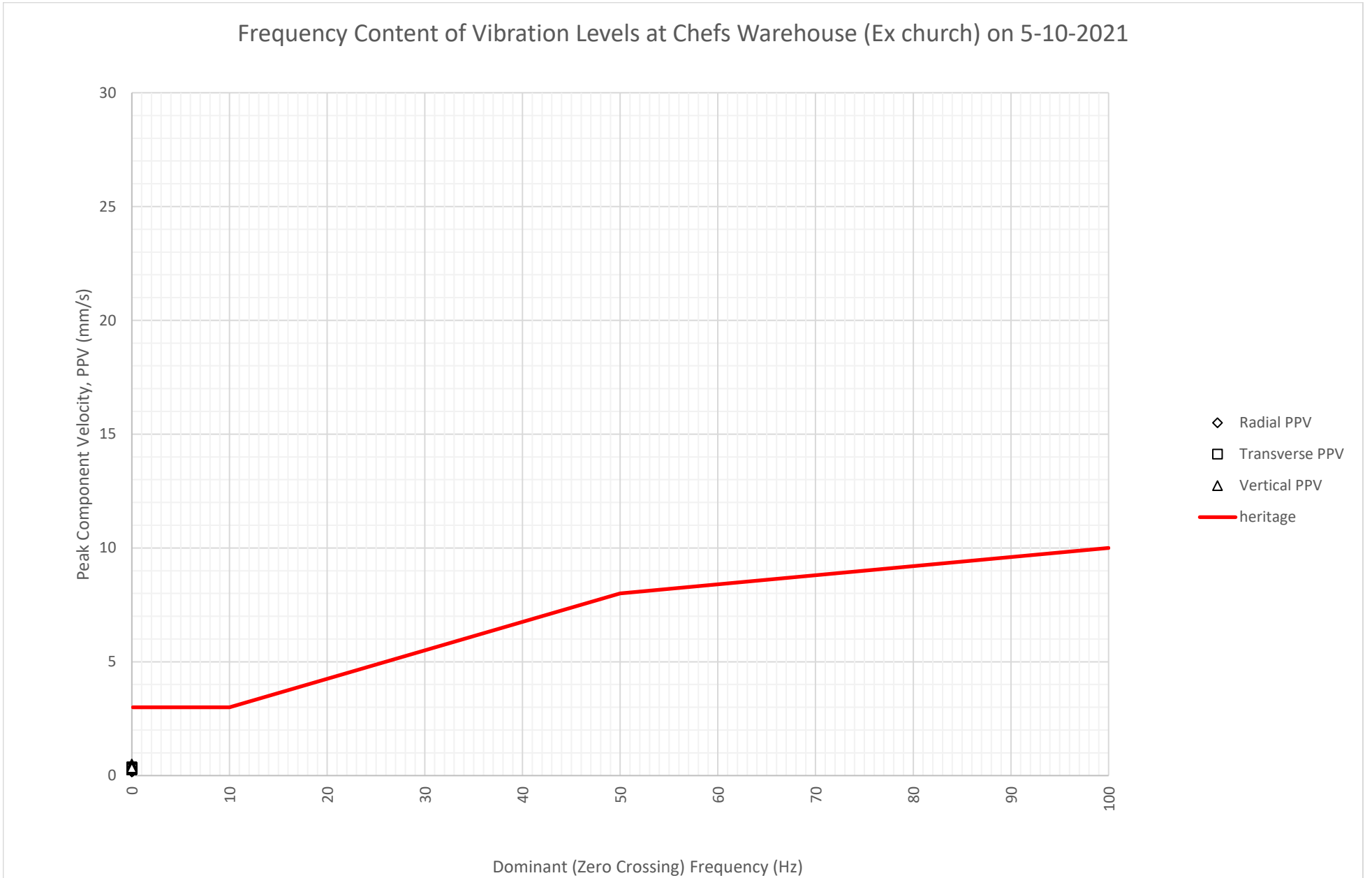

Daily Monitored Vibration Levels at Chefs Warehouse (Ex church) on 3-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

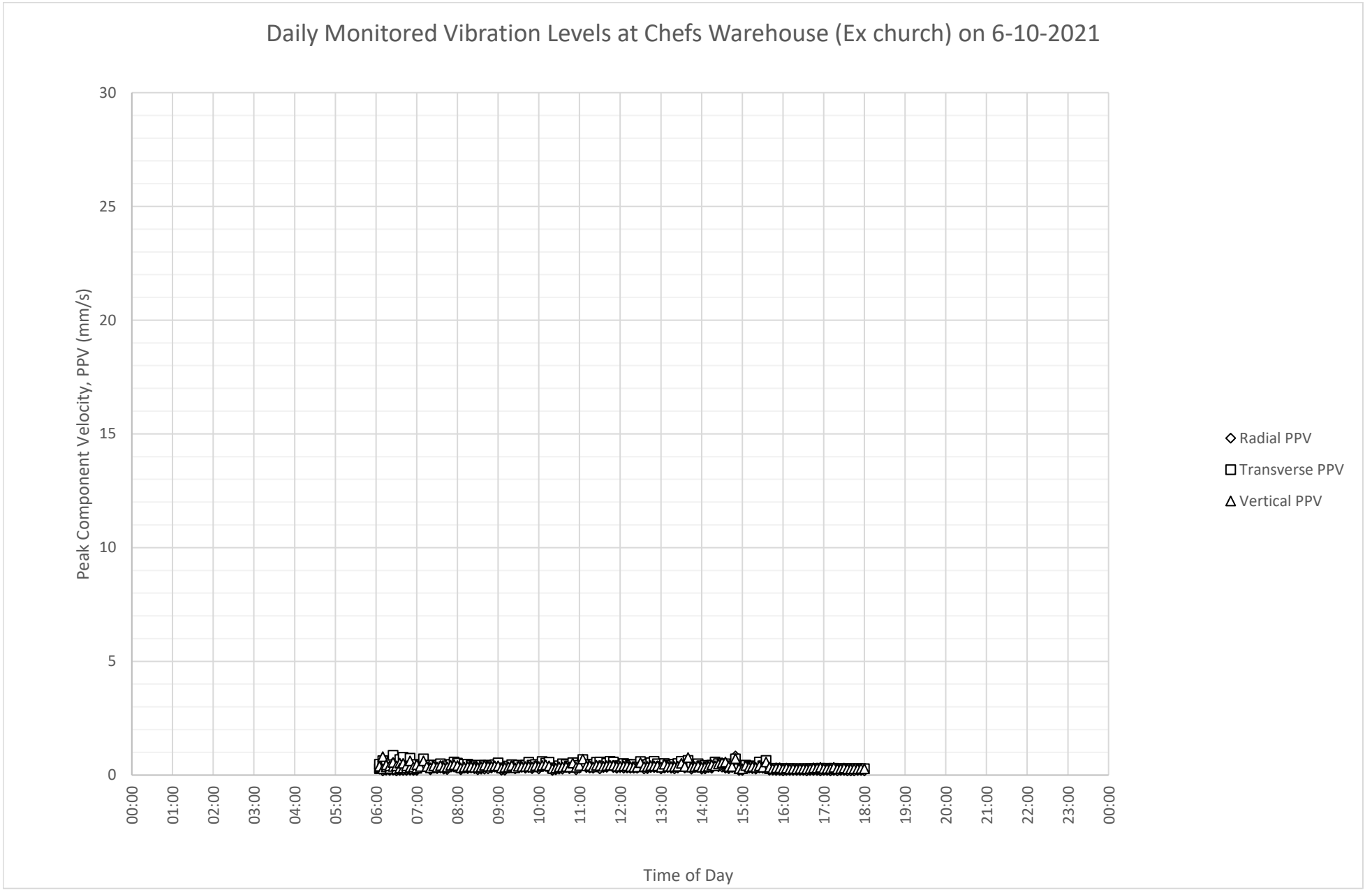

Frequency Content of Vibration Levels at Chefs Warehouse (Ex church) on 3-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (Ex church) on 4-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chefs Warehouse (Ex church) on 4-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (Ex church) on 5-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chefs Warehouse (Ex church) on 5-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (Ex church) on 6-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
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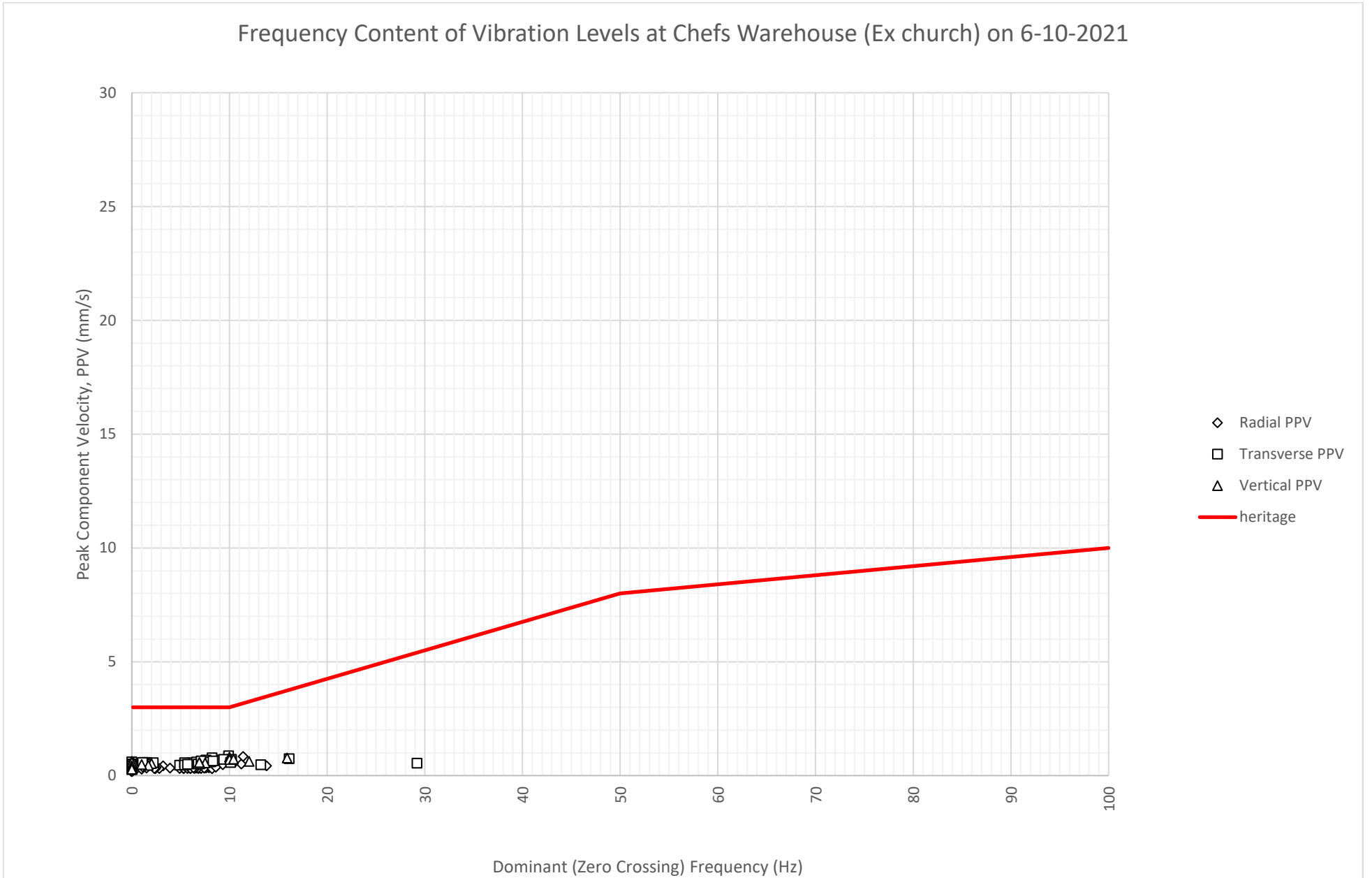
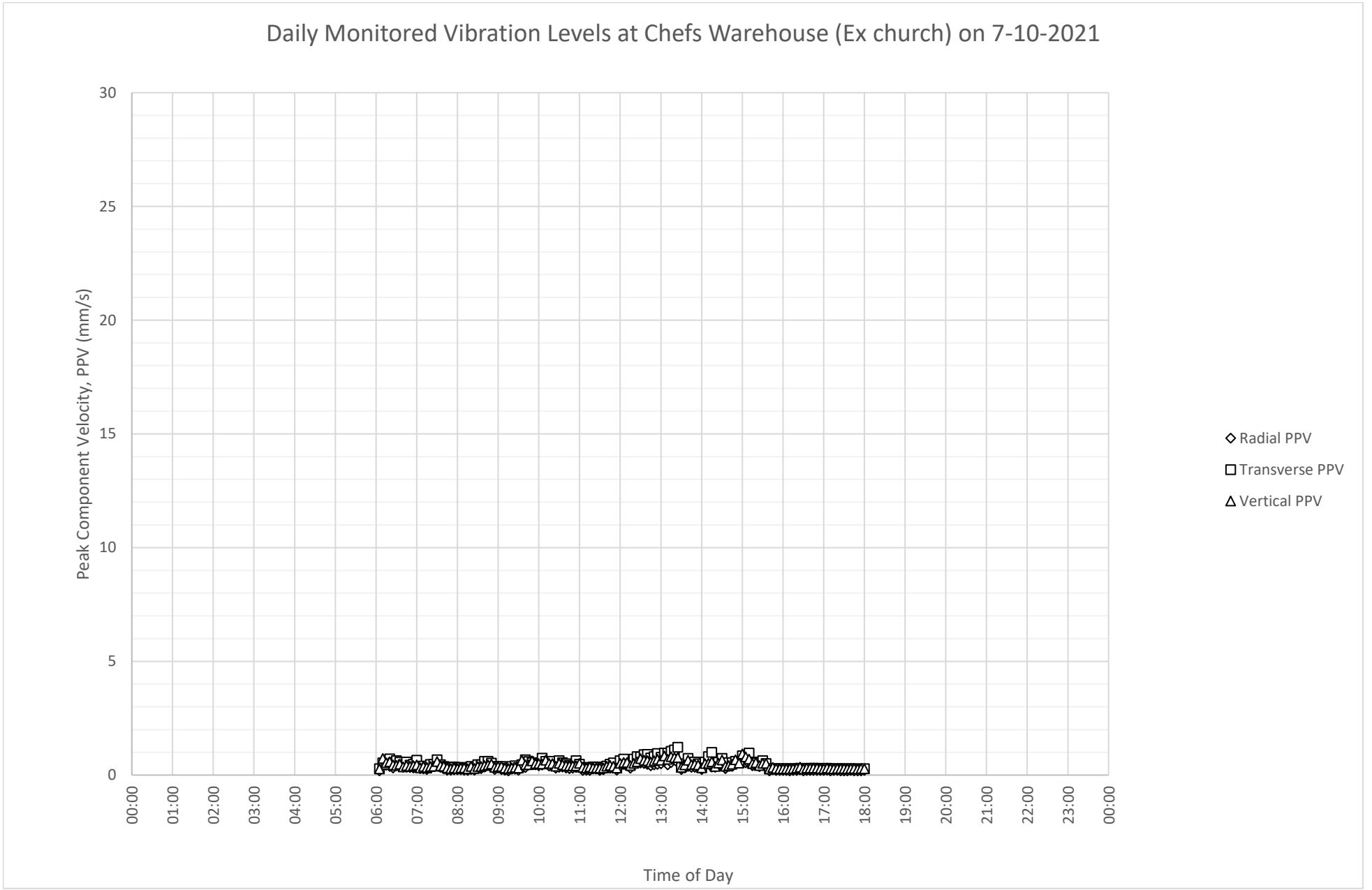
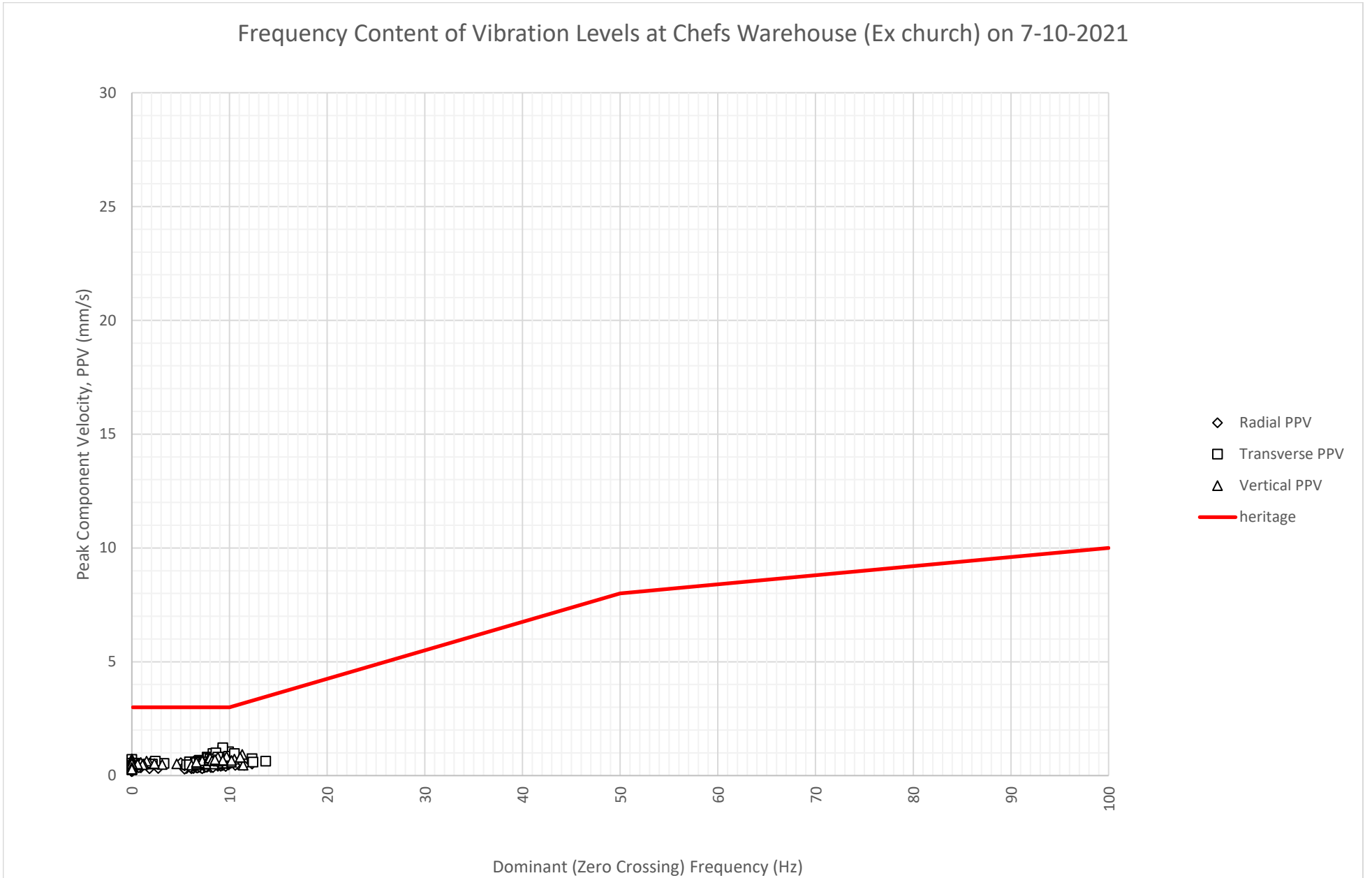
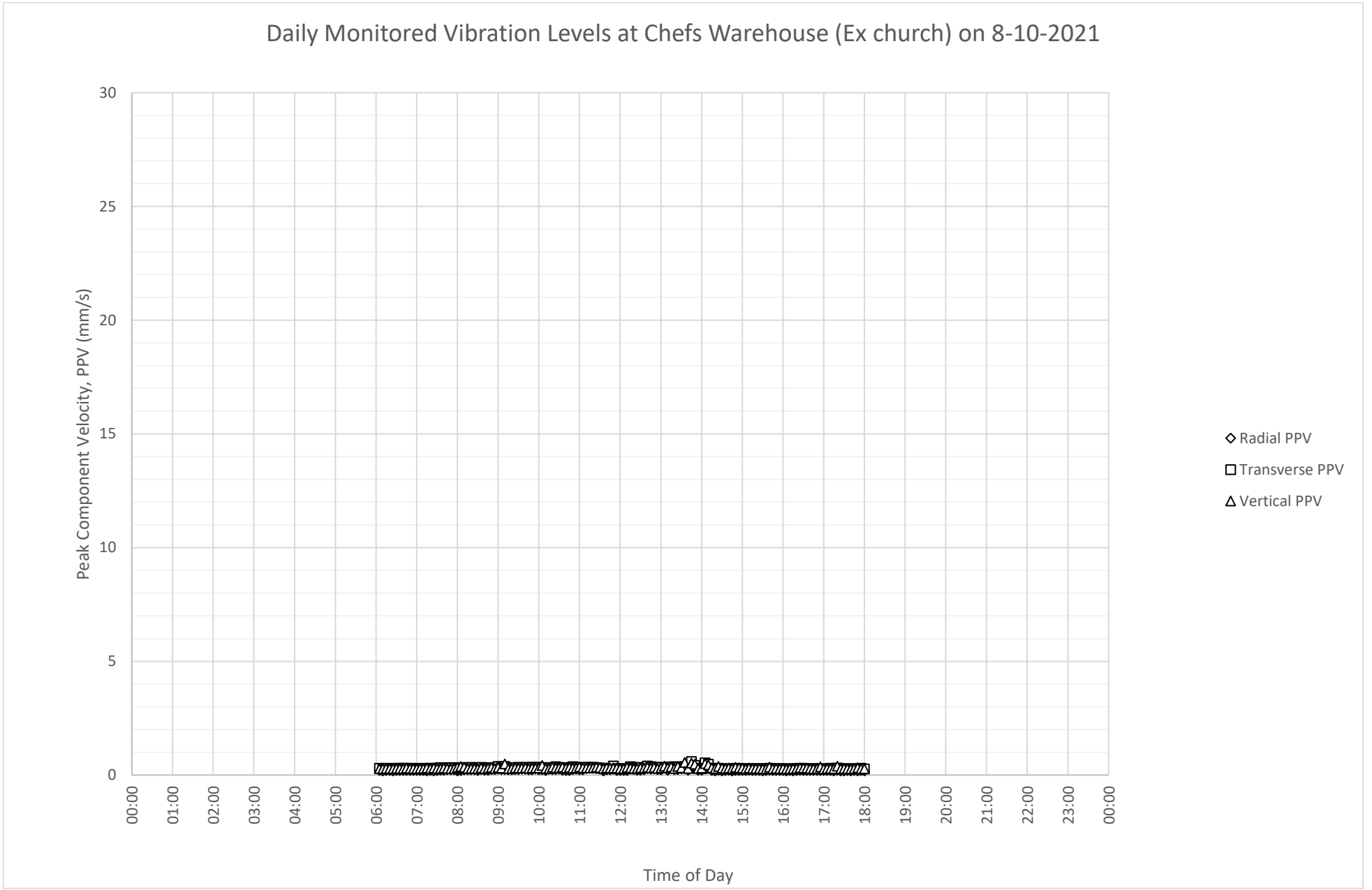
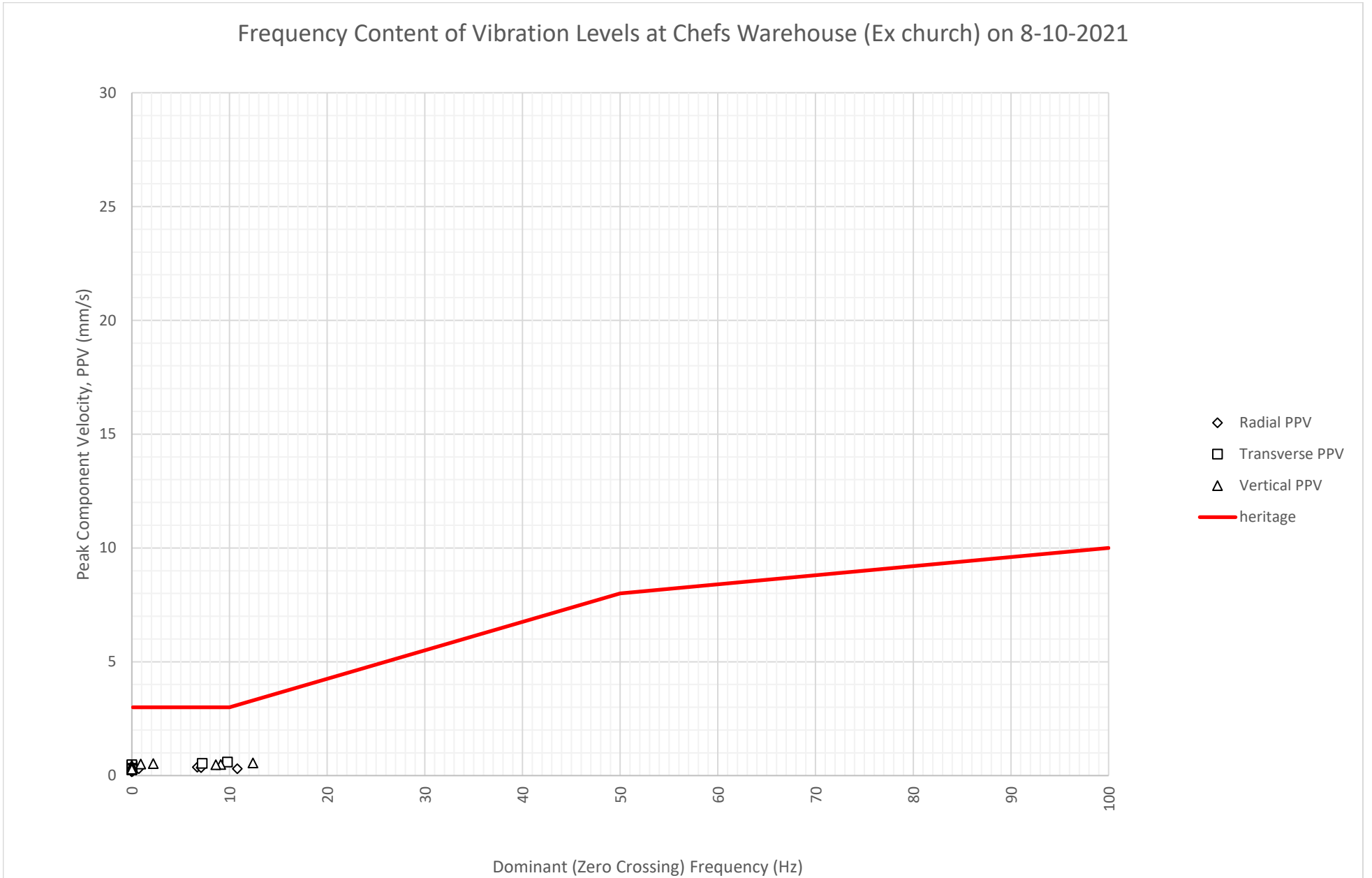
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

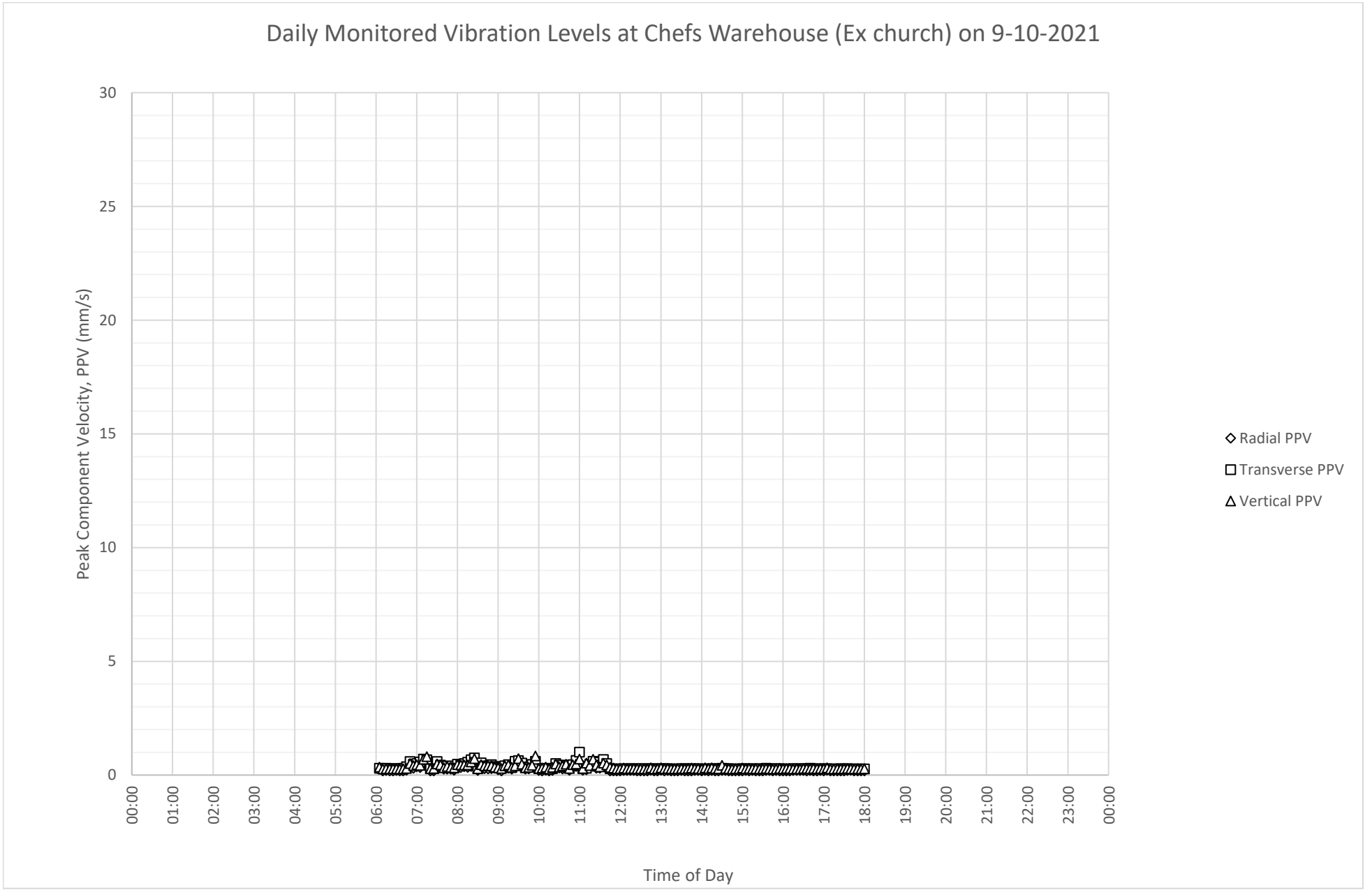

Frequency Content of Vibration Levels at Chefs Warehouse (Ex church) on 6-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage

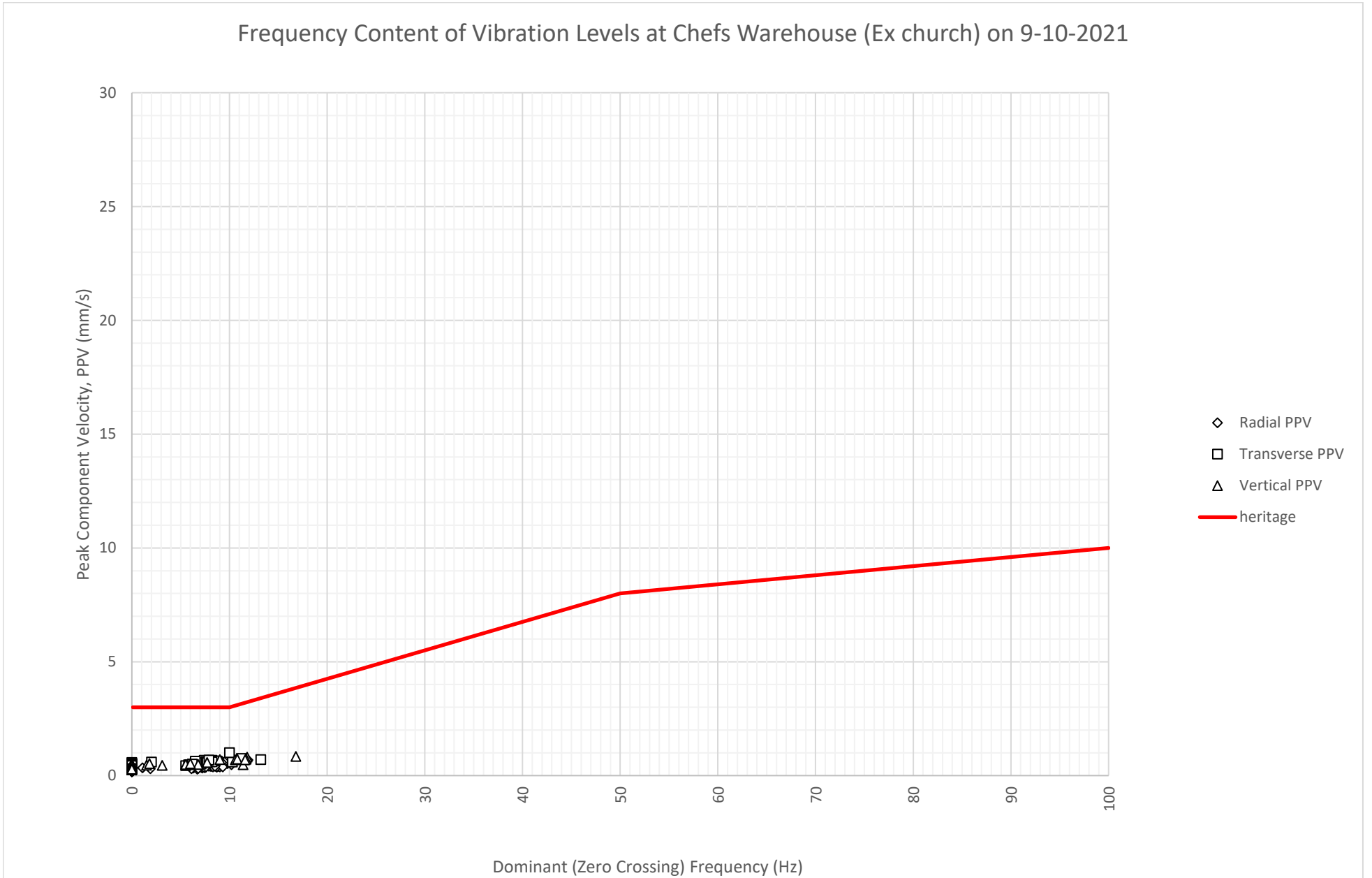

Daily Monitored Vibration Levels at Chefs Warehouse (Ex church) on 7-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

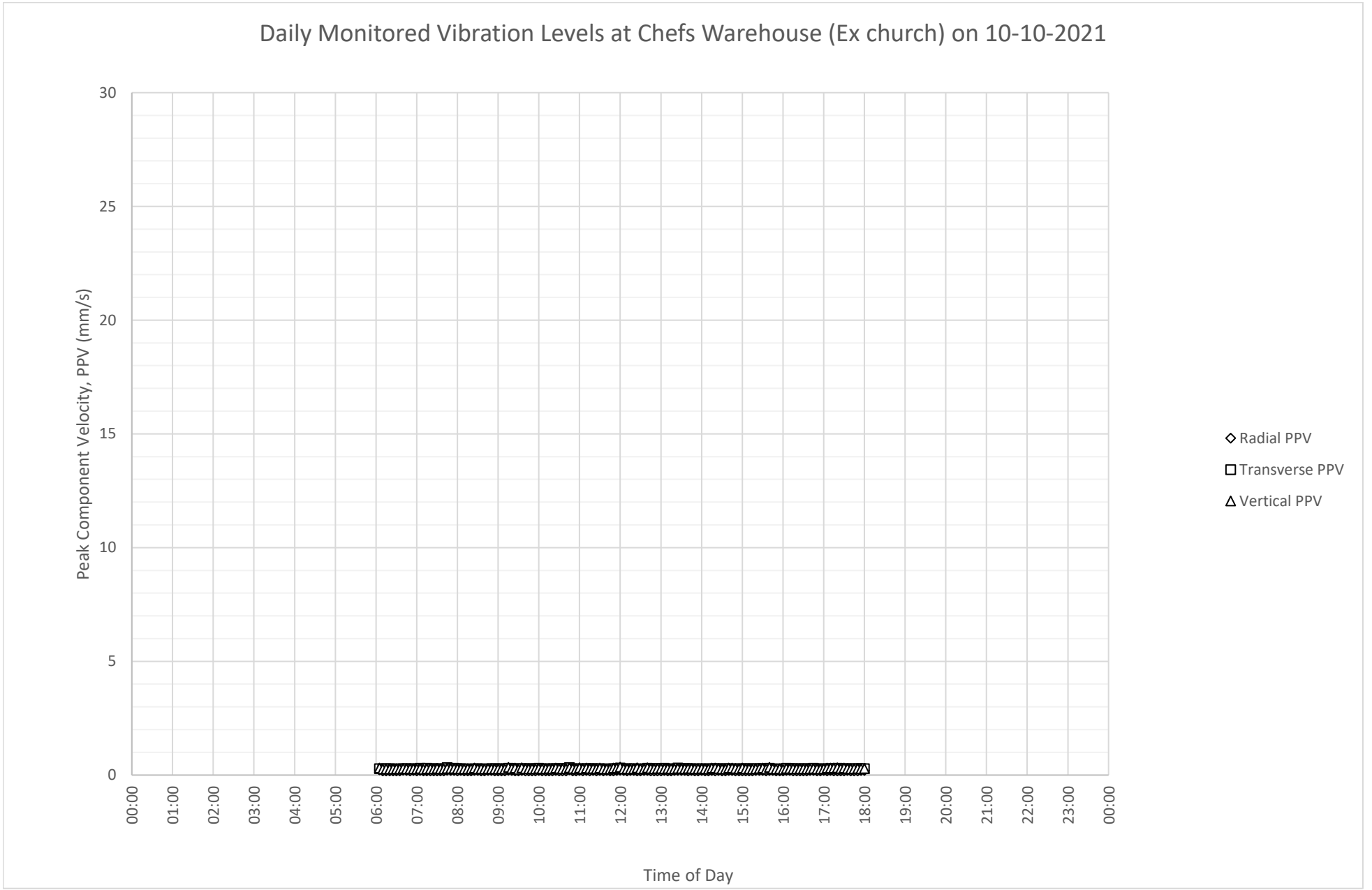

Frequency Content of Vibration Levels at Chefs Warehouse (Ex church) on 7-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (Ex church) on 8-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chefs Warehouse (Ex church) on 8-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (Ex church) on 9-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chefs Warehouse (Ex church) on 9-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (Ex church) on 10-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
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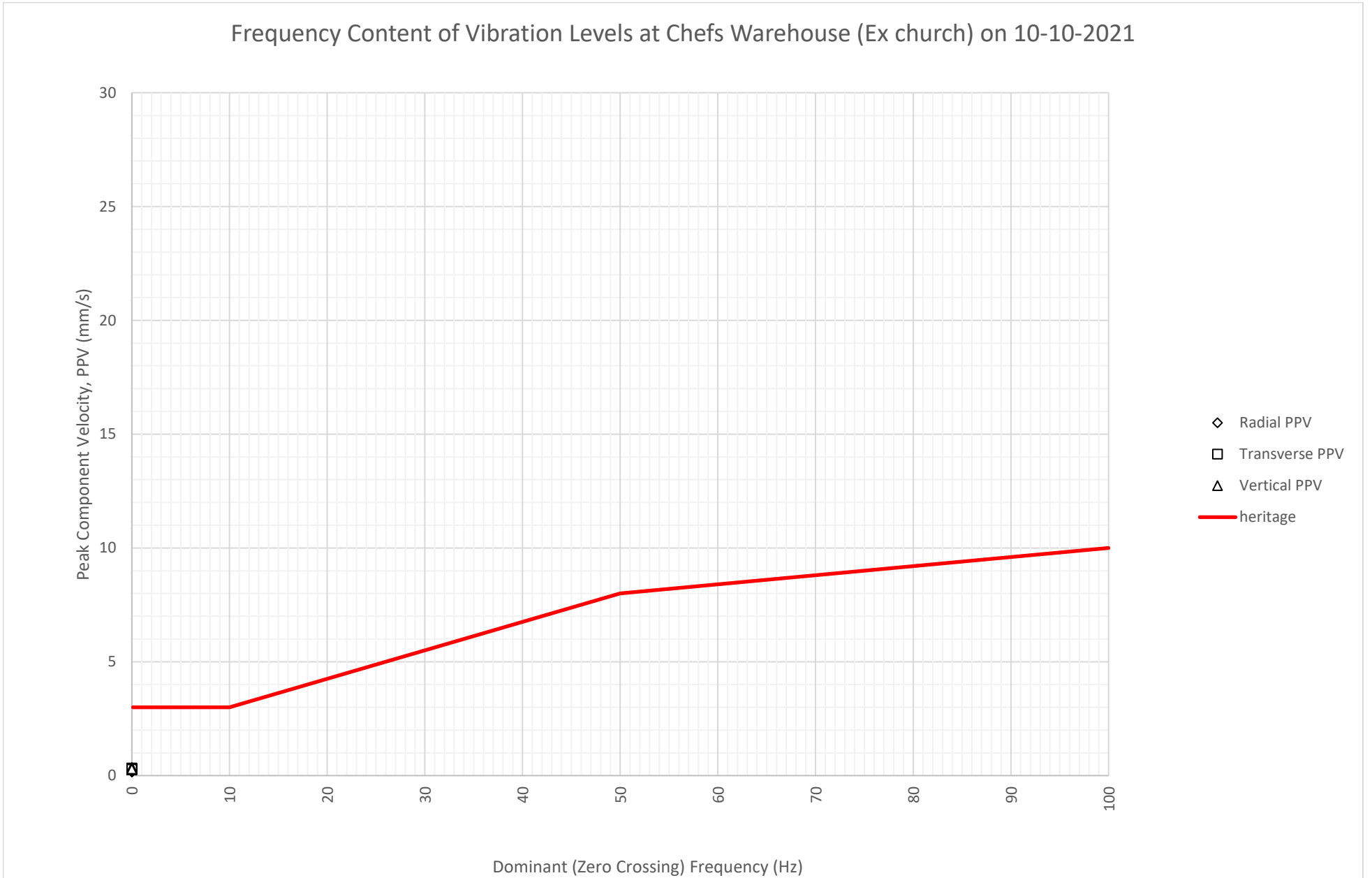
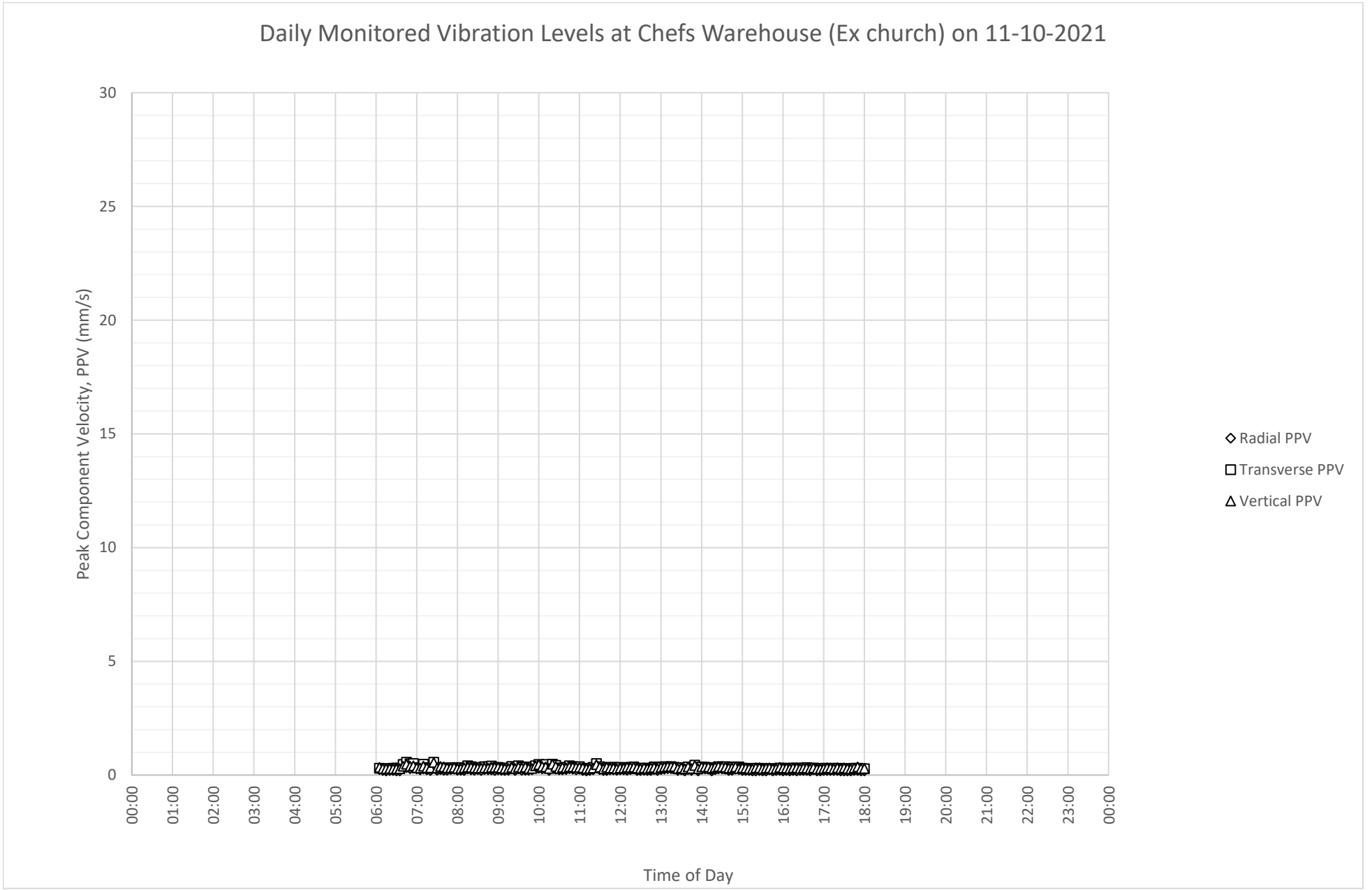
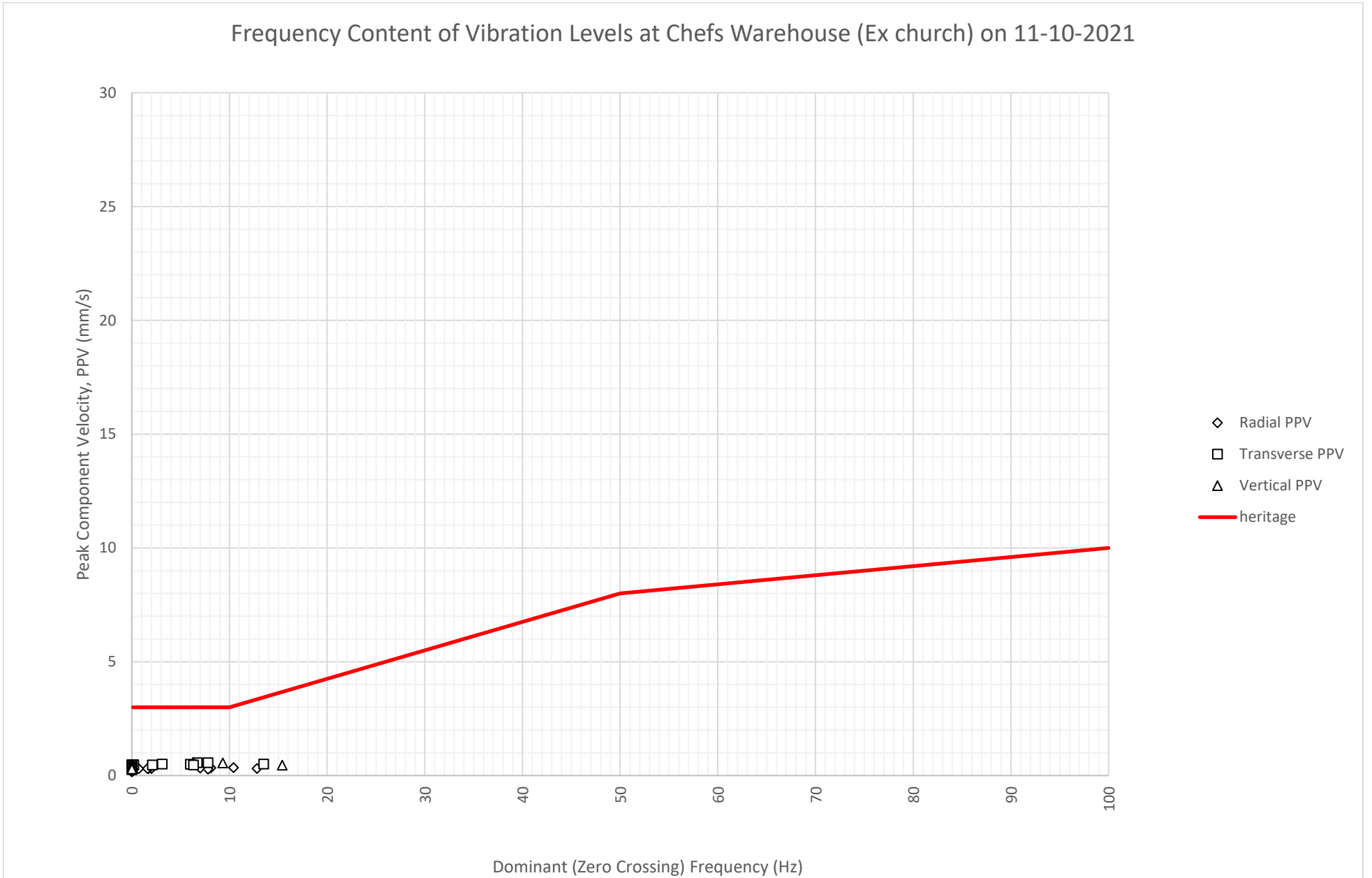
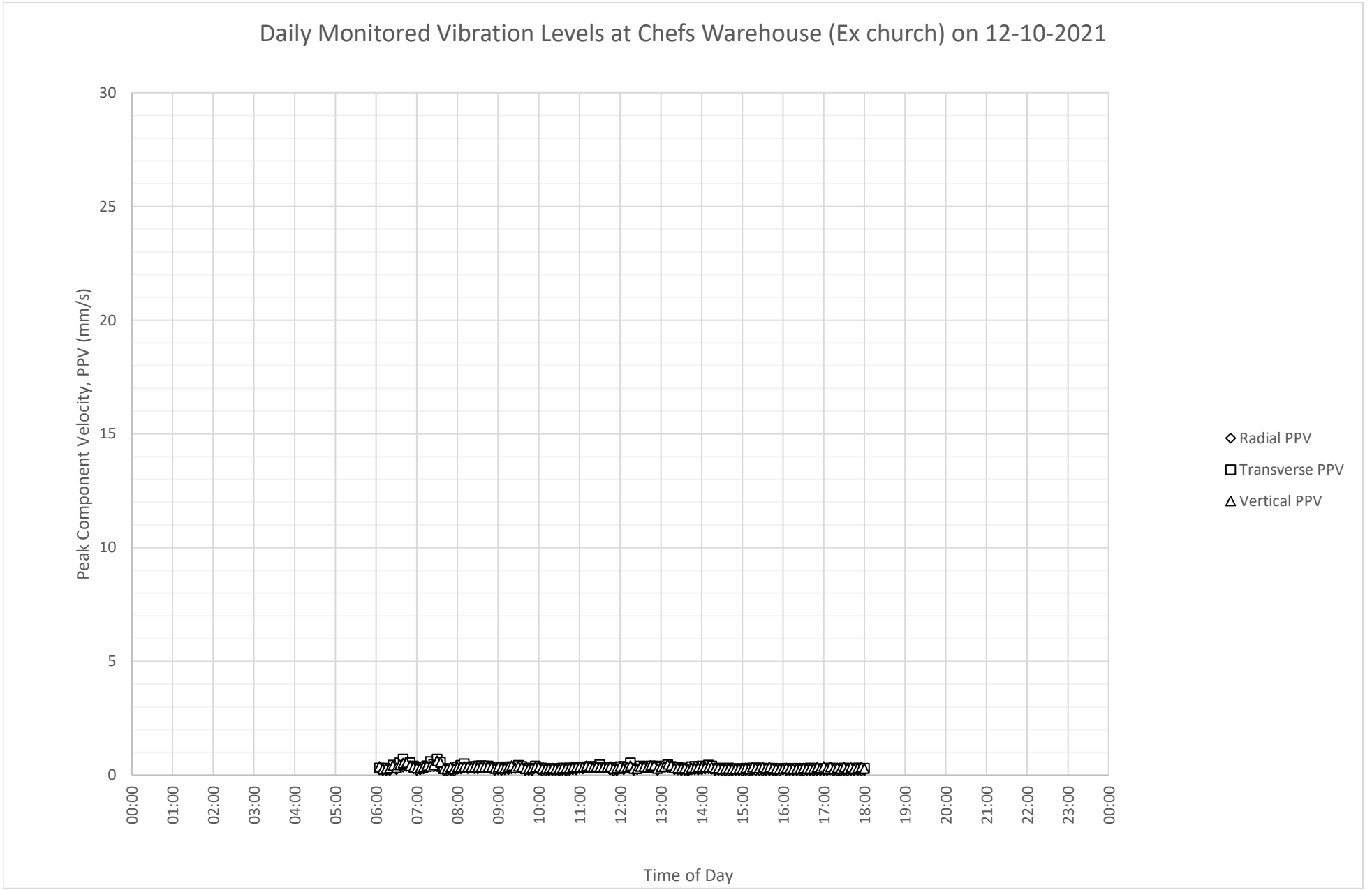
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chefs Warehouse (Ex church) on 10-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (Ex church) on 11-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chefs Warehouse (Ex church) on 11-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (Ex church) on 12-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
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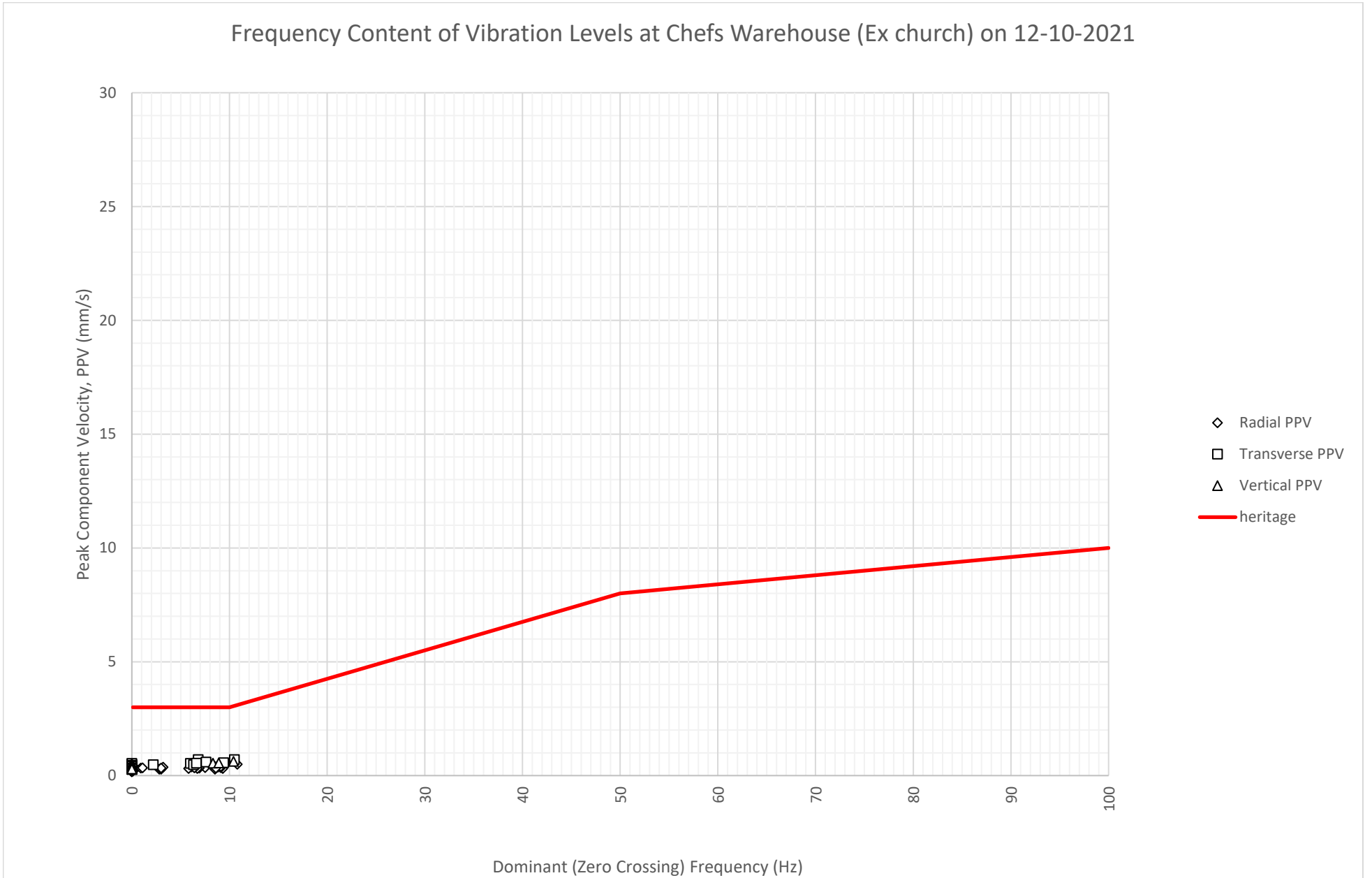
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chefs Warehouse (Ex church) on 12-10-2021
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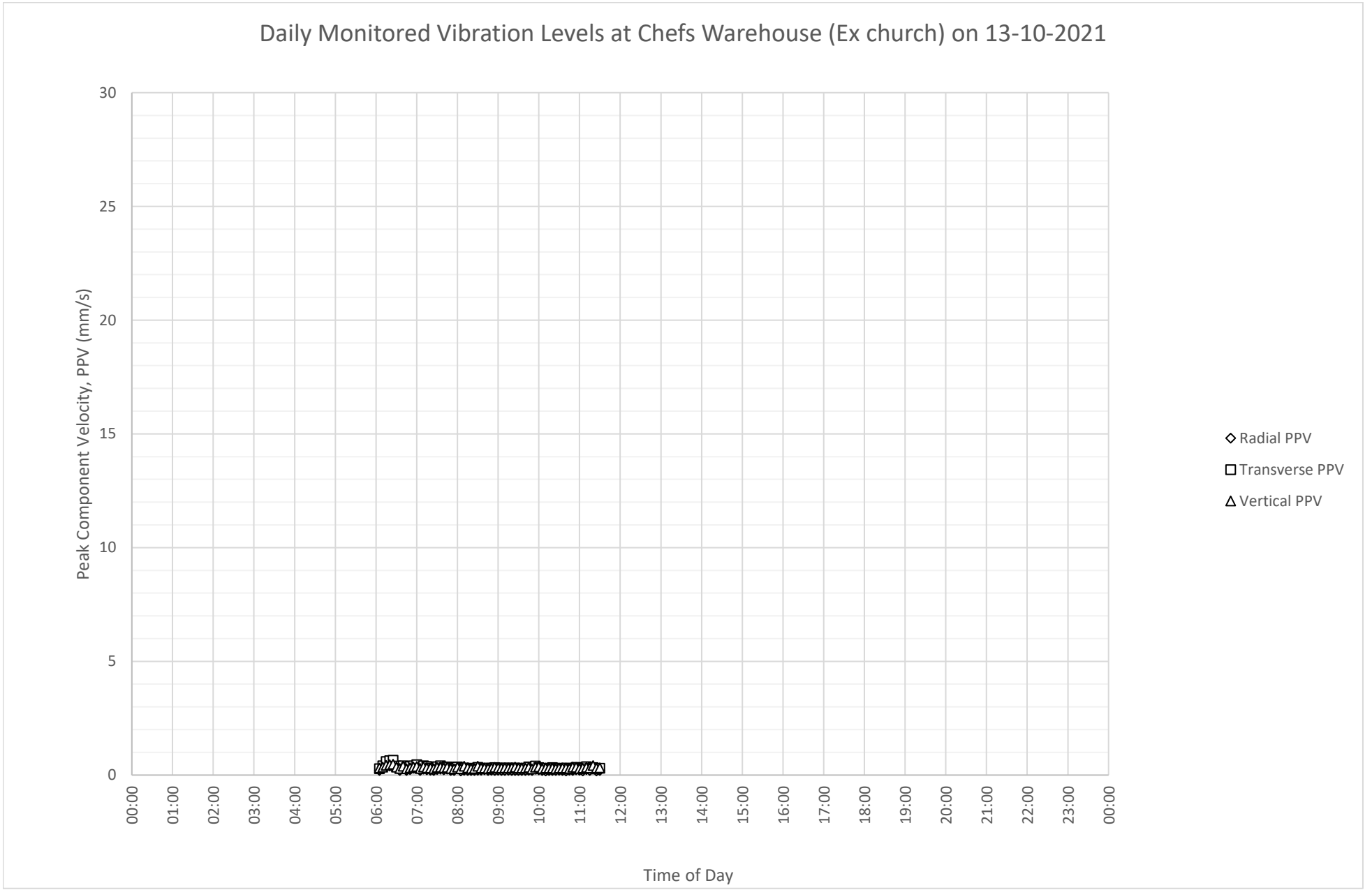
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (Ex church) on 13-10-2021
Peak Component Velocity, PPV (mm/s)
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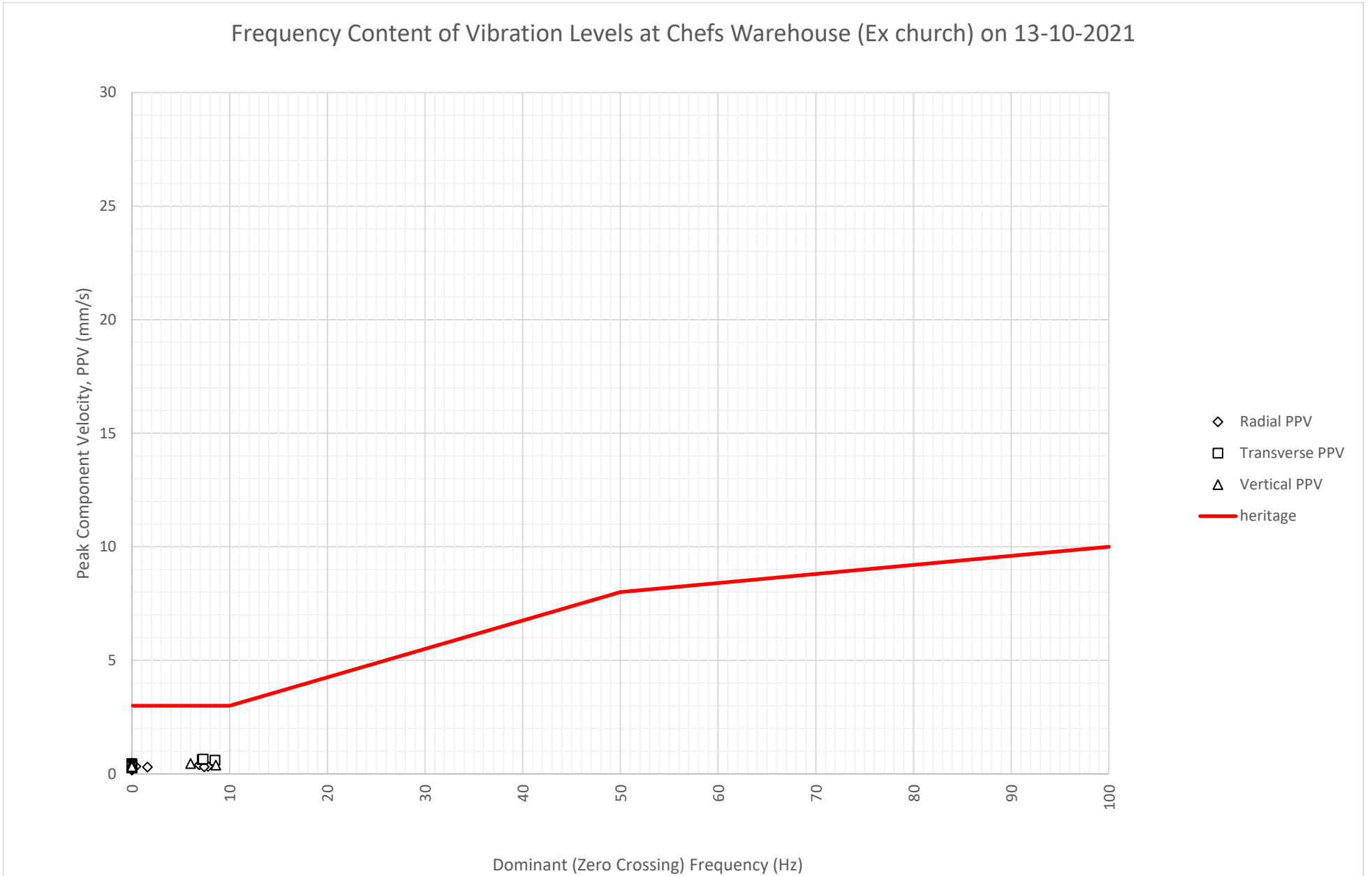
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chefs Warehouse (Ex church) on 13-10-2021
Peak Component Velocity, PPV (mm/s)
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100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage

13-23 Gibbons St, Redfern NSW

Report for Above Ground Vibration Monitoring (4)

Project ID	20210355.13
Document Title	Report for Above Ground Vibration Monitoring (4)
Attention To	Richard Crookes Constructions Pty Ltd

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	1/11/2021	20210355.13/0111A/R0/TB	TB		GW

TABLE OF CONTENTS

1 INTRODUCTION

Acoustic Logic has been engaged to carry out ground vibration monitoring for the vibration impacts associated with the site excavation and construction components of the 13 Gibbons Street, residential development in Redfern.

This monitoring report presents the vibration monitoring for the period as follows:

- 13th of October 2021 to the 31st of October 2021

The location of the 13 Gibbons Street construction site and the nearest and most affected receivers are shown in Figures 1 and 2. The location of the on-site monitors relative to the site are also shown in these figures.

The vibration management levels have been derived from DIN 4150-3 *Vibrations in buildings - Part 3: Effects on structures* as no site specific vibration criteria have been specified.

2 SITE DESCRIPTION AND SENSITIVE RECEIVERS

The subject site is located between Gibbons Street, Margaret and Regent Streets. All previous buildings have been demolished to ground level at the start of the surface monitoring by Acoustic Logic.

The vibration generating activities scheduled to be carried out on site are the final demolition of the existing basement car park, then an excavation for an underground carpark and building footings then finally the construction stage.

The monitor locations for the respective receivers for this monitoring period are as follows:

- Receiver 1 (R1) – Multistorey residential block on the corner of Gibbons Street and Margaret Street. The vibration monitor is located in the basement carpark
- Receiver 2 (R2) – A heritage category church building. The monitor is located in a Hot Water Heater/ Cleaner's closet.

Figure 1 – Residential and Heritage Category receivers

3 VIBRATION CRITERIA

Vibration caused by construction at any residence or structure outside the subject site must be limited to:

- For structural damage vibration, German Standard DIN 4150-3 Structural Vibration: Effects of Vibration on Structures; and

The criteria and the application of this standard are discussed in separate sections below.

3.1 DAMAGE CRITERIA

German Standard DIN 4150-3 (1999-02) provides vibration velocity guideline levels for use in evaluating the effects of vibration on structures. The criteria presented in DIN 4150-3 (2016-12) are presented in Table 2 of the standard.

It is noted that the peak velocity is the absolute value of the maximum of any of the three orthogonal component particle velocities as measured at the foundation, and the maximum levels measured in the x- and y-horizontal directions in the plane of the floor of the uppermost storey.

Table 1 – DIN 4150-3 (2016-12) Safe Limits for Building Vibration

Type of Structure		Peak Particle Velocity (mms^{-1})				
		At Foundation at a Frequency of			Plane of Floor of Uppermost Storey	Floor Slabs, Vertical Direction
		< 10Hz	10Hz to 50Hz	50Hz to 100Hz	All Frequencies	All Frequencies
1	Buildings used in commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40	20
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15	20
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8	*20

* May be required to be lower to suit condition and construction of floor.

4 VIBRATION MONITORING

Vibration monitoring was conducted using two Texcel ETM vibration monitors with external Tri axial geophones. The monitors are programmed to store statistical vibration data over every 5-minute period, along with any 'triggered' events that occur throughout the monitoring period.

The vibration monitor installation locations are shown in Figure 2. The vibration sensor (geophone) in the ex-Church is adhered to the on-grade ground slab. The geophone in the carpark has been fastened to the basement slab with dynabolts. Both monitoring locations are suitable for construction vibration monitoring at receiving structures

This period presents the results of vibration monitoring for the period between the 13th of October 2021 to the 31st of October 2021. Primary works carried out on site during this period include:

- Demolition of existing carpark slab which is above the previous building's basement
- Bore (soldier) Piling the site perimeter along Gibbons and Margaret Streets

Pool Vibration monitor

Apartment Driveway Boundary Vibration monitor

Figure 2 – Vibration Monitor Locations

5 MEASUREMENT RESULTS

The following Tables summarise the frequency analysed events recorded at each respective vibration monitor. The charts of daily vibration levels and the corresponding frequency analyses are presented in the Appendices for each respective monitor.

5.1 RECEIVER 1 – GIBBONS STREET APARTMENT RECEIVERS

Table 2 – Basement Vibration Levels

Vibration Geophone Location	Date	Maximum Measured Vibration Level mm/s	Criteria Vibration Level	Complies
Carpark Slab	All	0.91<mm/s	5mm/s PPV	Yes

5.2 RECEIVER 2 – CHEFS WAREHOUSE (EX CHURCH)

Table 3 – Ground Slab Vibration Levels

Vibration Geophone Location	Date	Maximum Measured Vibration Level mm/s	Criteria Vibration Level	Complies
Ground Slab	All	2.77<mm/s	3mm/s PPV	Yes

5.3 ANALYSES OF VIBRATION LEVELS

Daily plots of the Vibration levels versus Time and versus Frequency are attached to the Appendices.

The vibration levels were under the frequency independent vibration limit so no further analyses were necessary.

It is noted that the maximum vibration level recorded for this period (2.77mm/s) in the radial direction occurred on the 23th of October 2021 at midday. These may be related to the closing of a door at lunchtime, as suspected in the previous report.

6 MANAGEMENT OF VIBRATION LEVELS

No exceedances of the nominated criteria have occurred at monitoring locations in this monitoring period.

Vibration monitoring data are collated and reported on a fortnightly basis however the remote real time vibration monitoring system sends SMS alerts when trigger levels are exceeded and the monitors are downloaded daily. This allows for the prompt investigation of sources and the review and adjustment of work practices if necessary.

A register of vibration events is maintained by Richard Crookes when and where vibrations are excessive.

7 CONCLUSION

Acoustic Logic has carried out above ground vibration monitoring for the vibration impacts associated with the demolition , excavation and construction works at the residential development site at 13 Gibbons Street, Redfern.

This monitoring report presents the vibration monitoring for the periods as follows:

- Vibration Monitoring: 13th of October 2021 to the 31st of October 2021

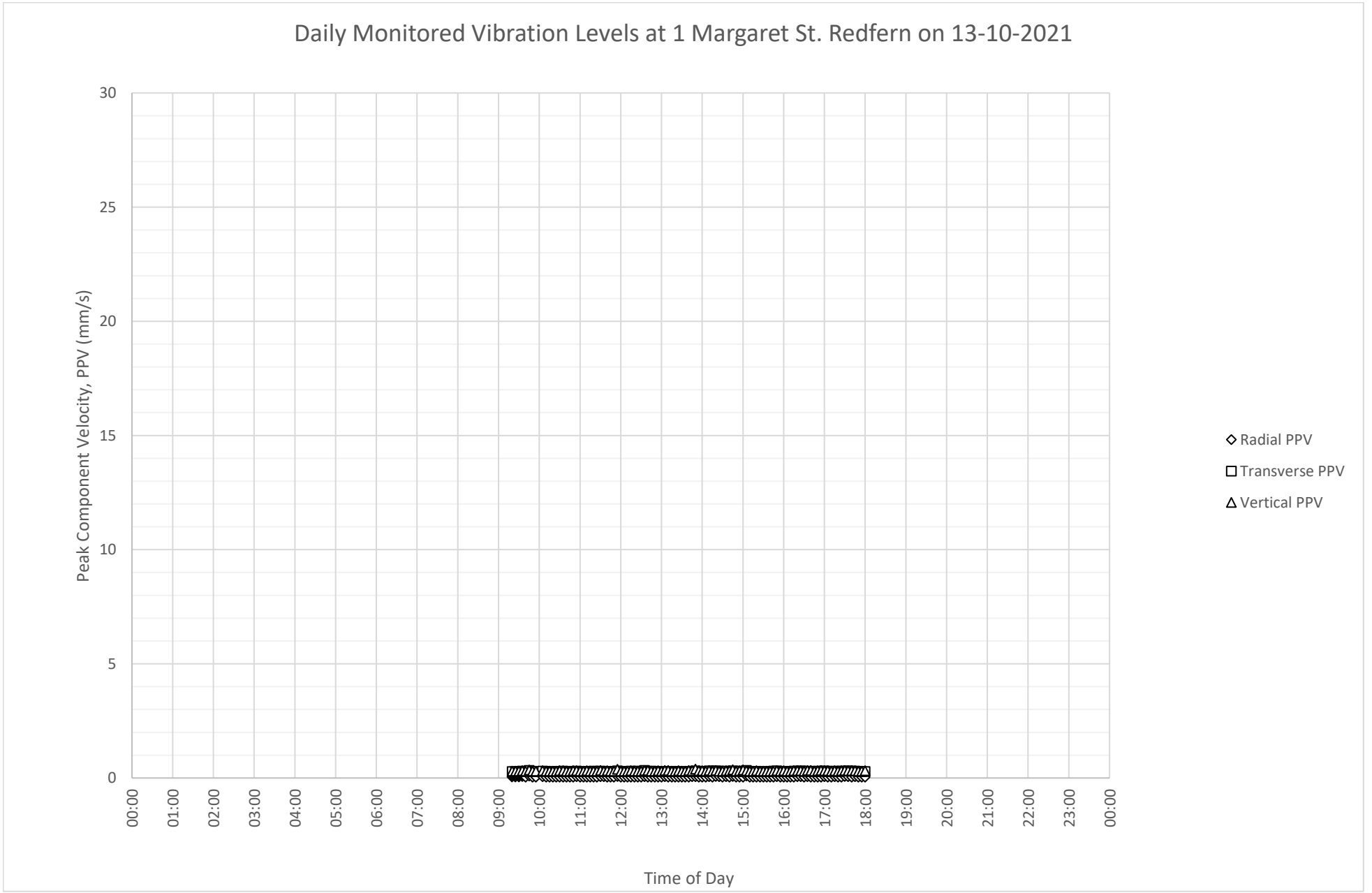
Acoustic Logic has undertaken a detailed analysis of the vibration events captured in that period and has made comments in the Sections above.

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

Acoustic Logic Pty Ltd
Tomas Bohdan

APPENDIX 1 – VIBRATION MONITORING DATA – RECEIVER 1- GIBBONS STREET APARTMENTS


Daily Monitored Vibration Levels at 1 Margaret St. Redfern on 13-10-2021
Peak Component Velocity, PPV (mm/s)
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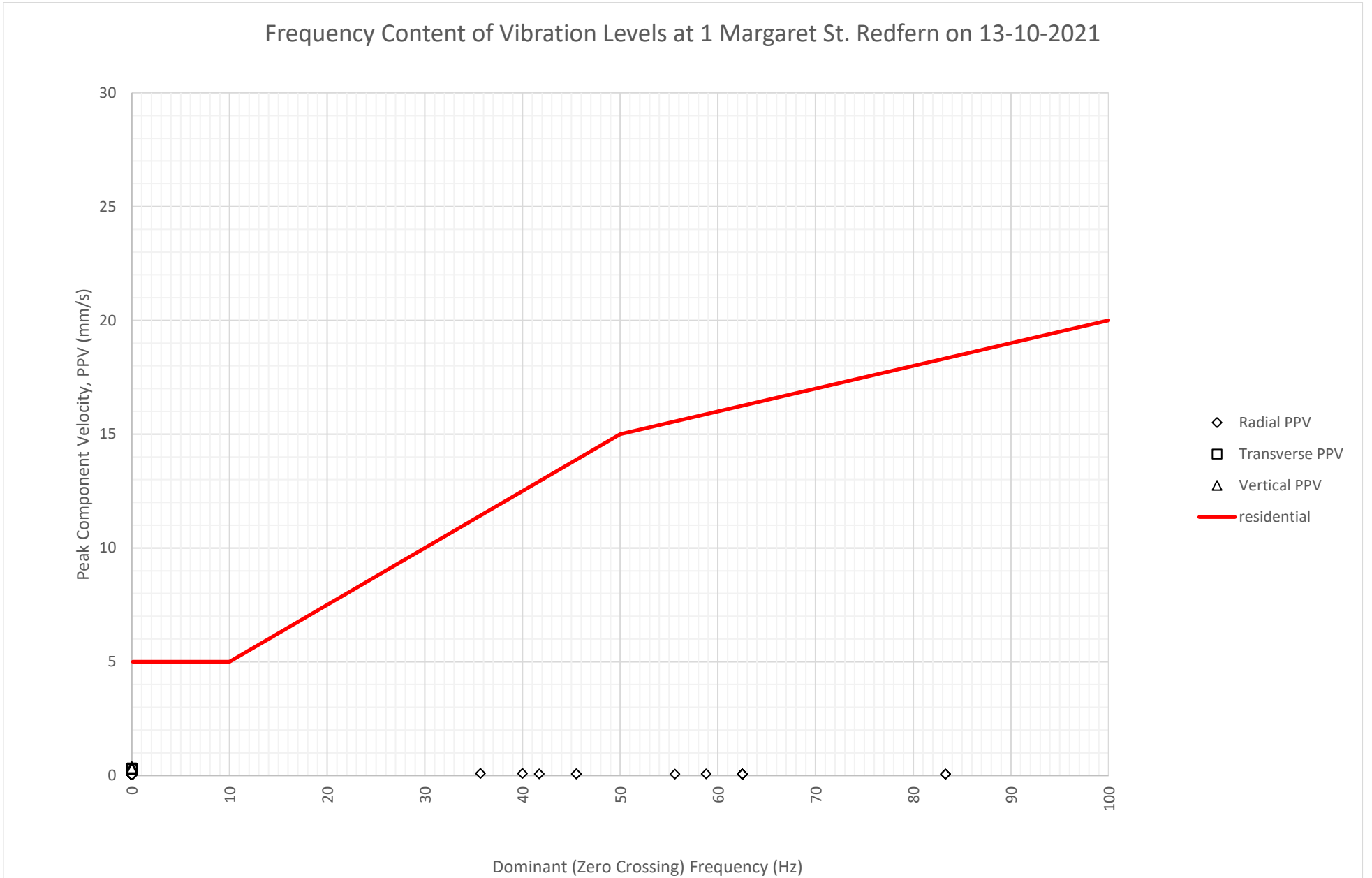
Time of Day
Radial PPV
Transverse PPV
Vertical PPV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Peak Component Velocity, PPV (mm/s)
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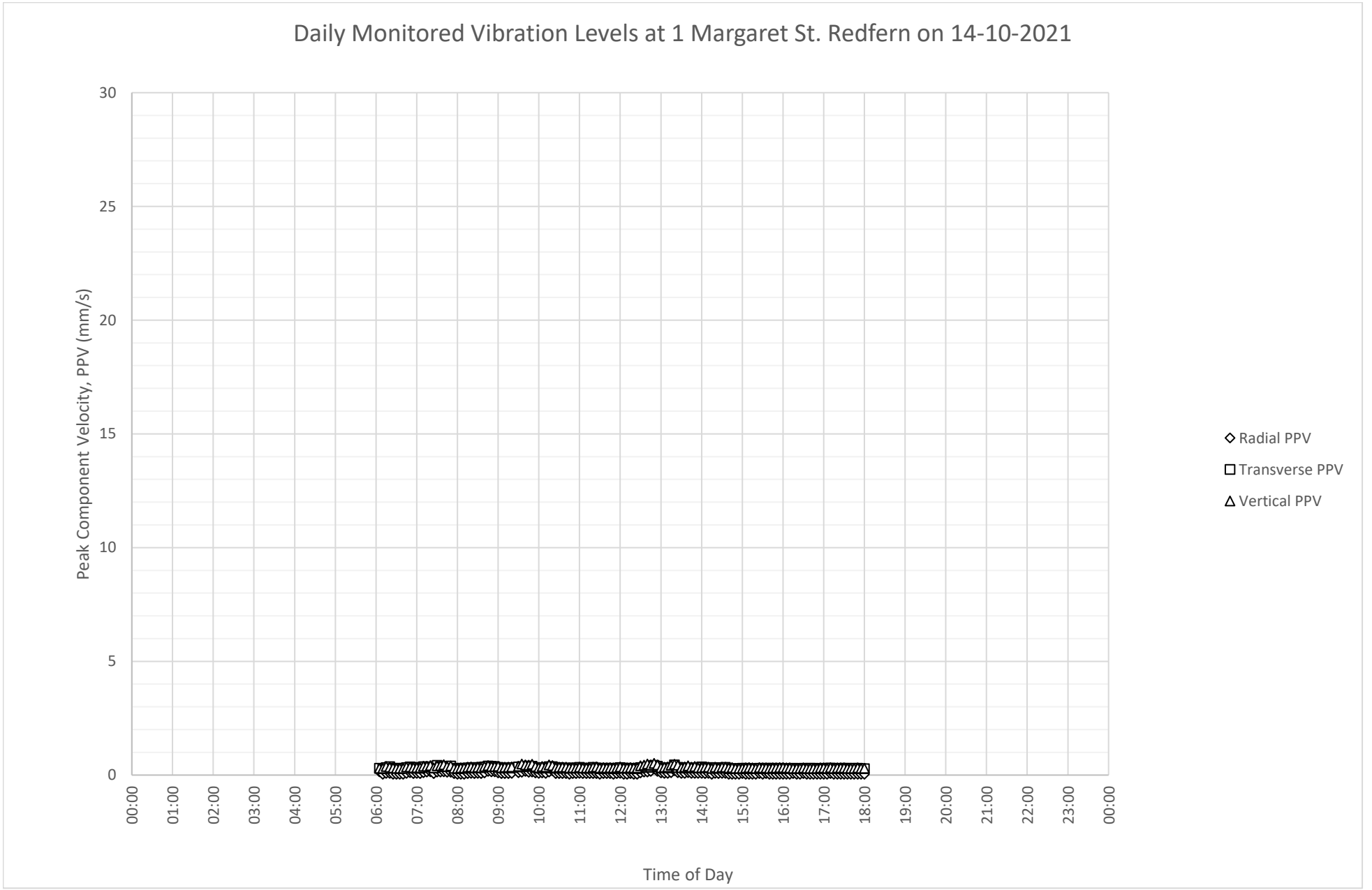
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential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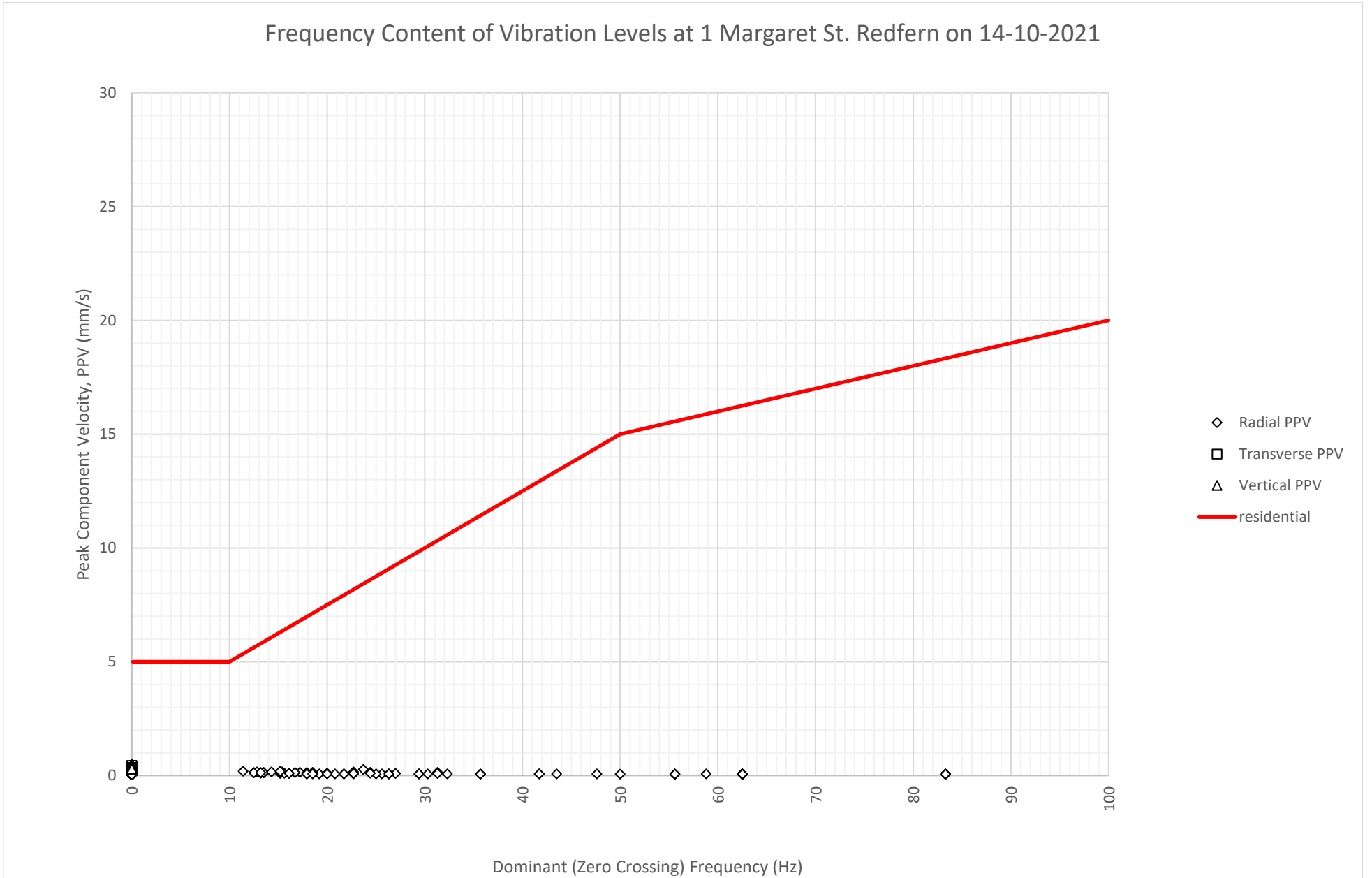
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St. Redfern on 14-10-2021
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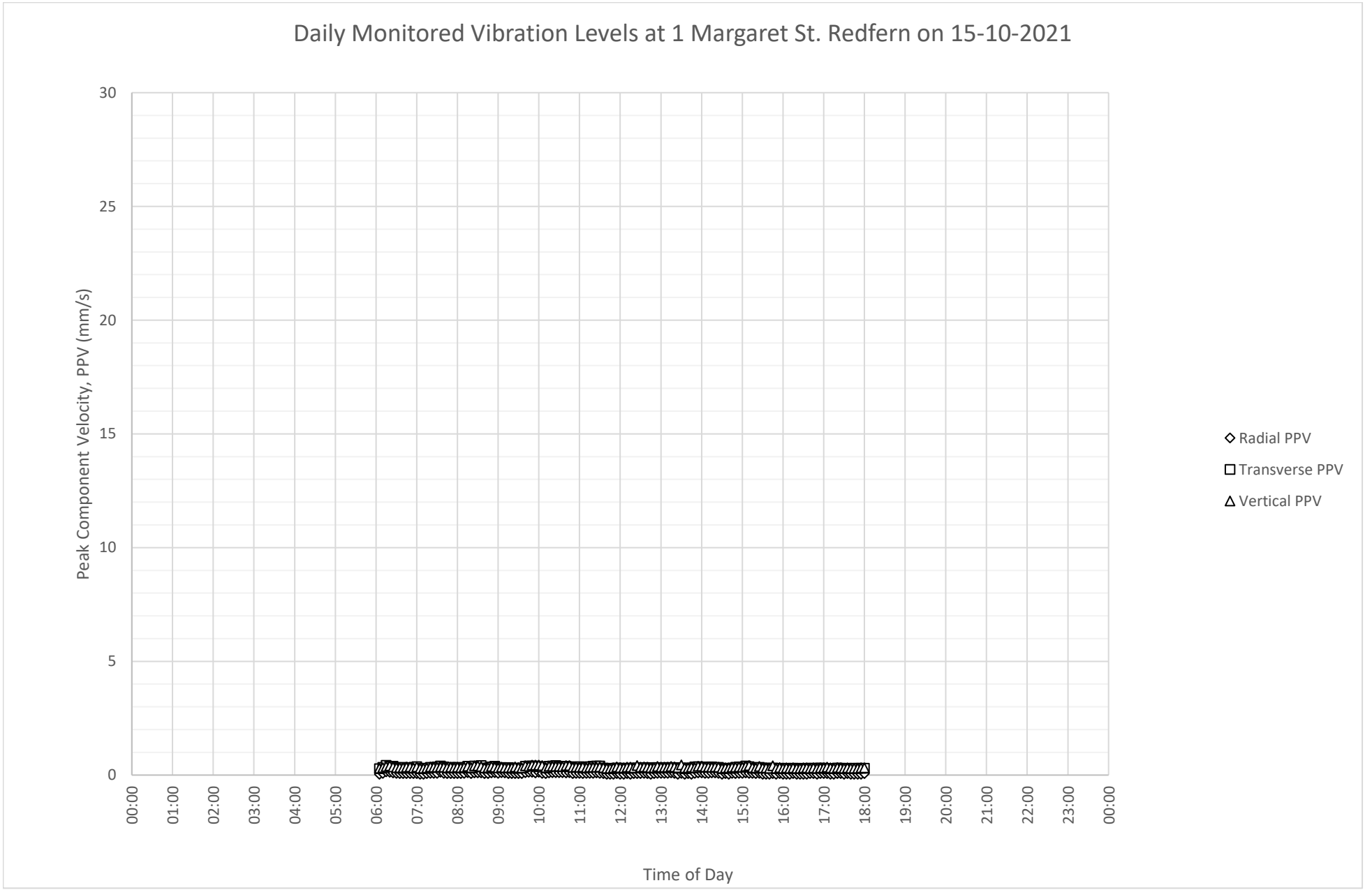
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential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Peak Component Velocity, PPV (mm/s)
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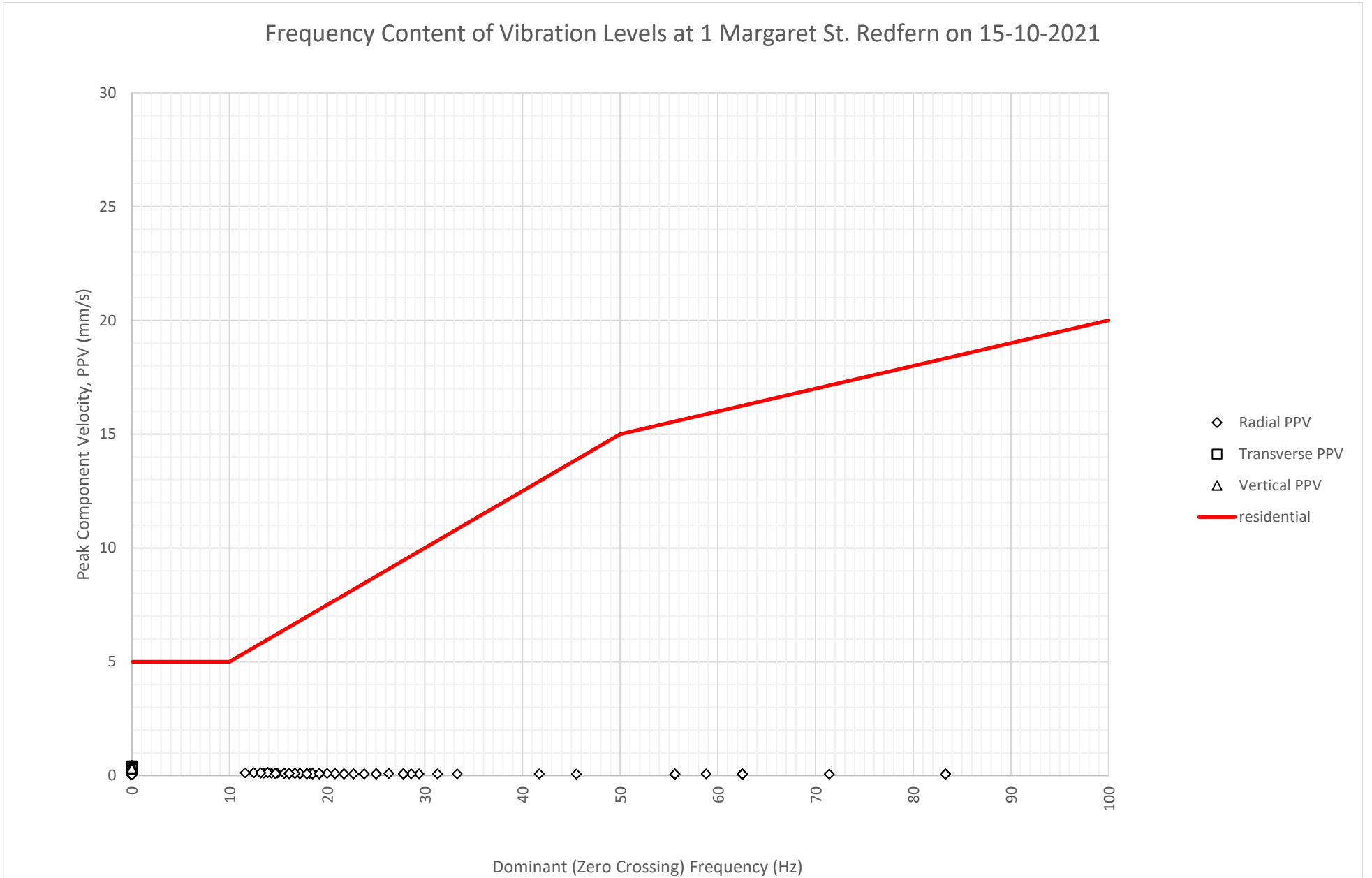
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St. Redfern on 15-10-2021
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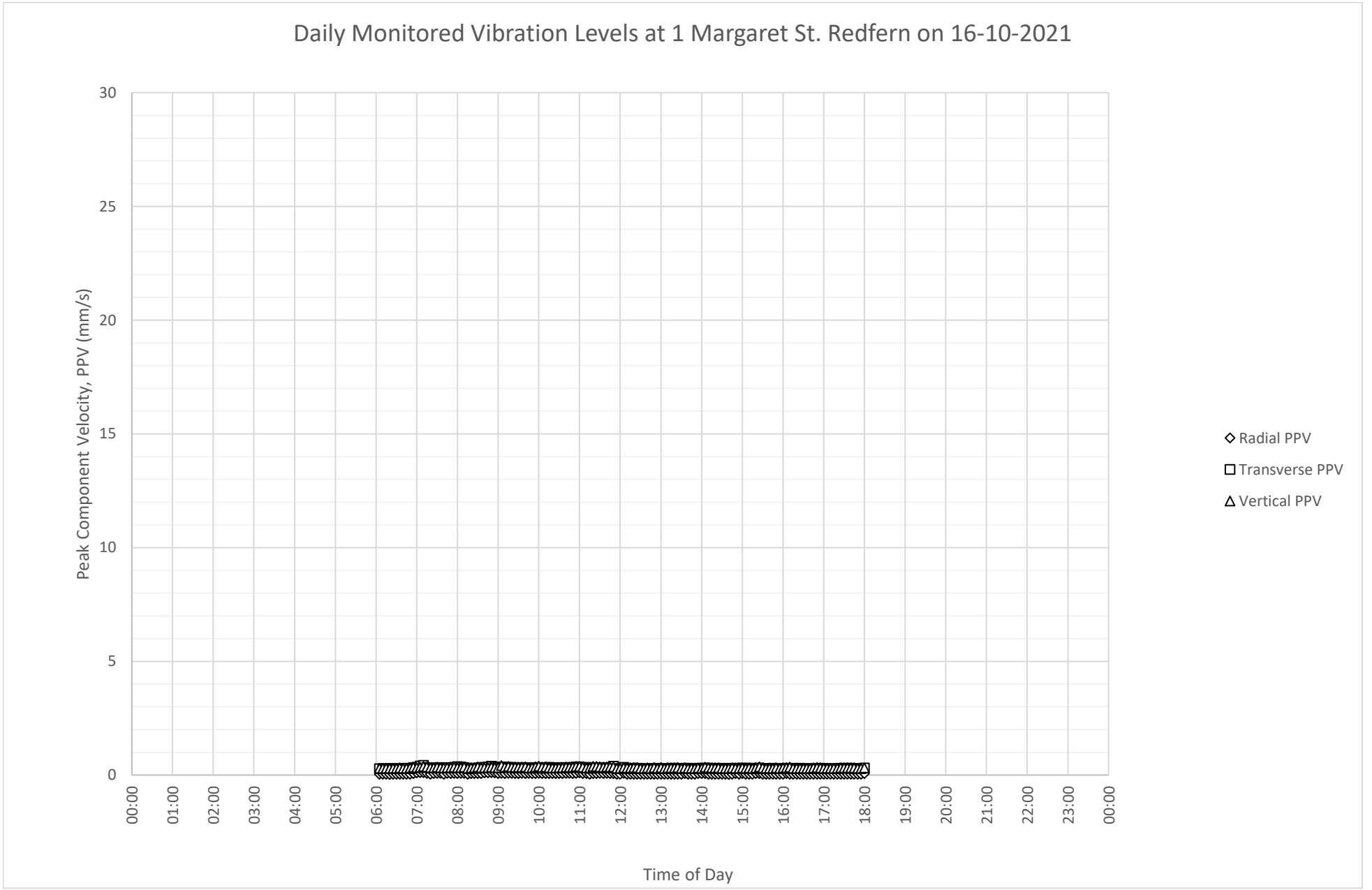
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential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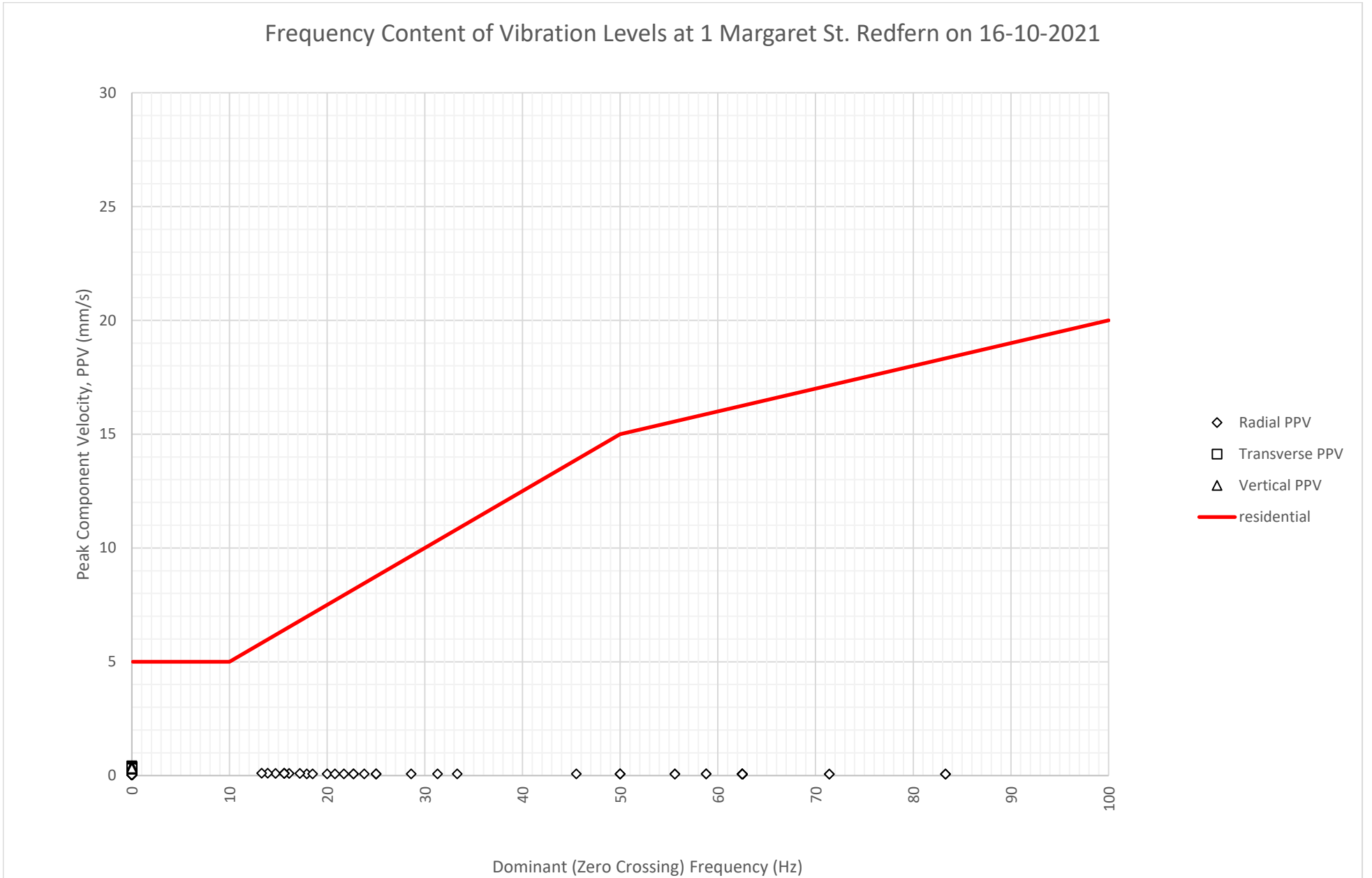
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St. Redfern on 16-10-2021
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Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
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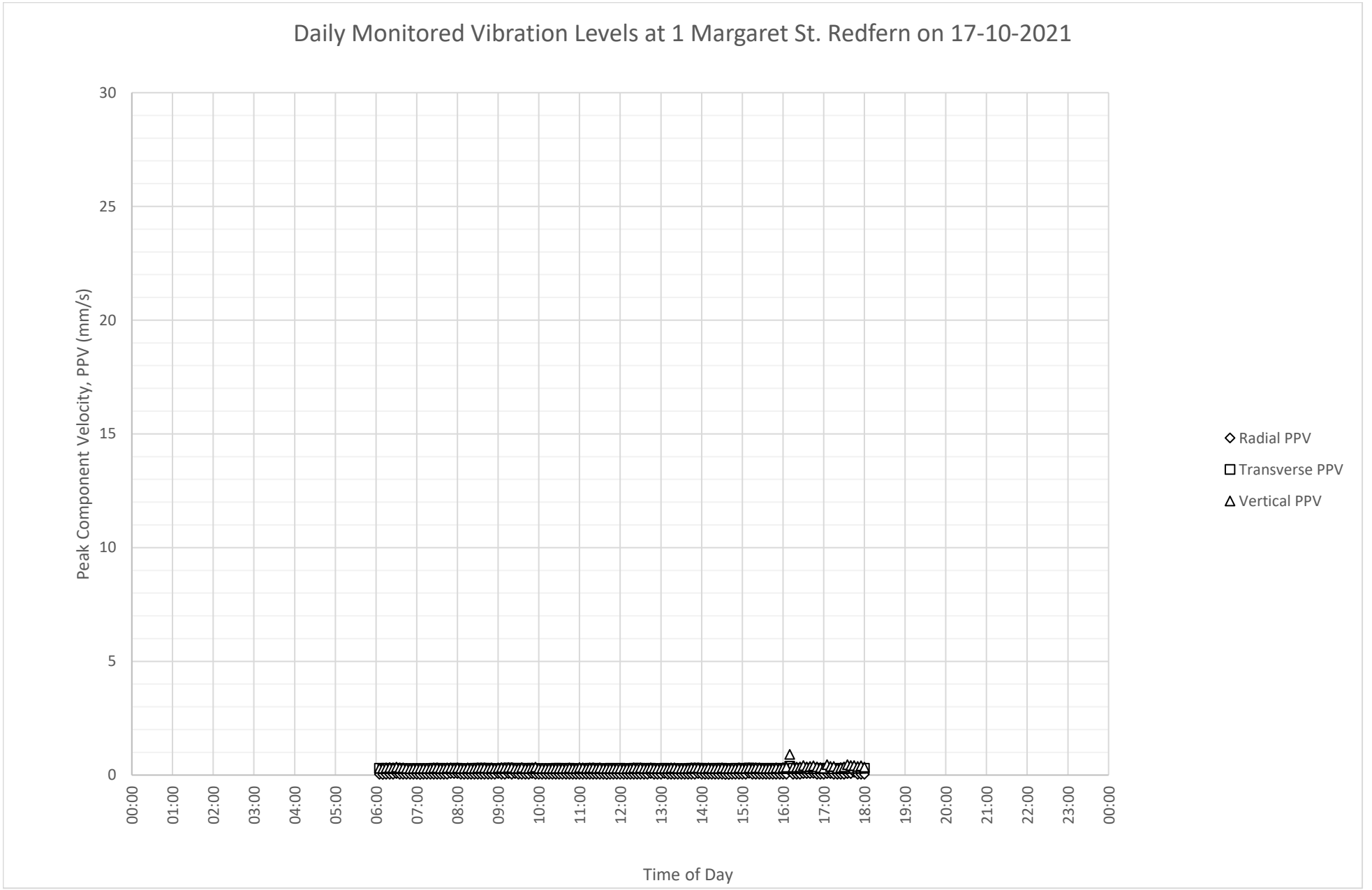
residential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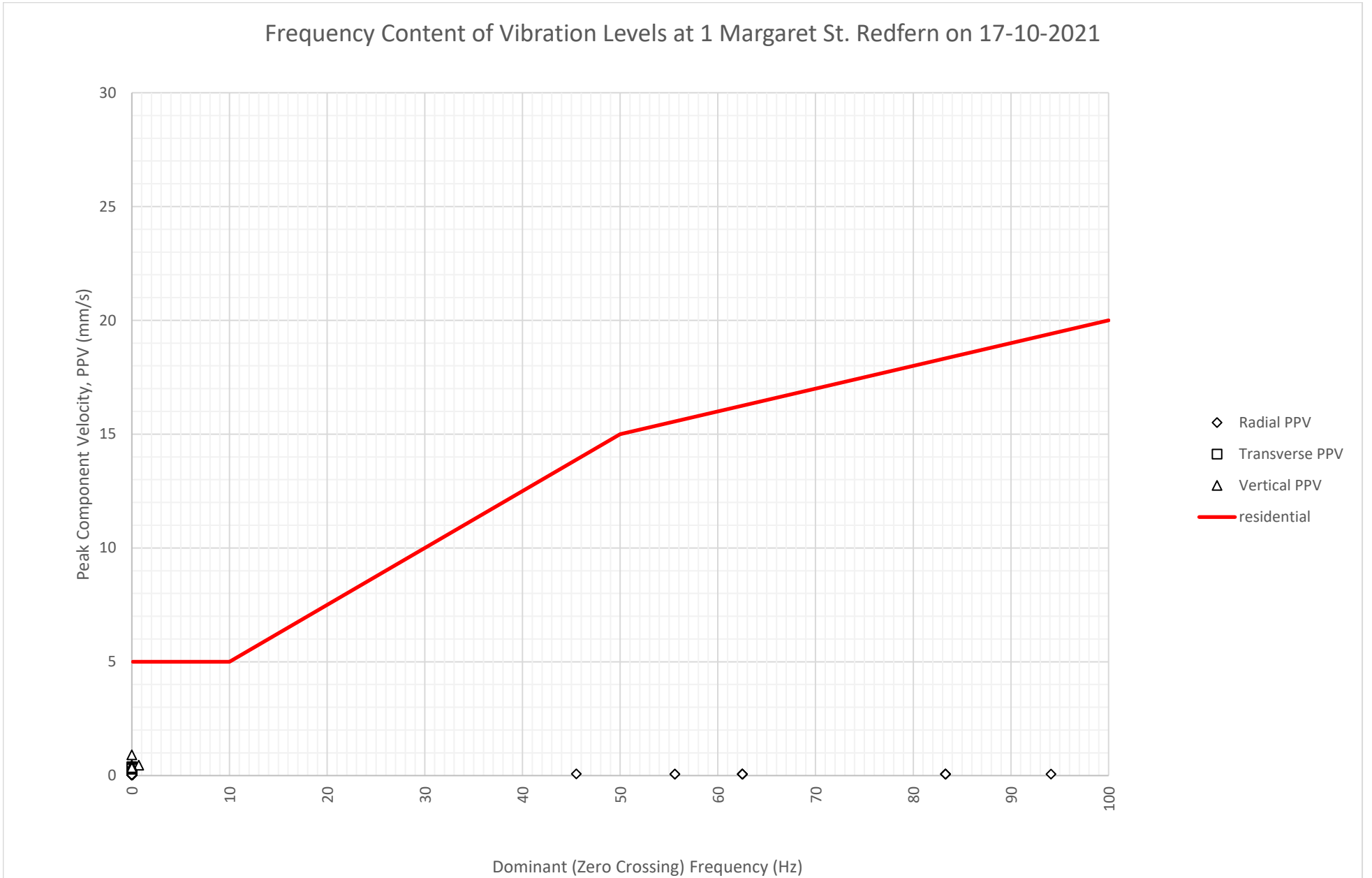
Time of Day
Radial PPV
Transverse PPV
Vertical PPV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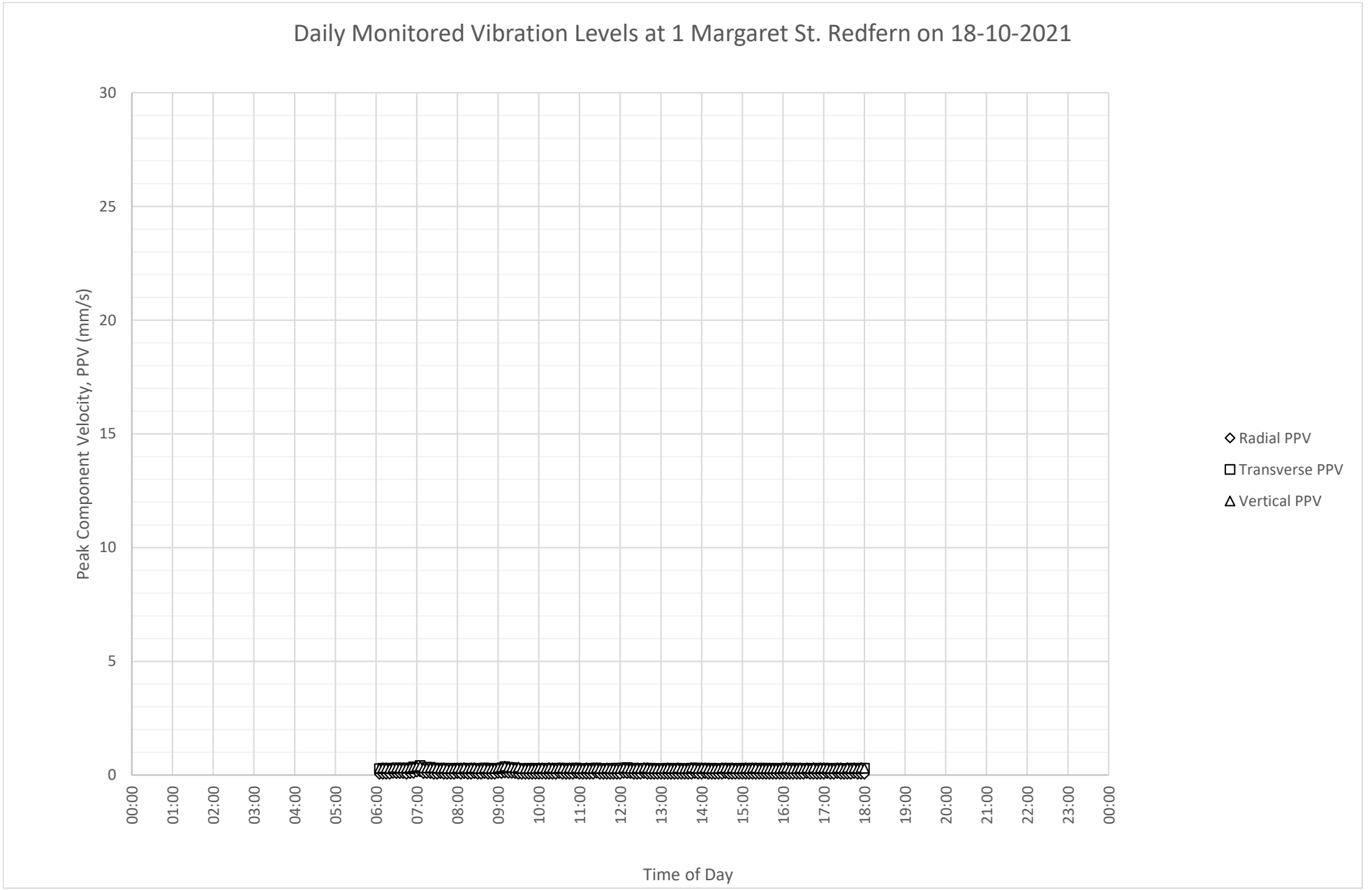
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential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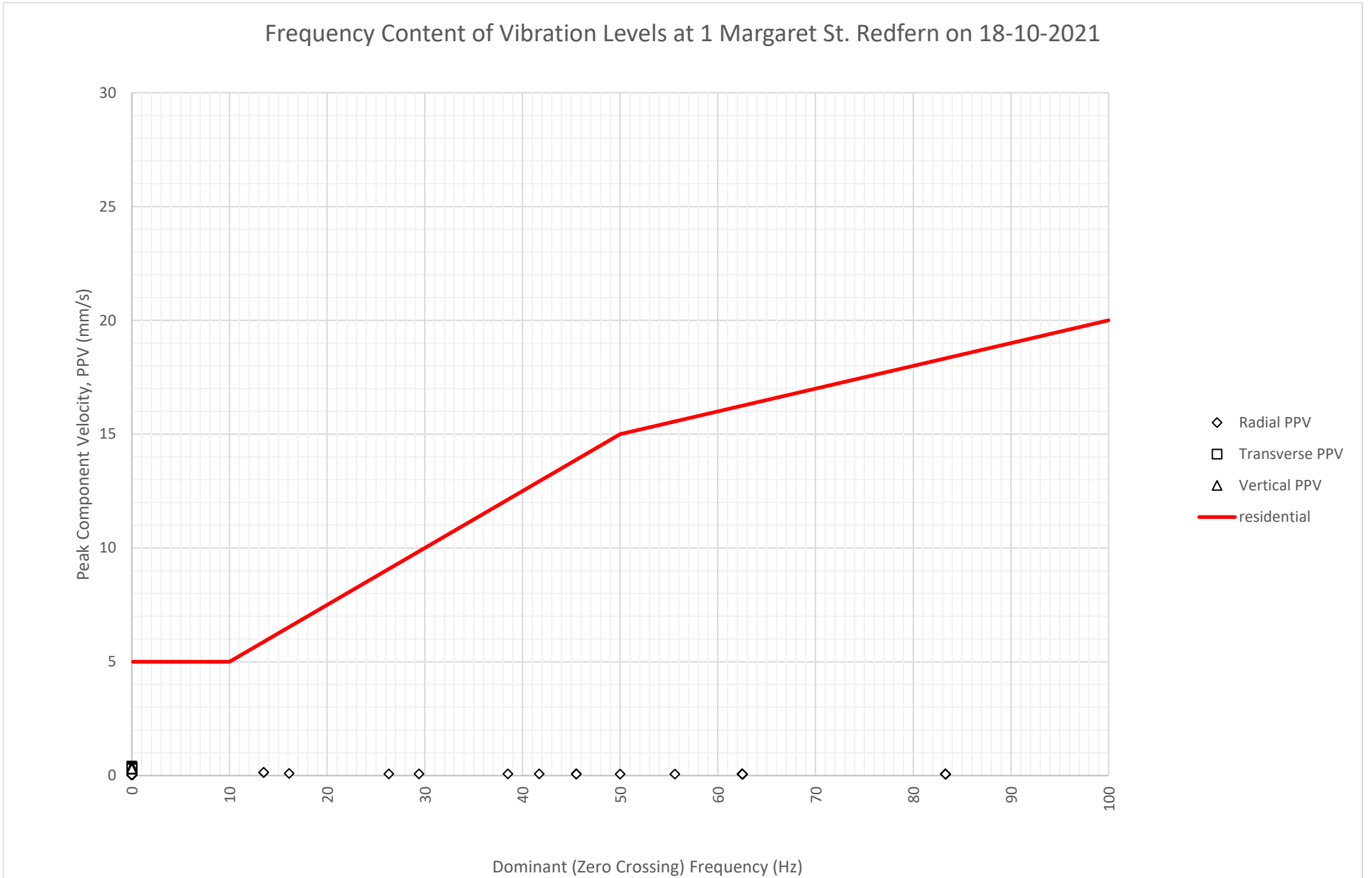
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St. Redfern on 18-10-2021
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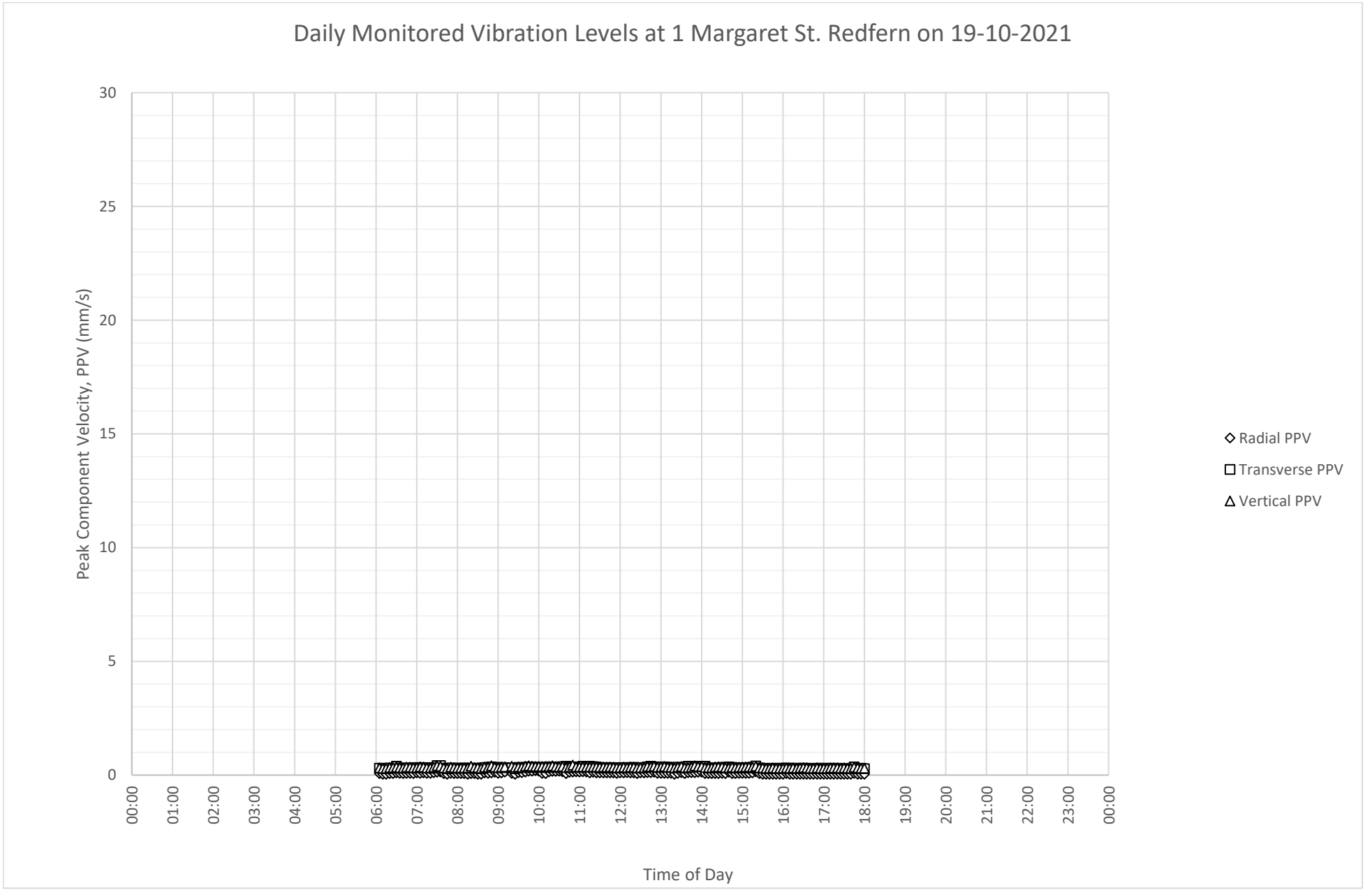
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential


Daily Monitored Vibration Levels at 1 Margaret St. Redfern on 19-10-2021
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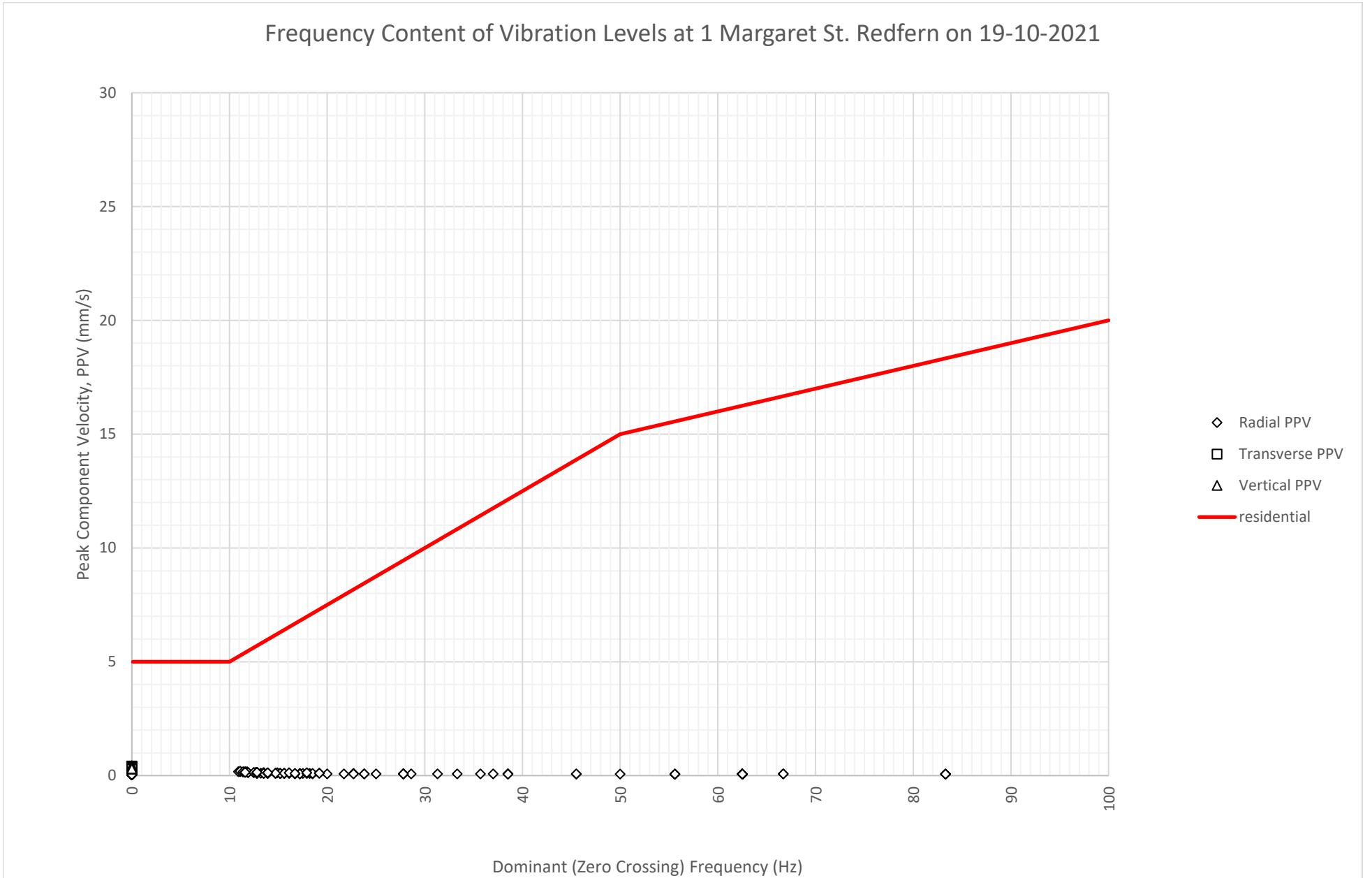
Transverse PPV
Vertical PPV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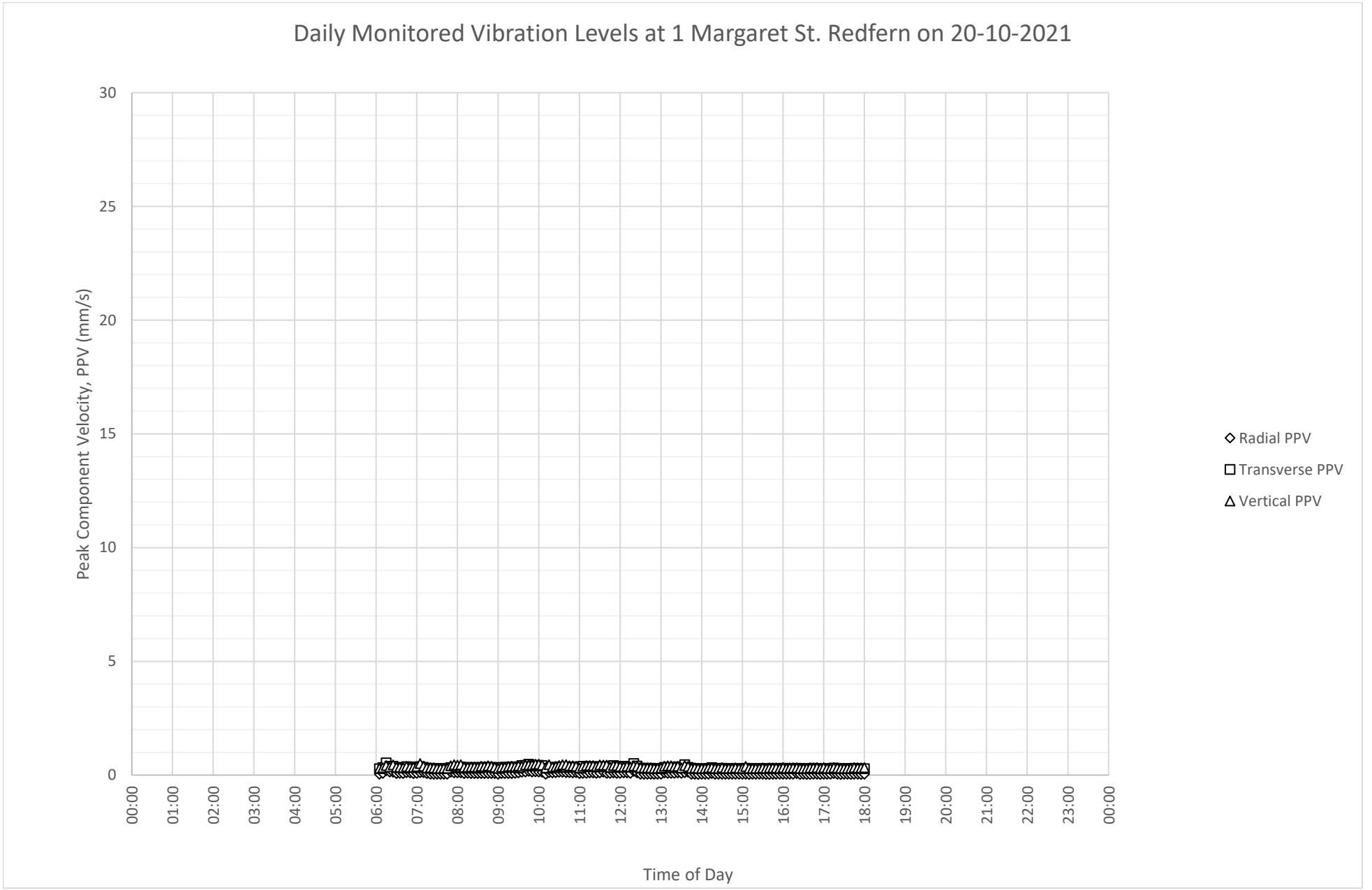
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential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Time of Day
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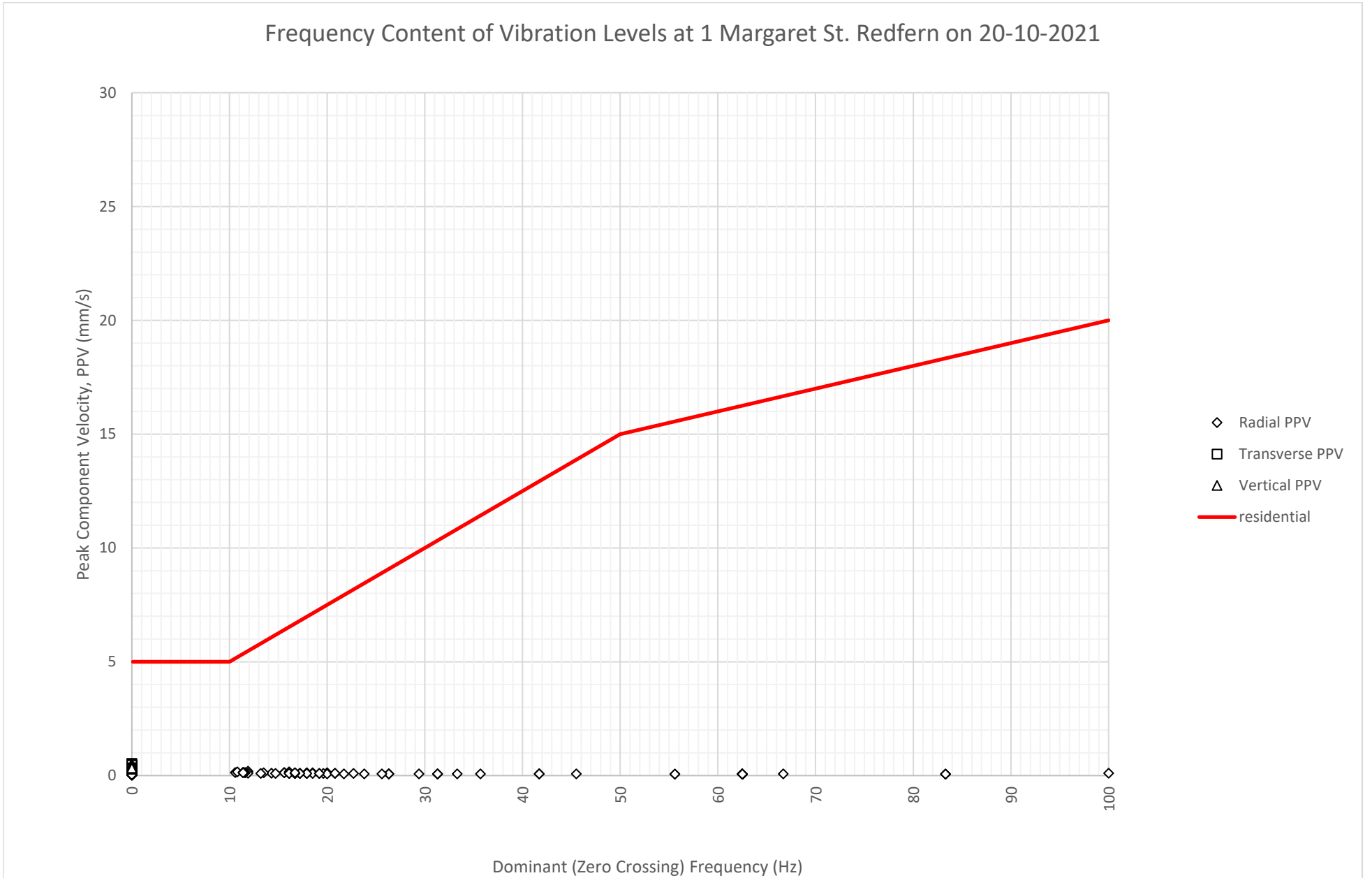
Vertical PPV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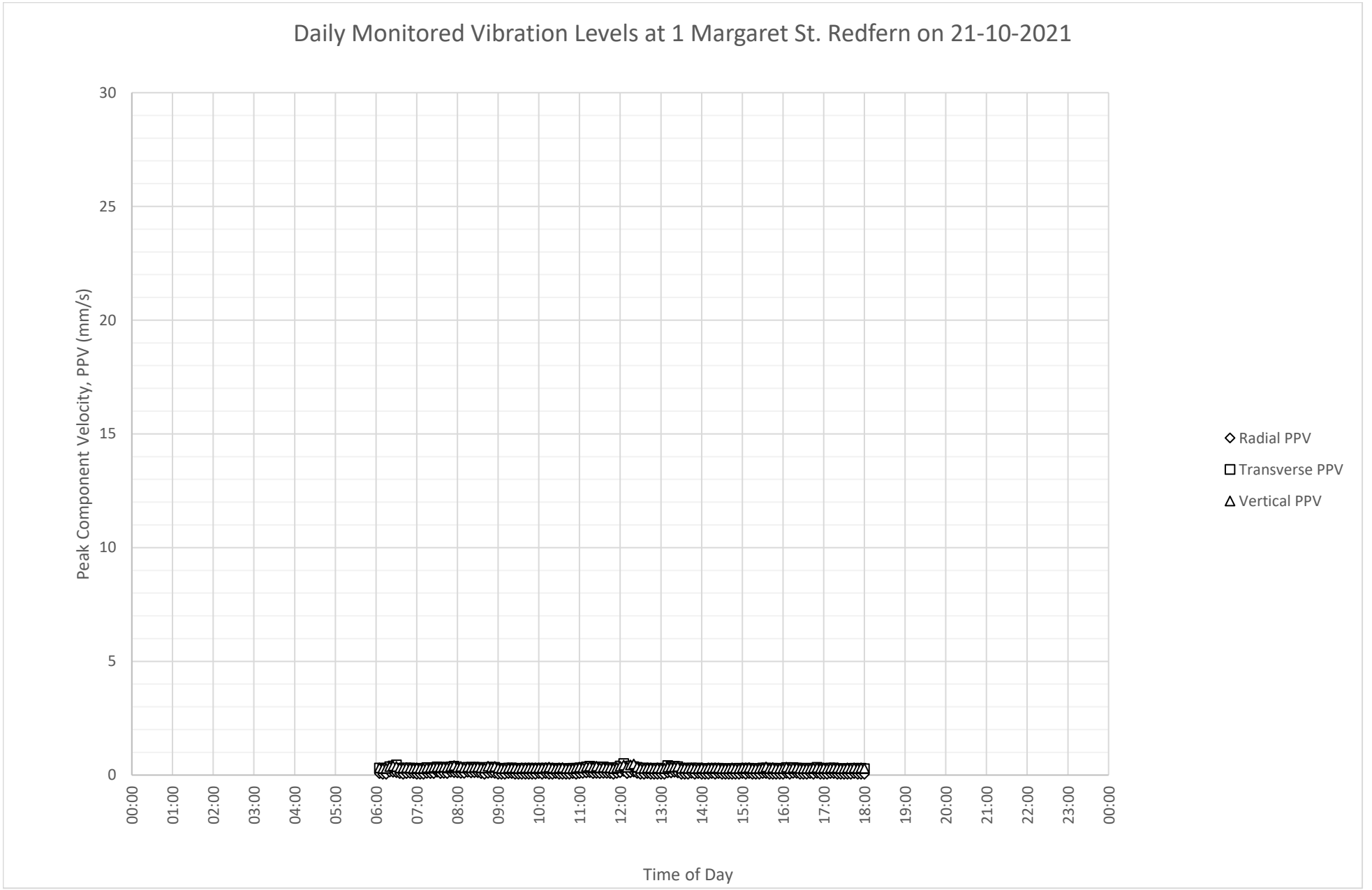
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential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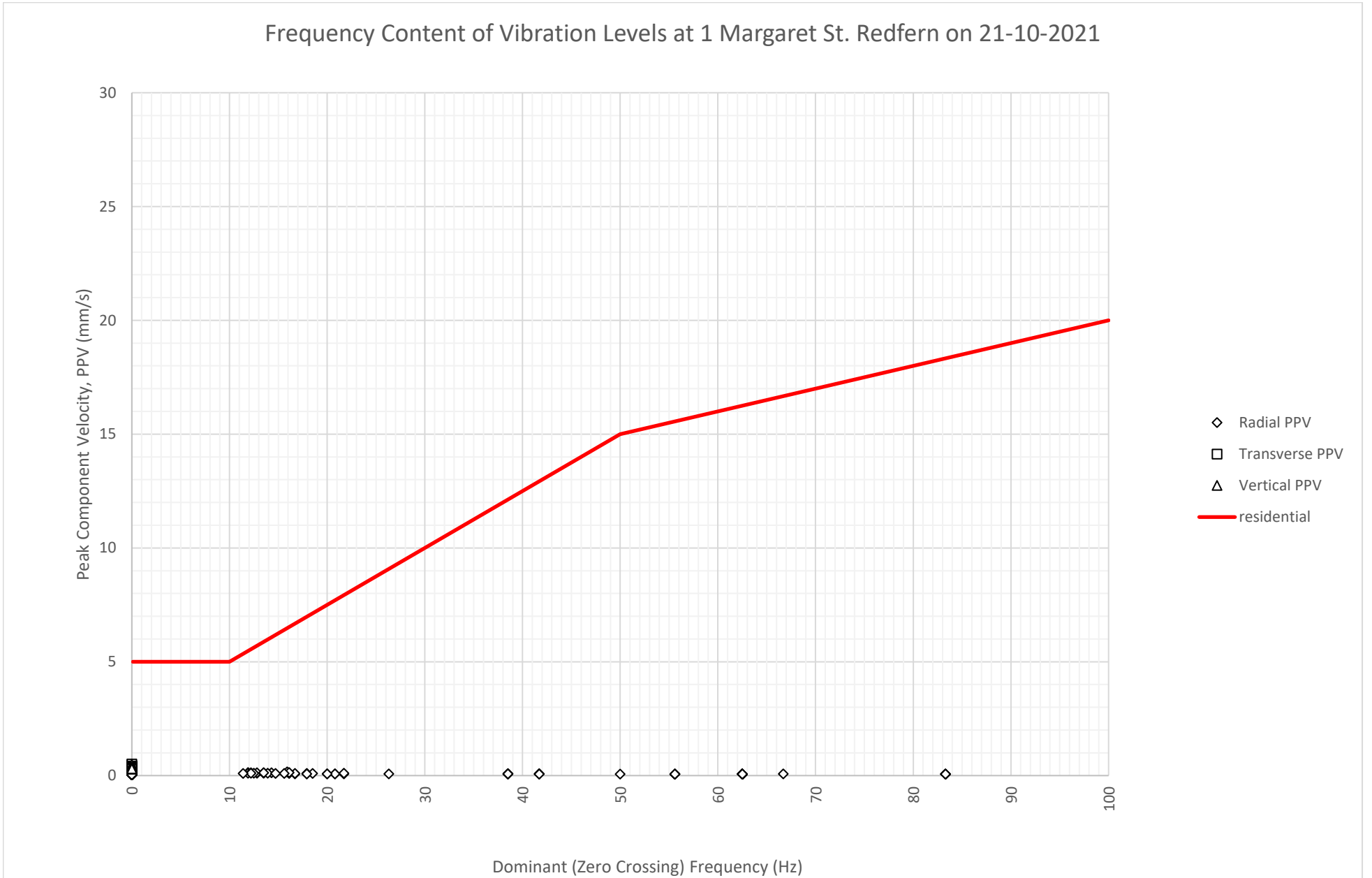
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St. Redfern on 21-10-2021
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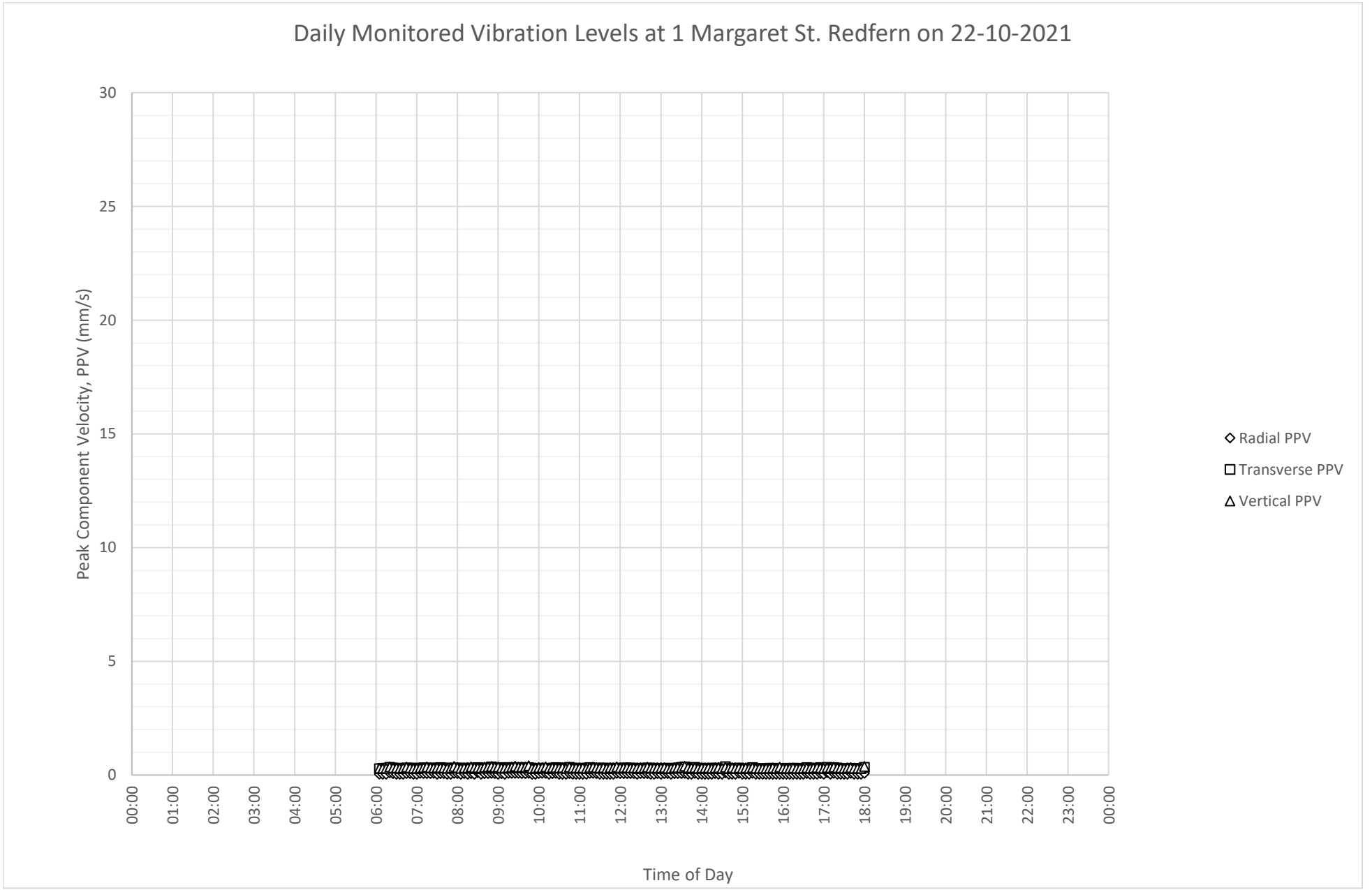
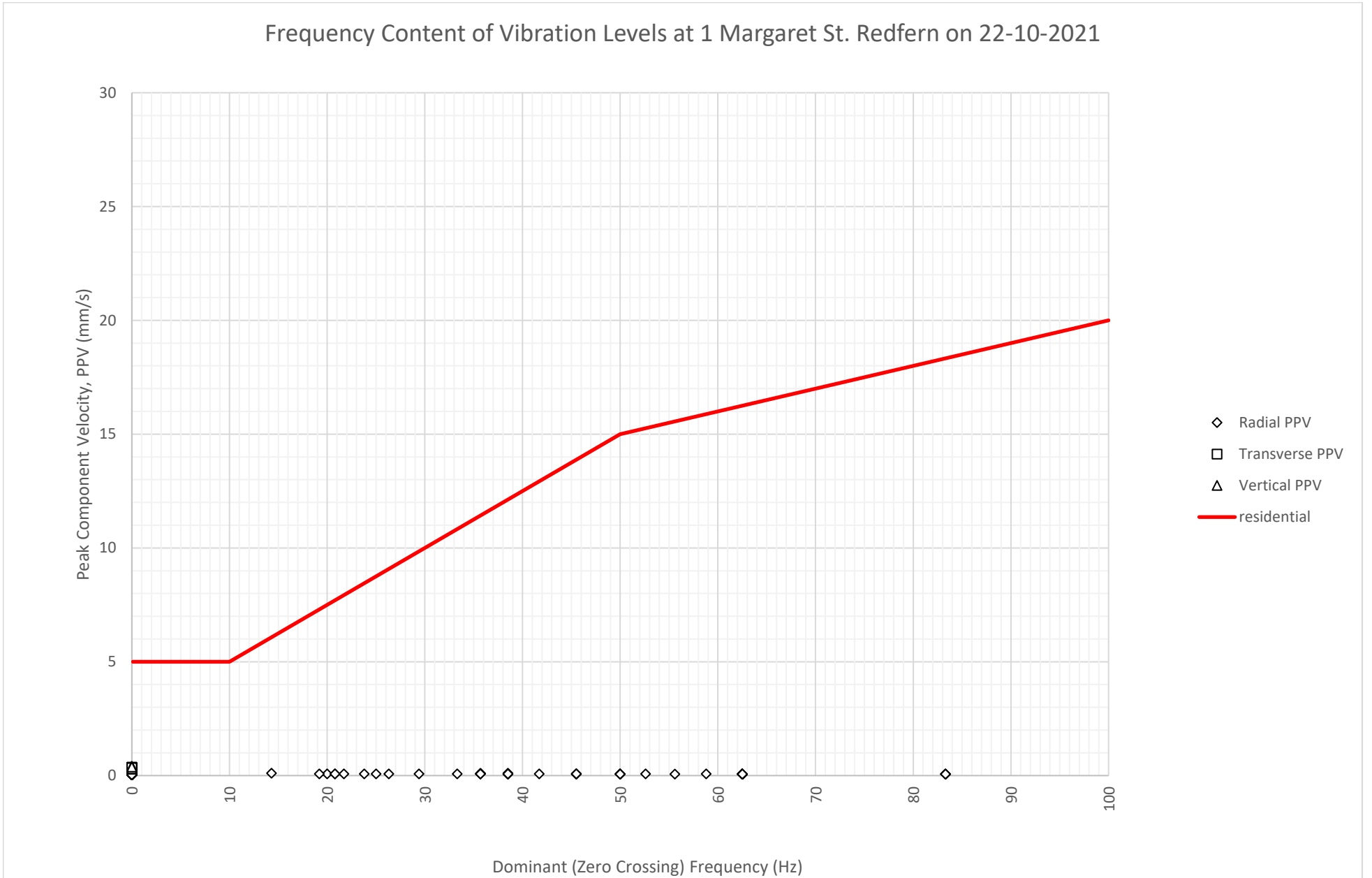
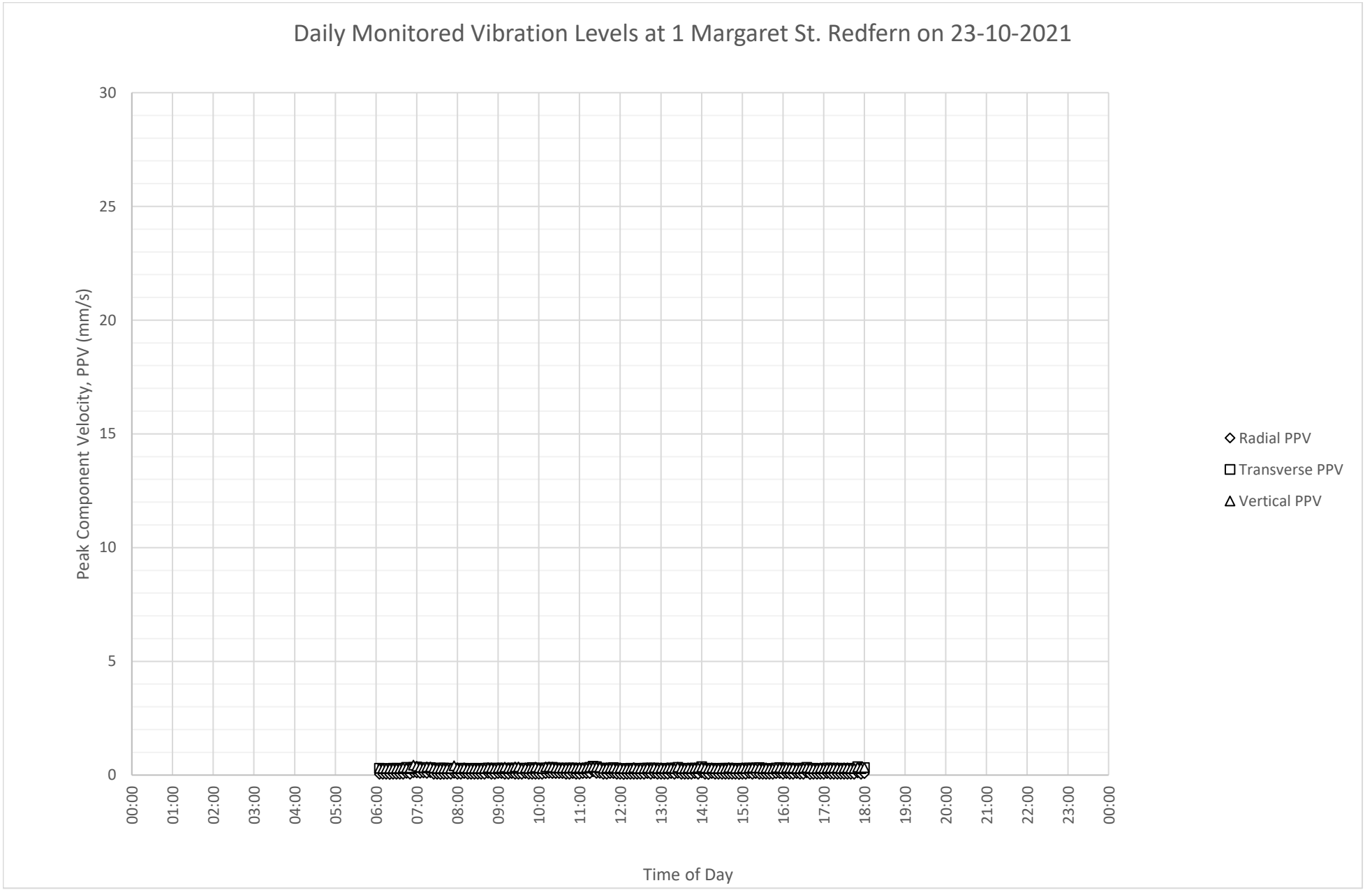
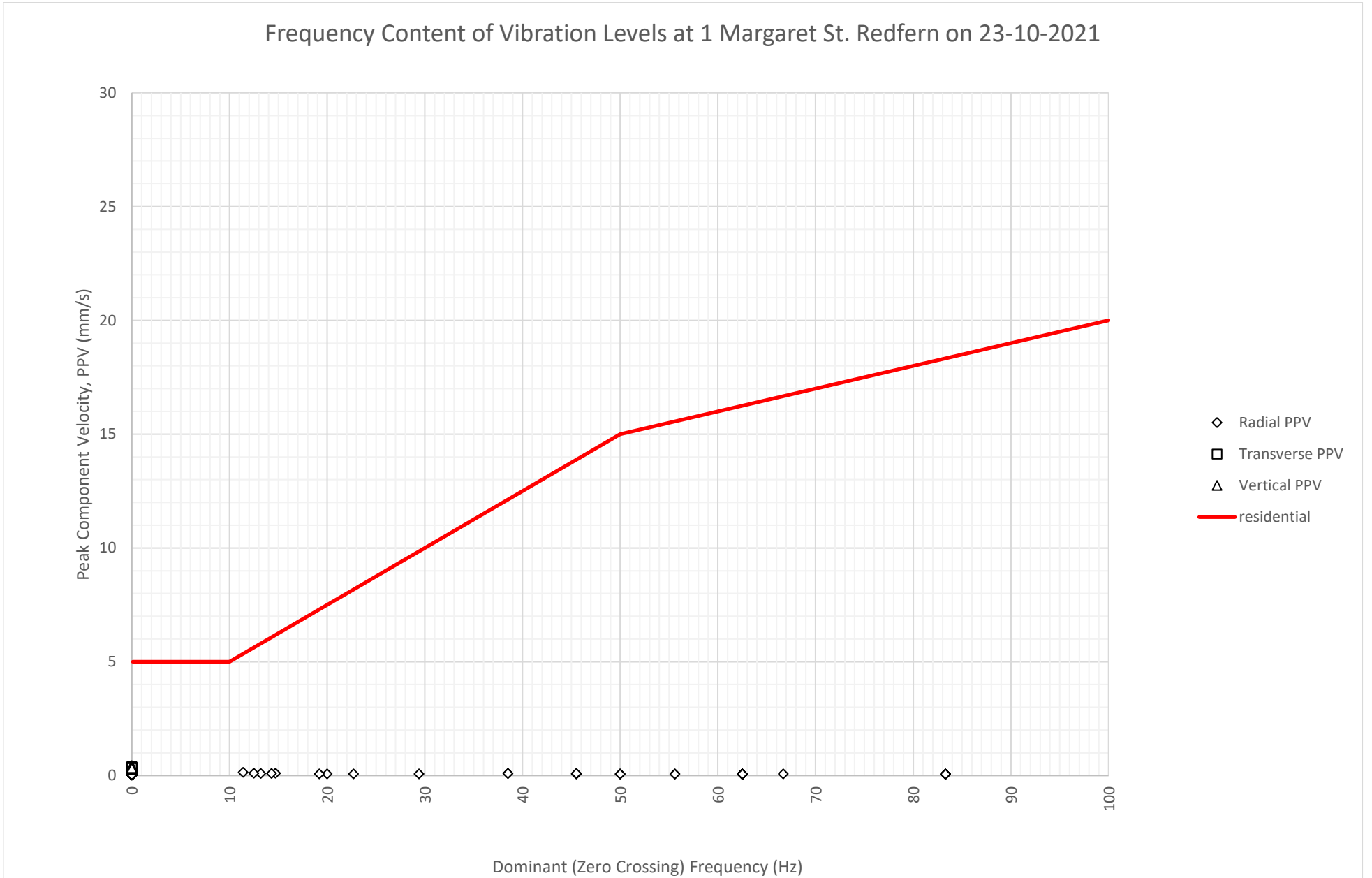
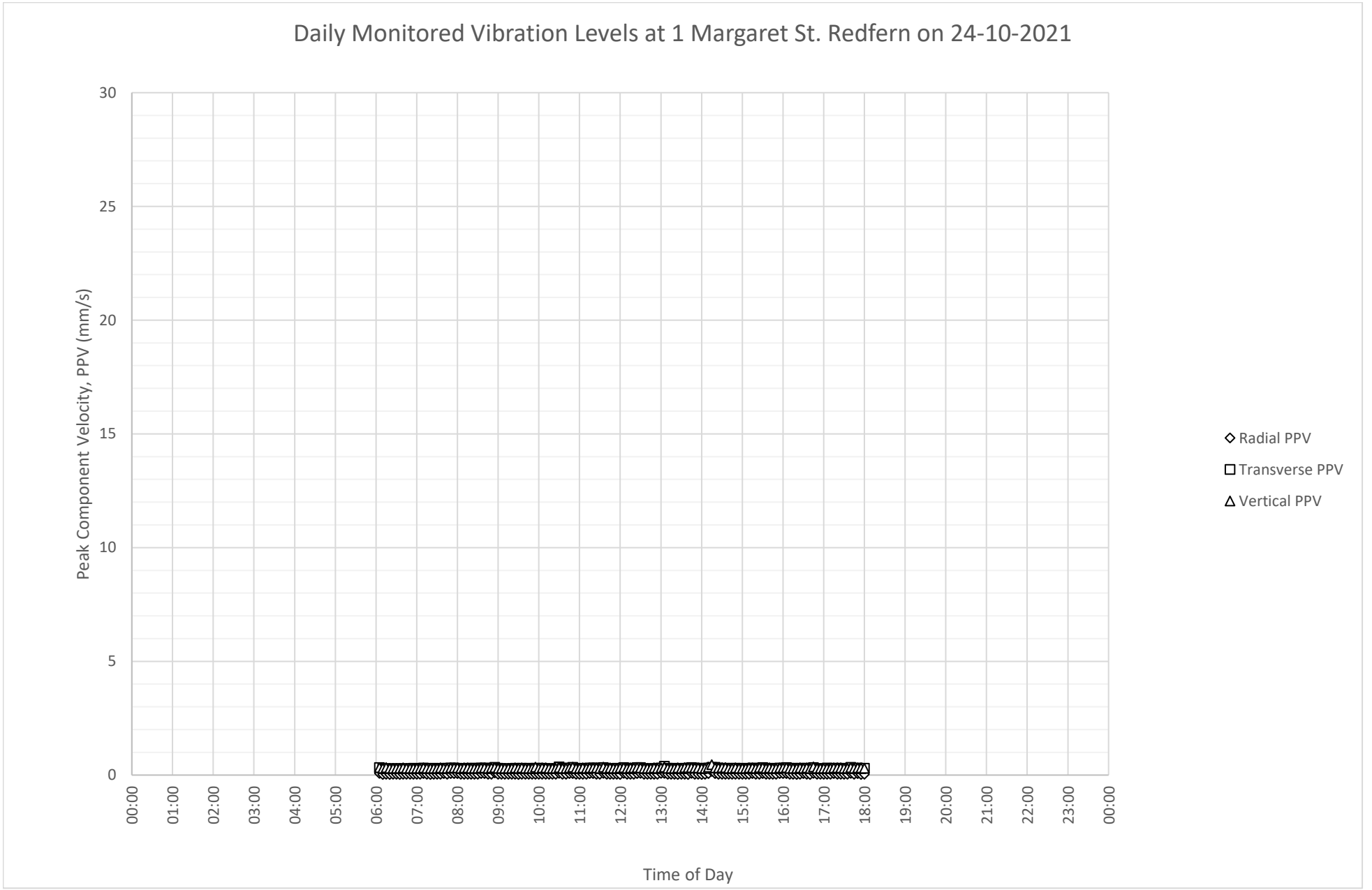
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential

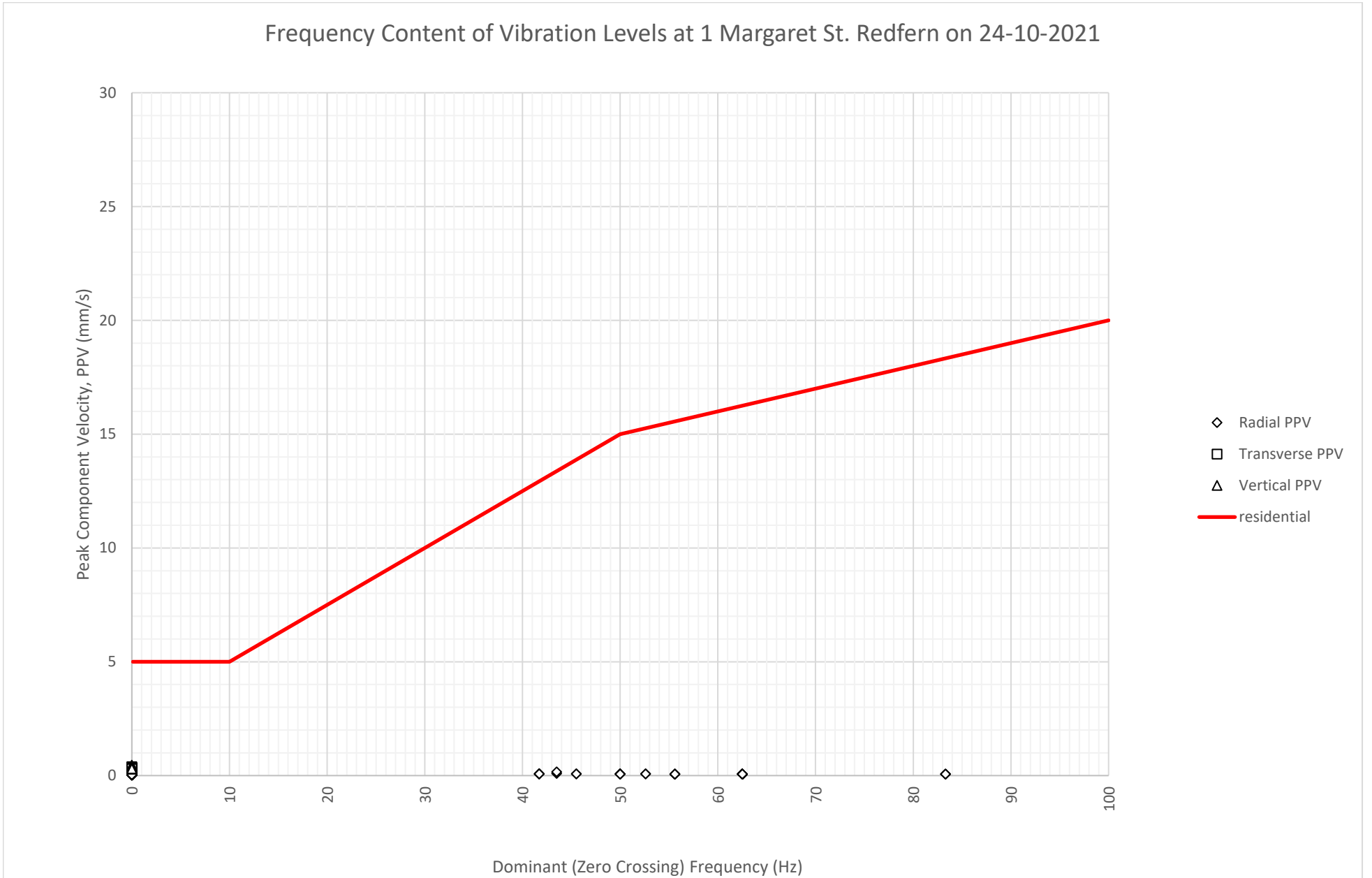

Daily Monitored Vibration Levels at 1 Margaret St. Redfern on 22-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

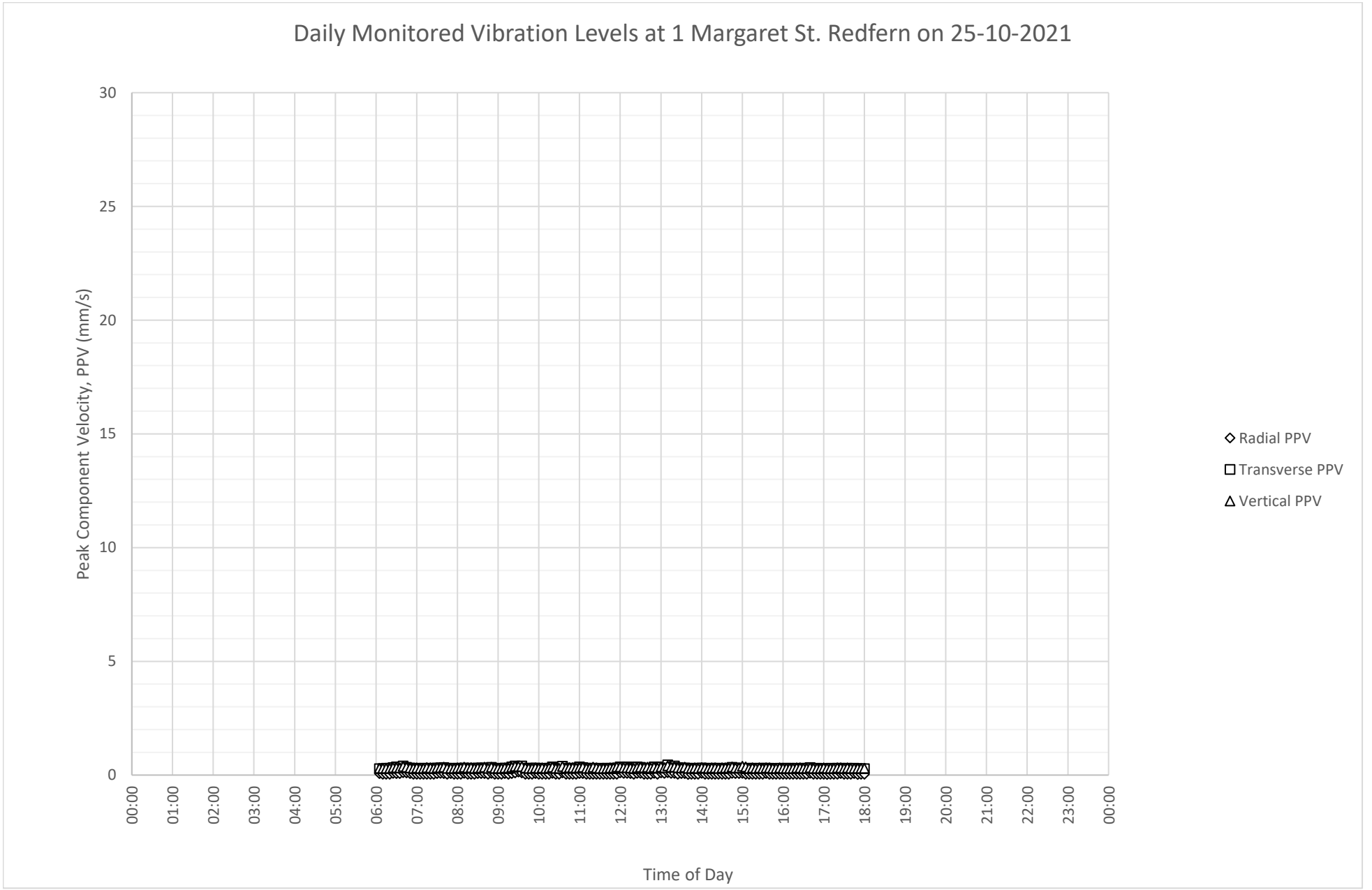

Frequency Content of Vibration Levels at 1 Margaret St. Redfern on 22-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential

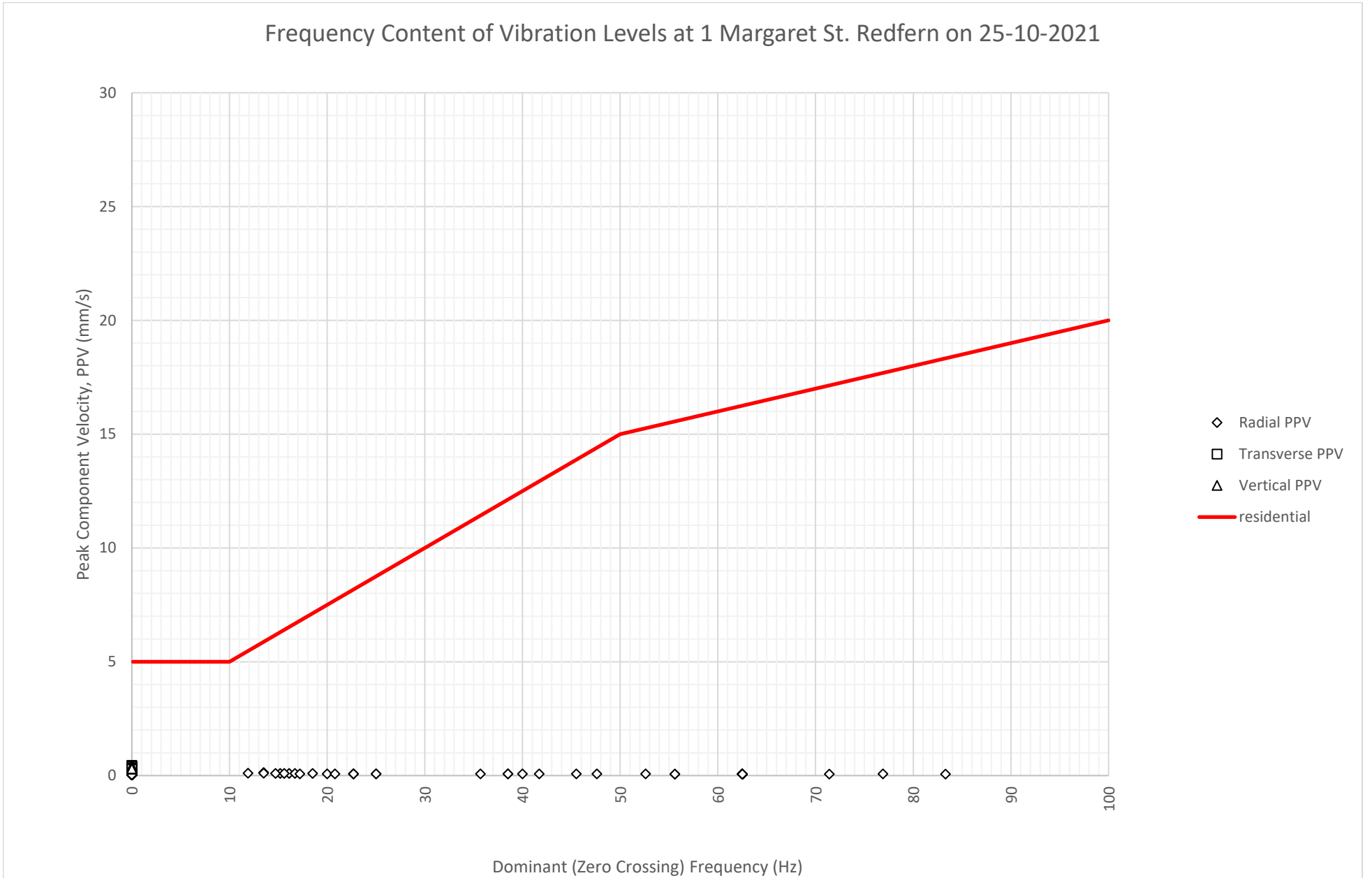

Daily Monitored Vibration Levels at 1 Margaret St. Redfern on 23-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

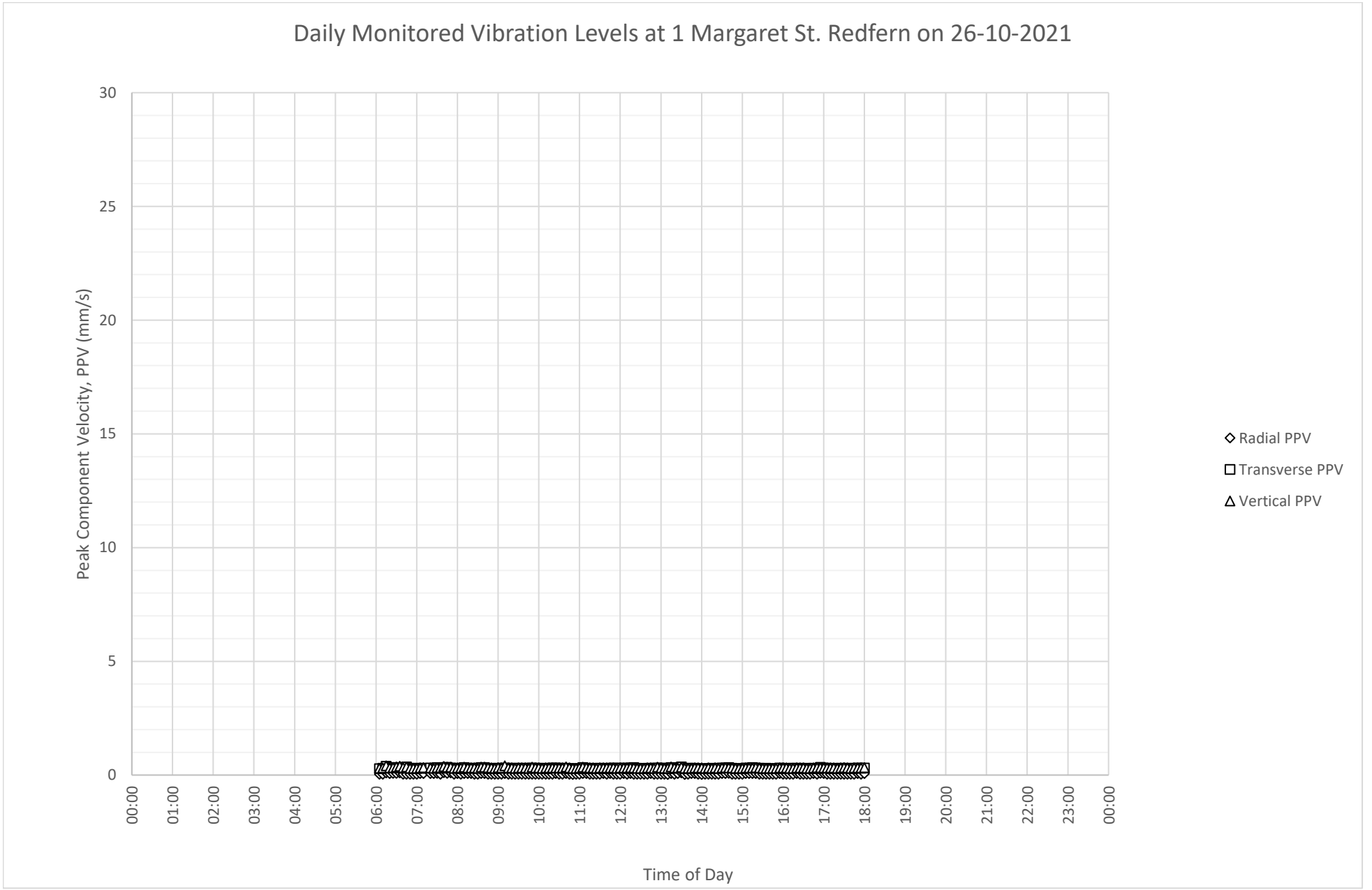

Frequency Content of Vibration Levels at 1 Margaret St. Redfern on 23-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential

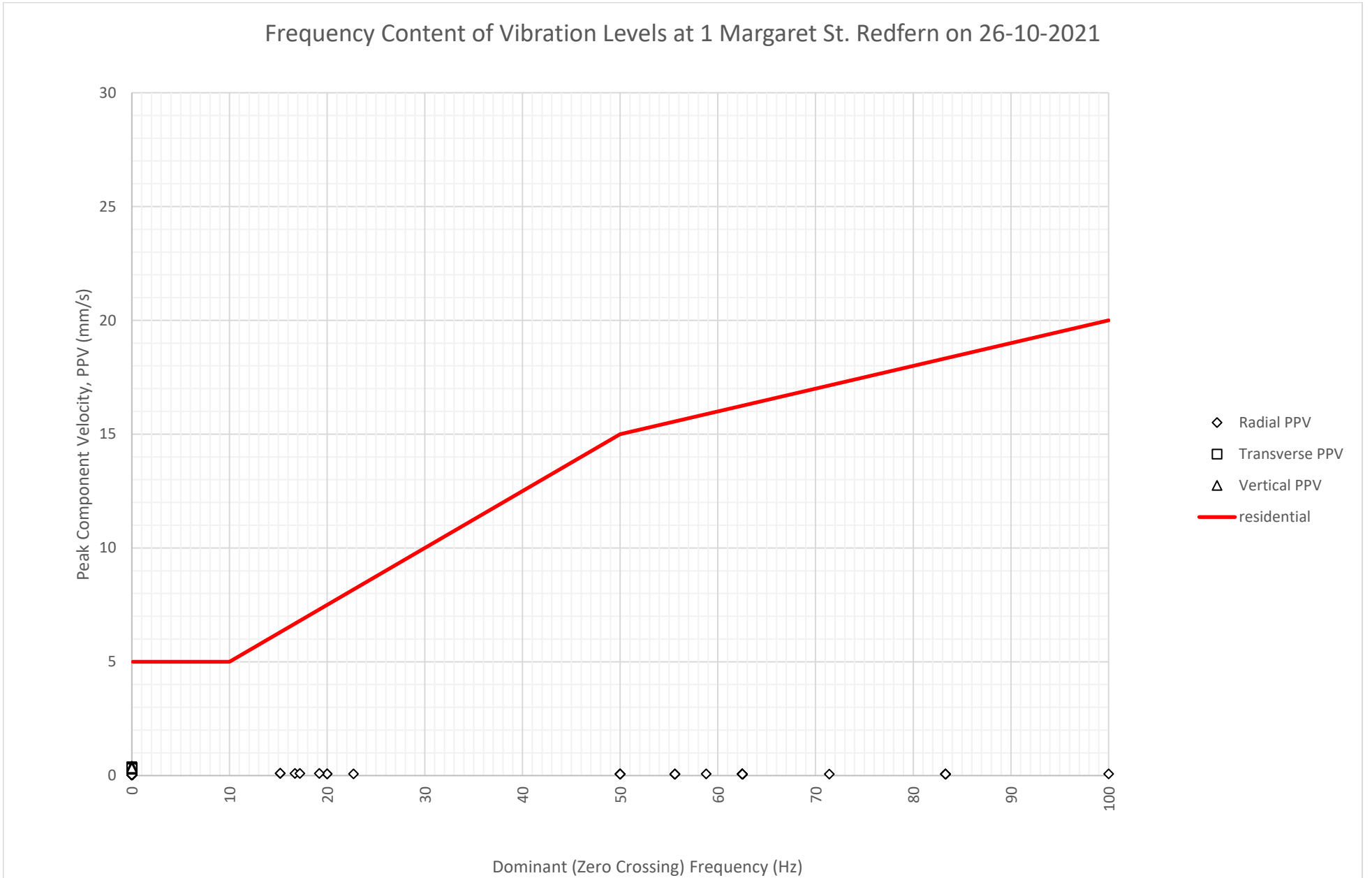

Daily Monitored Vibration Levels at 1 Margaret St. Redfern on 24-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

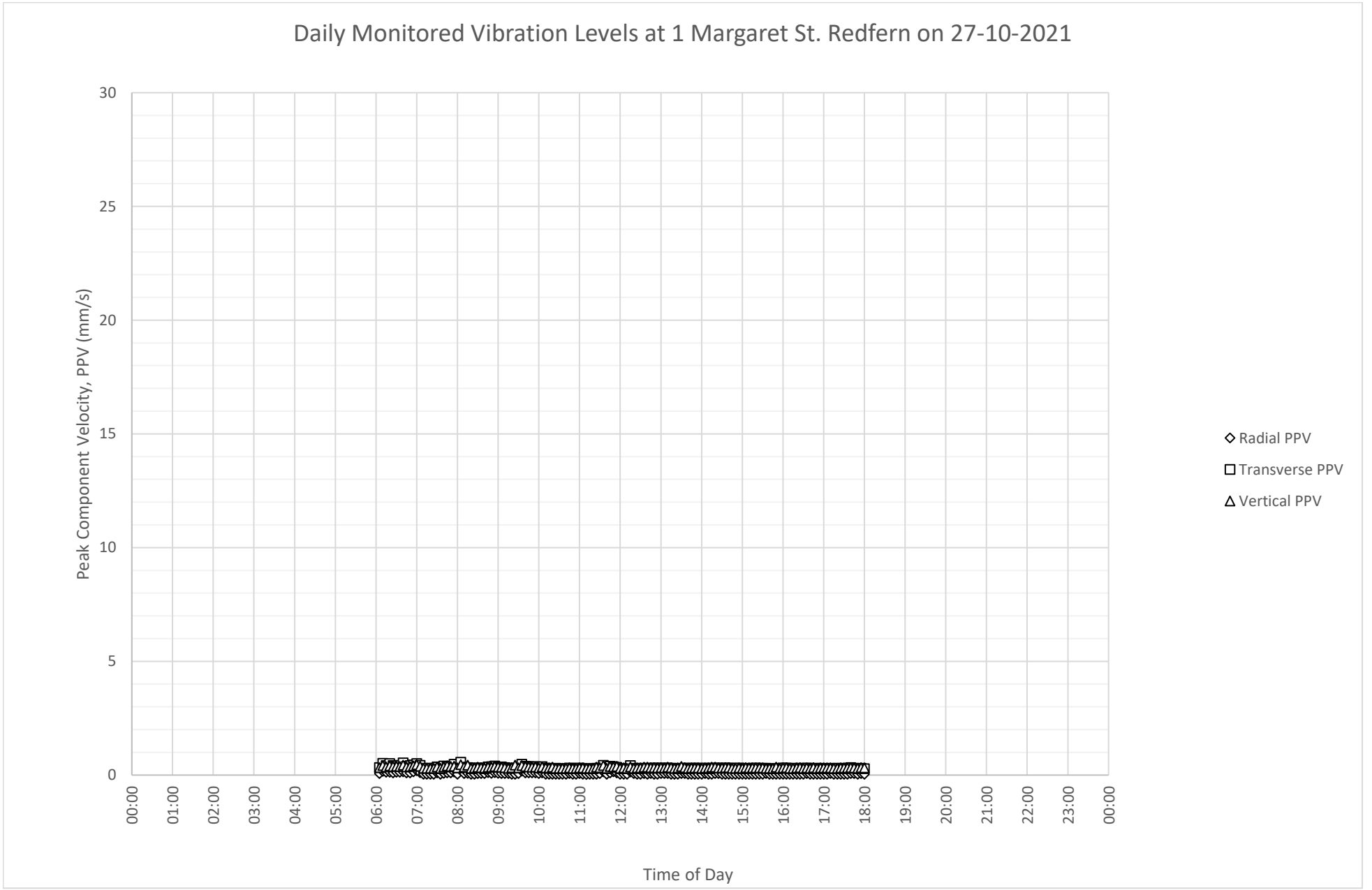

Frequency Content of Vibration Levels at 1 Margaret St. Redfern on 24-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential

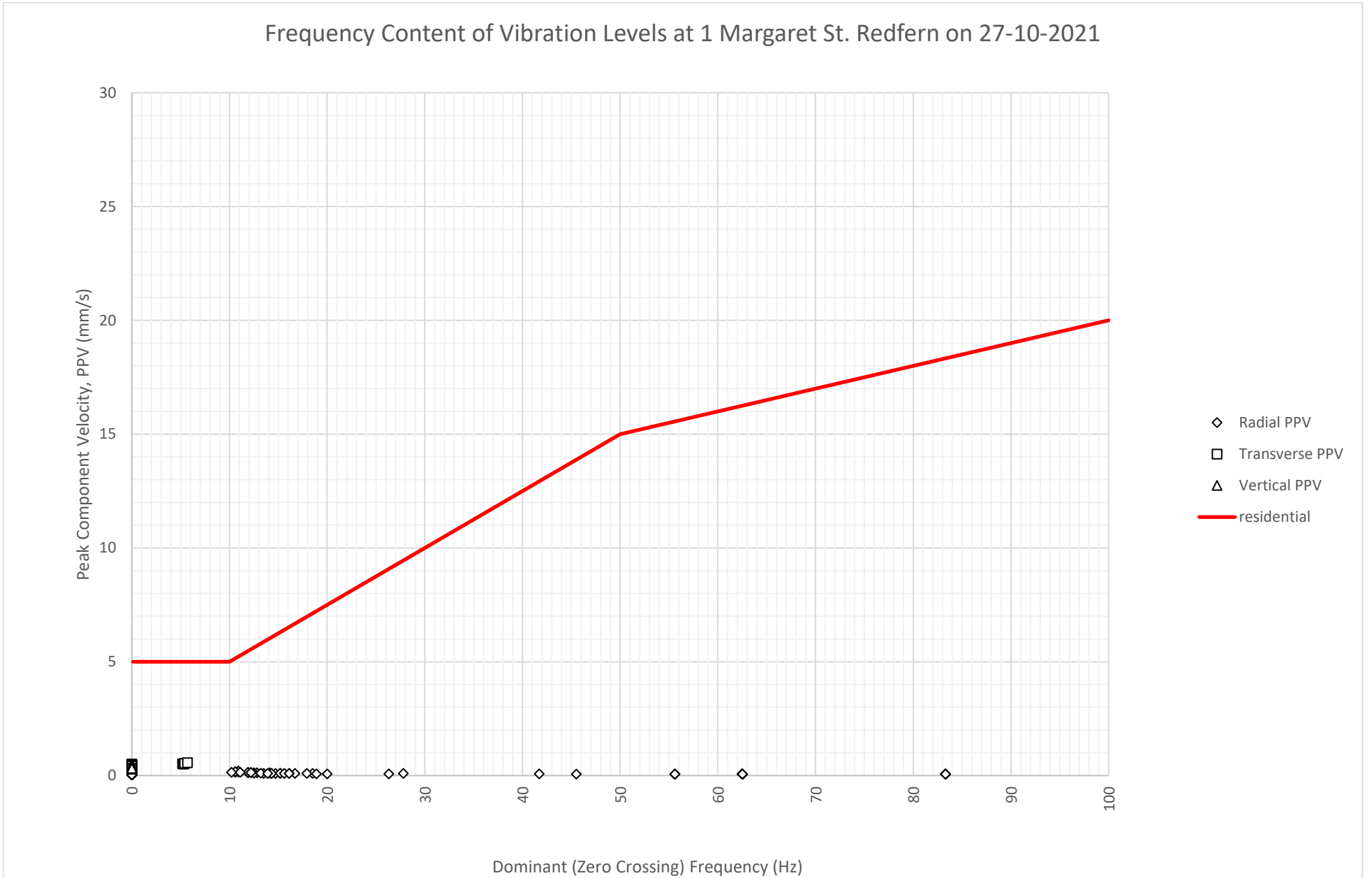

Daily Monitored Vibration Levels at 1 Margaret St. Redfern on 25-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

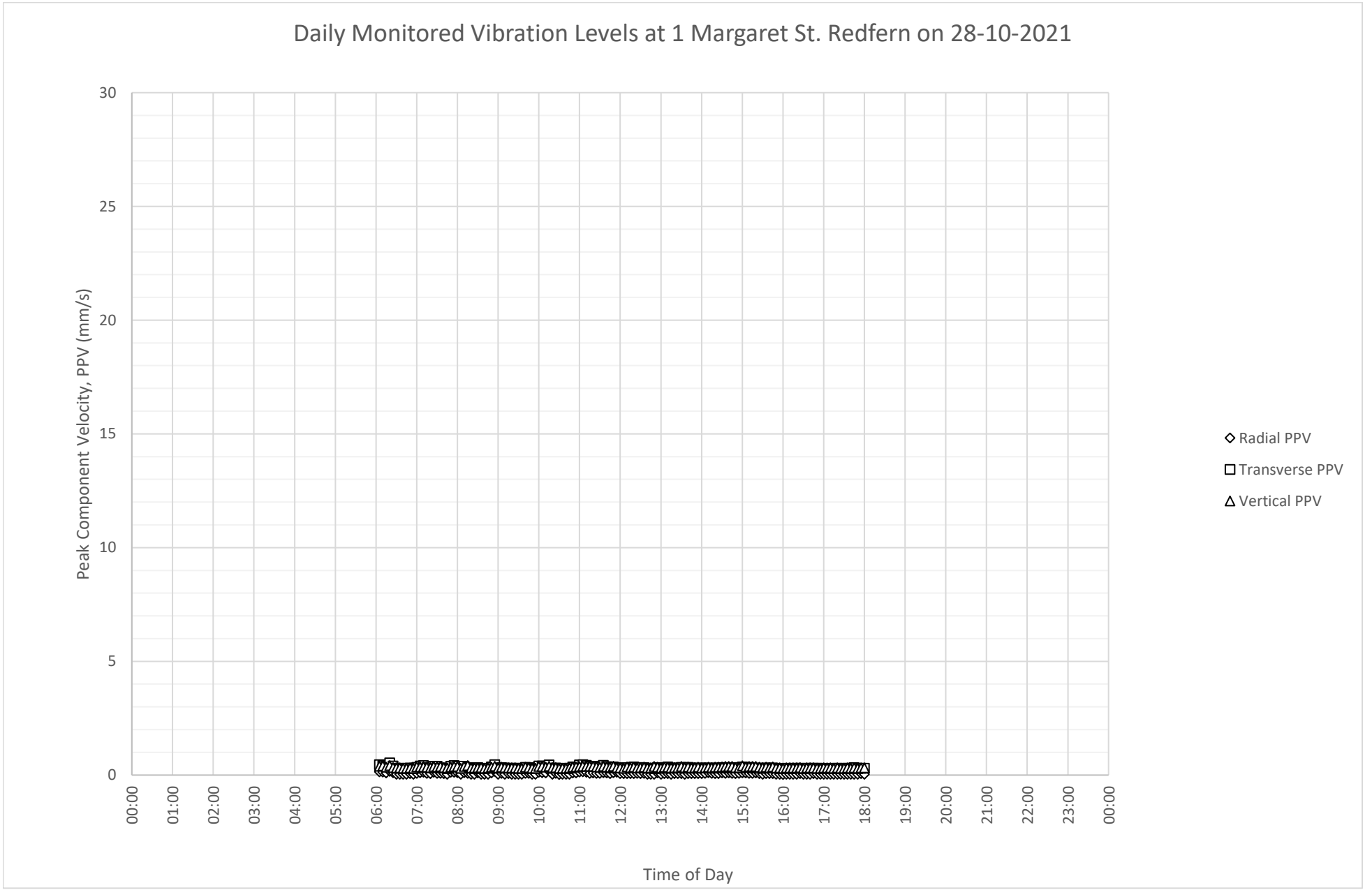

Frequency Content of Vibration Levels at 1 Margaret St. Redfern on 25-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential


Daily Monitored Vibration Levels at 1 Margaret St. Redfern on 26-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St. Redfern on 26-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential


Daily Monitored Vibration Levels at 1 Margaret St. Redfern on 27-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St. Redfern on 27-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential


Daily Monitored Vibration Levels at 1 Margaret St. Redfern on 28-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
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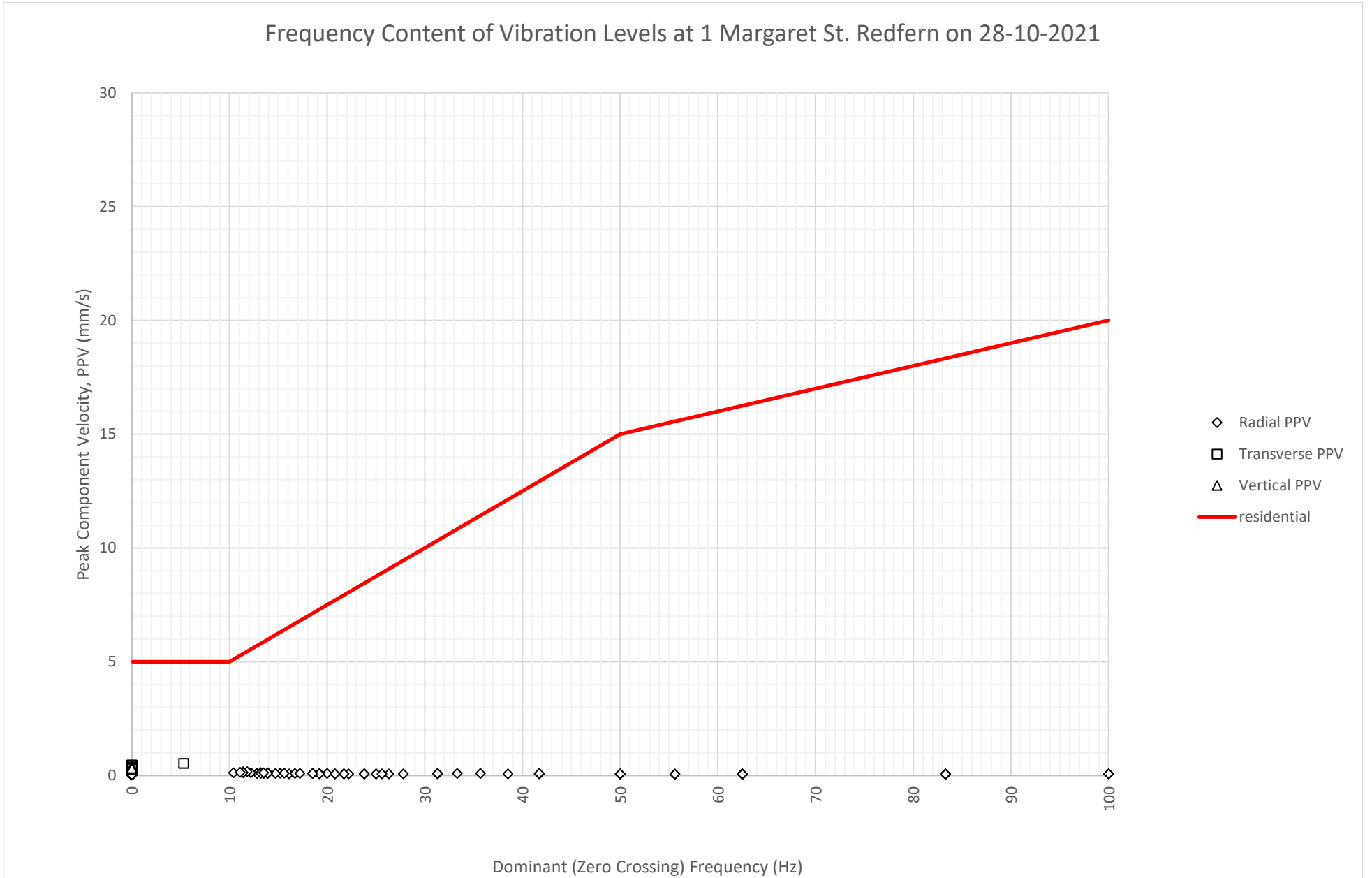
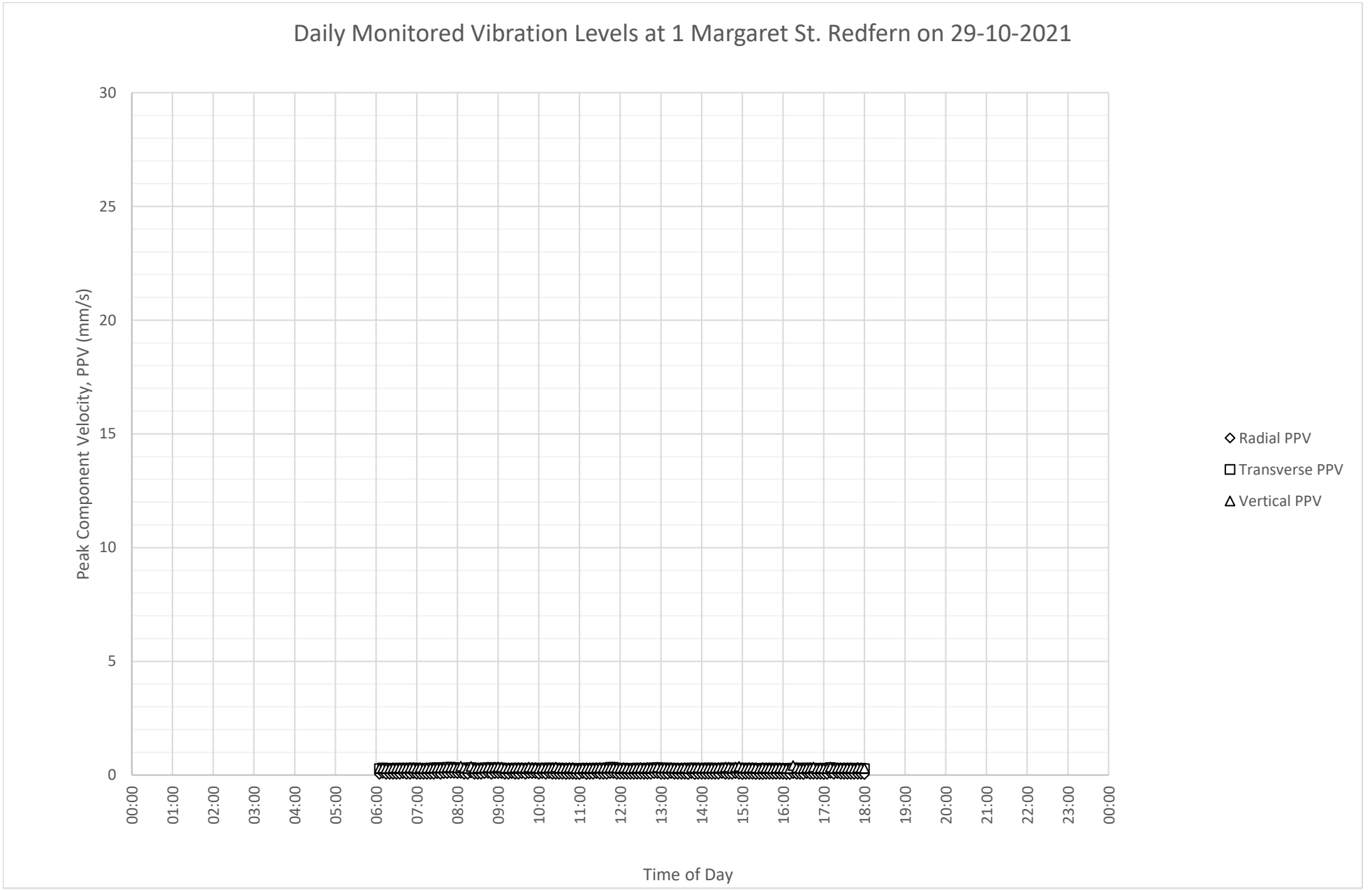
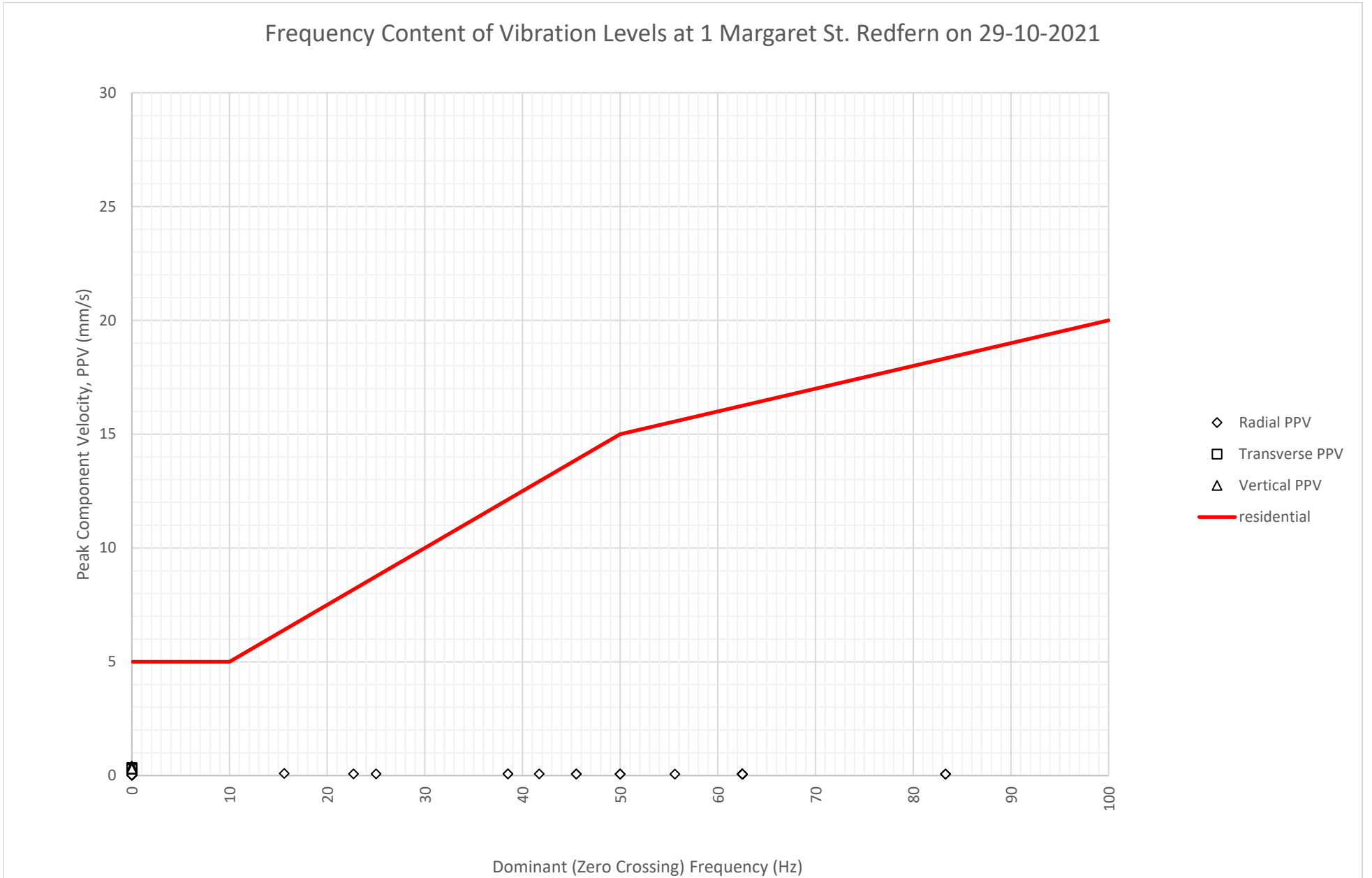
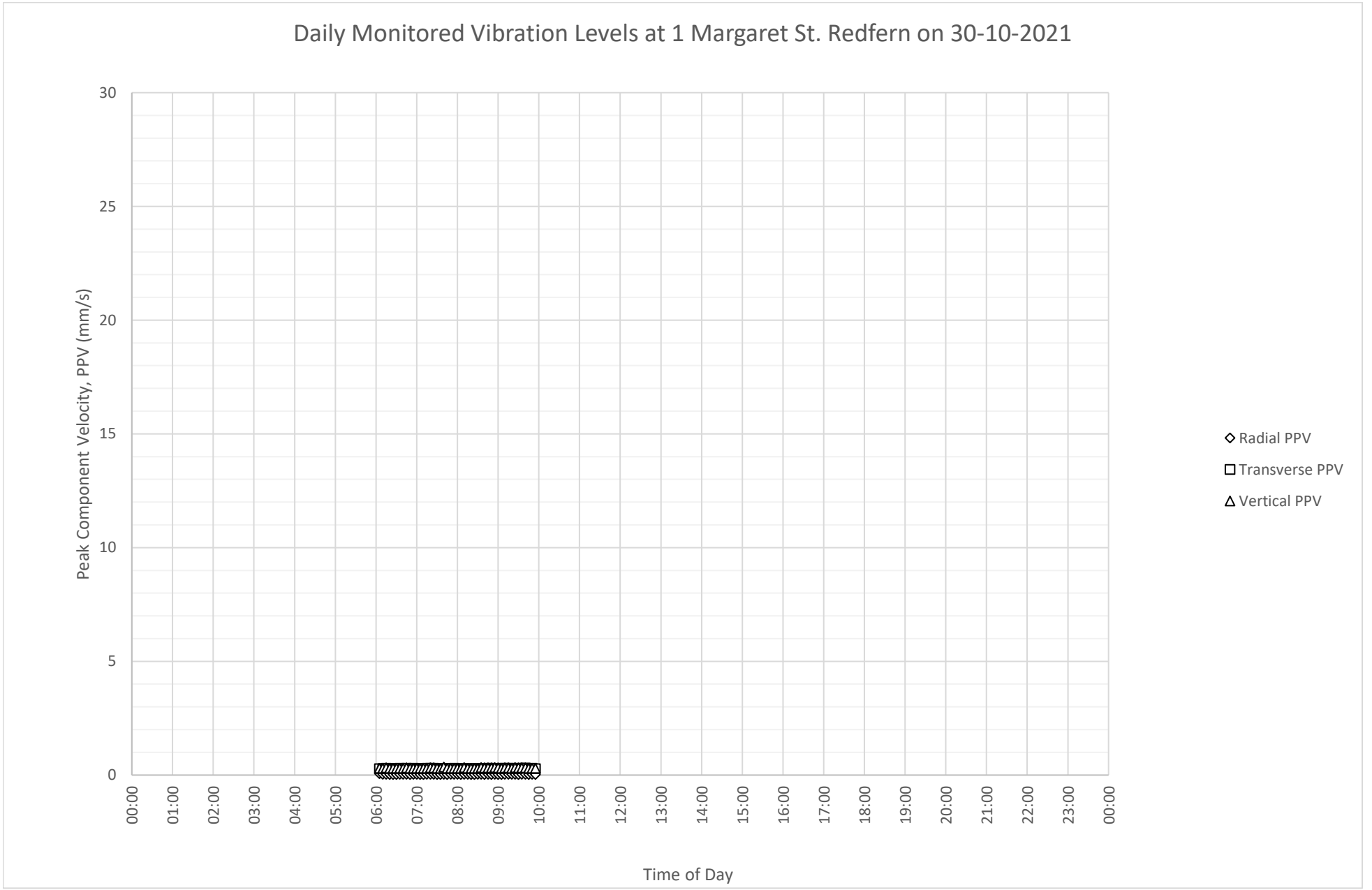
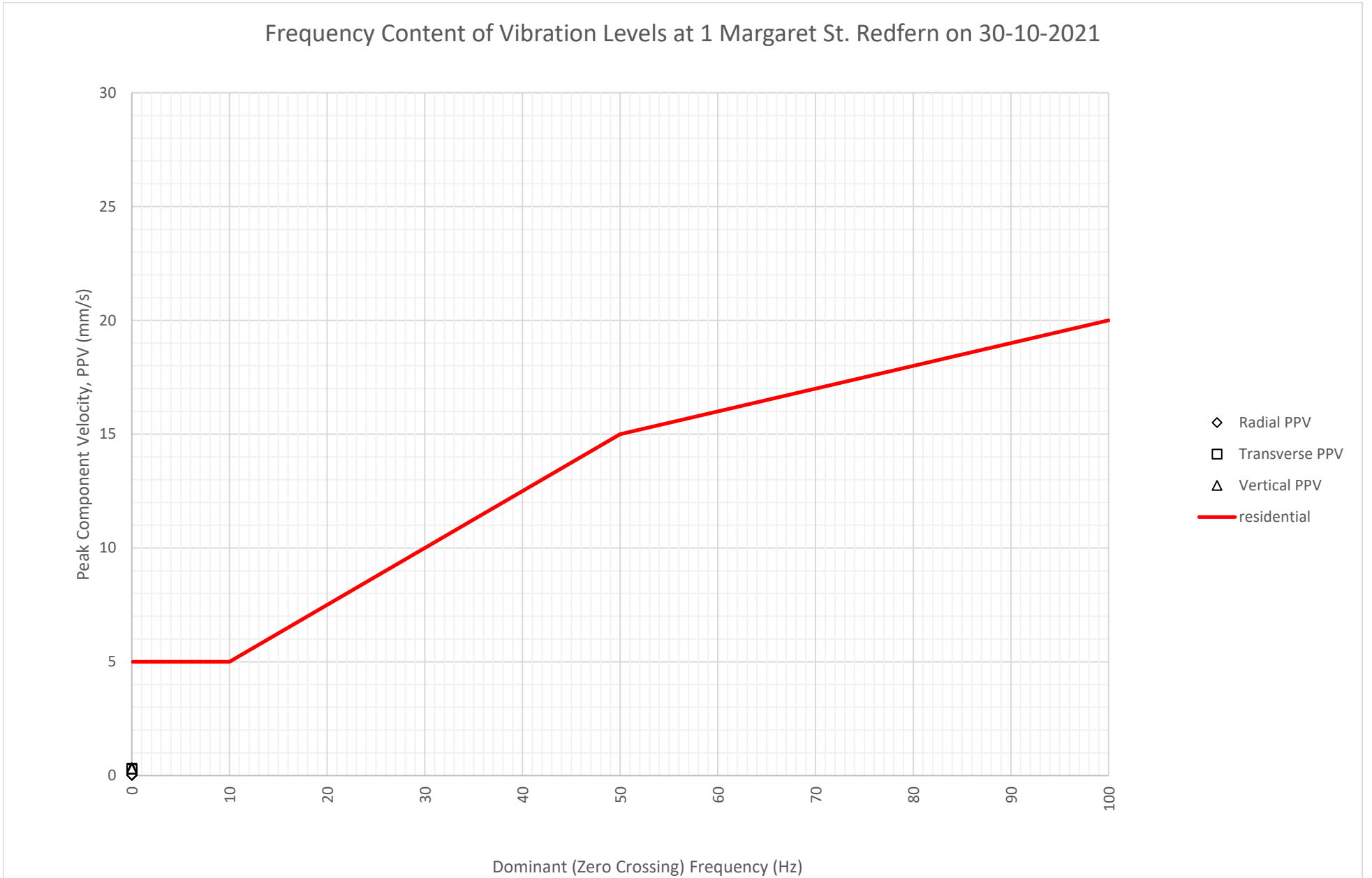
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

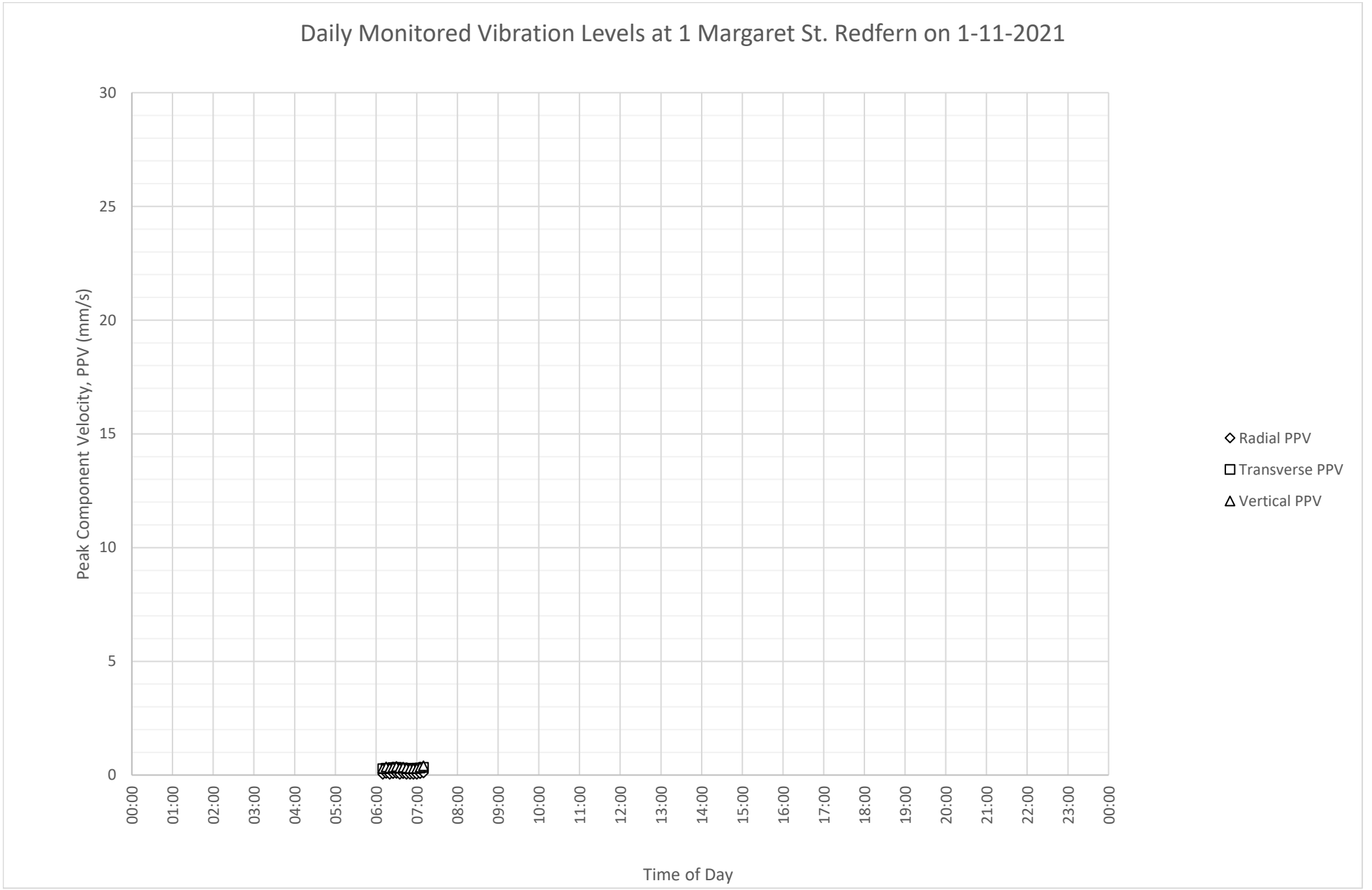

Frequency Content of Vibration Levels at 1 Margaret St. Redfern on 28-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential

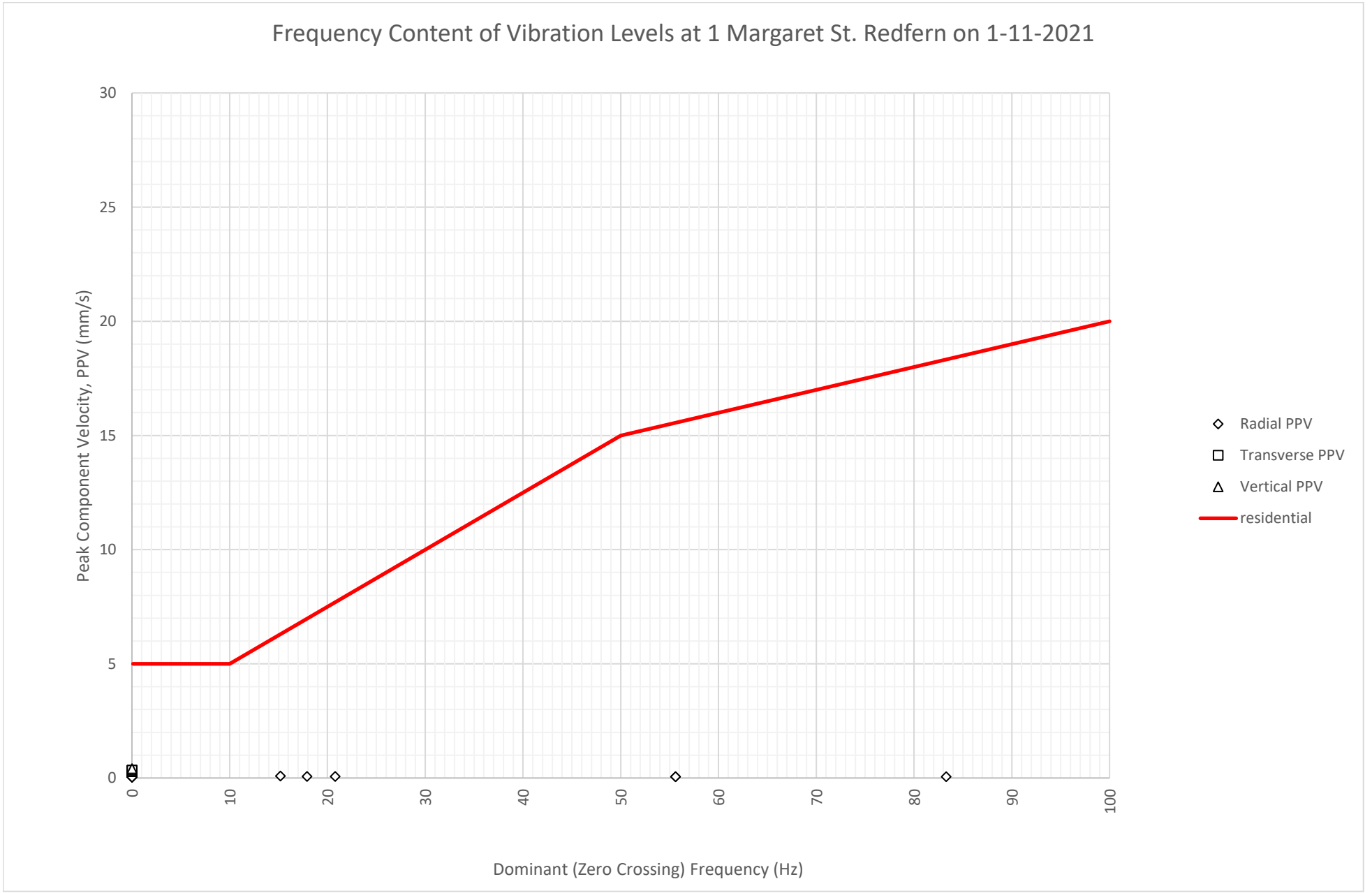

Daily Monitored Vibration Levels at 1 Margaret St. Redfern on 29-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at 1 Margaret St. Redfern on 29-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential

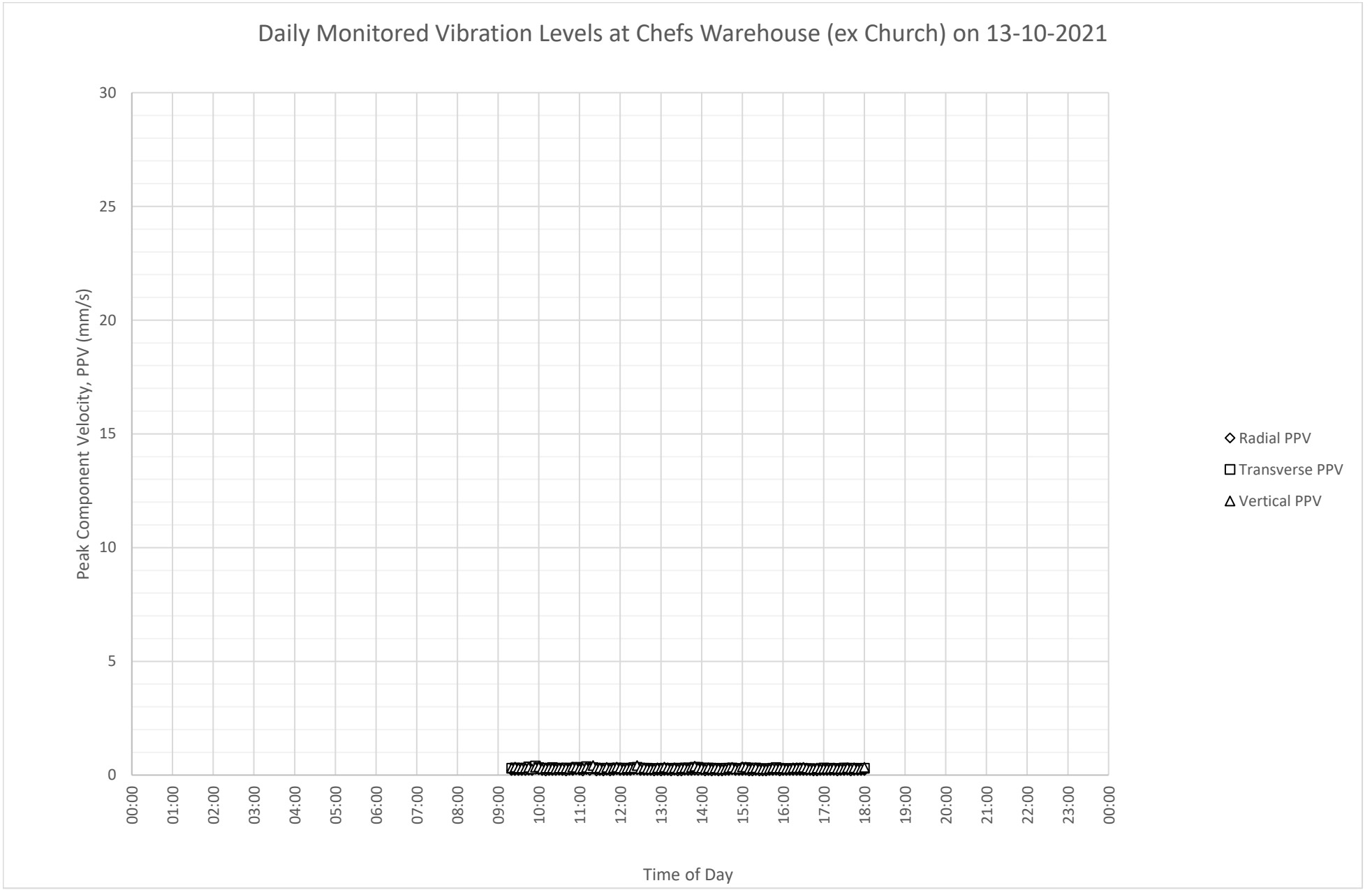

Daily Monitored Vibration Levels at 1 Margaret St. Redfern on 30-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

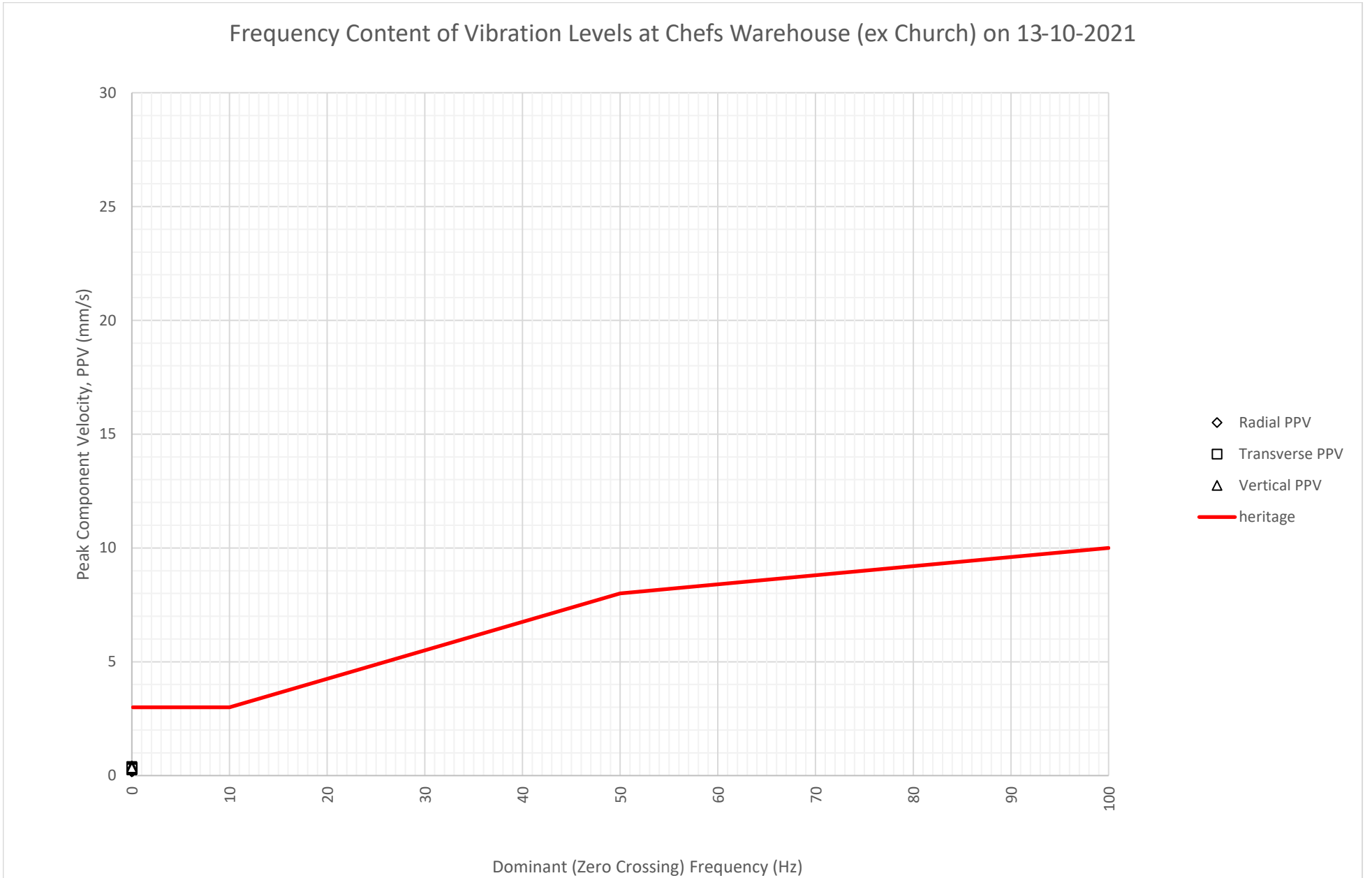

Frequency Content of Vibration Levels at 1 Margaret St. Redfern on 30-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential

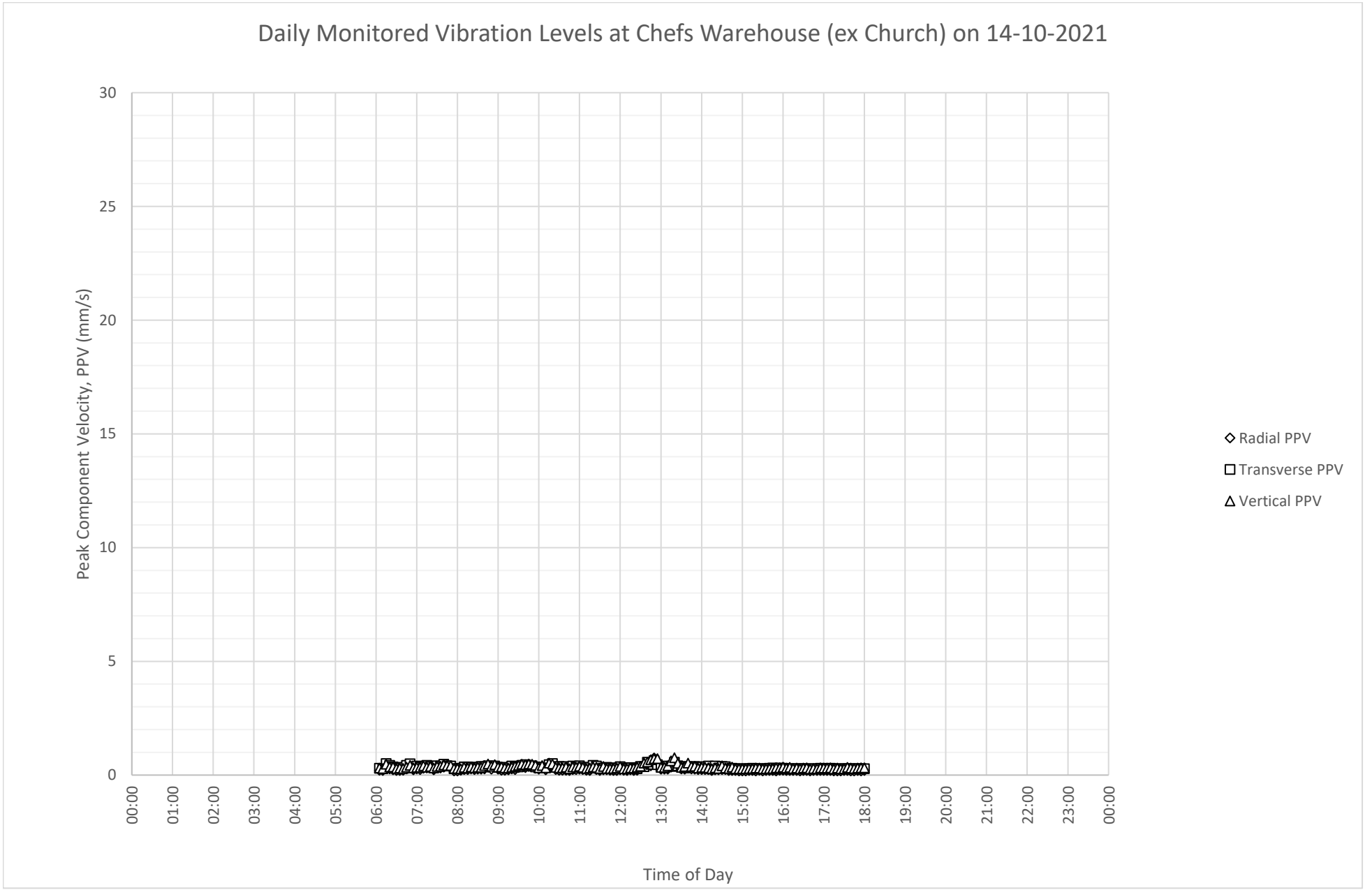

Daily Monitored Vibration Levels at 1 Margaret St. Redfern on 1-11-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

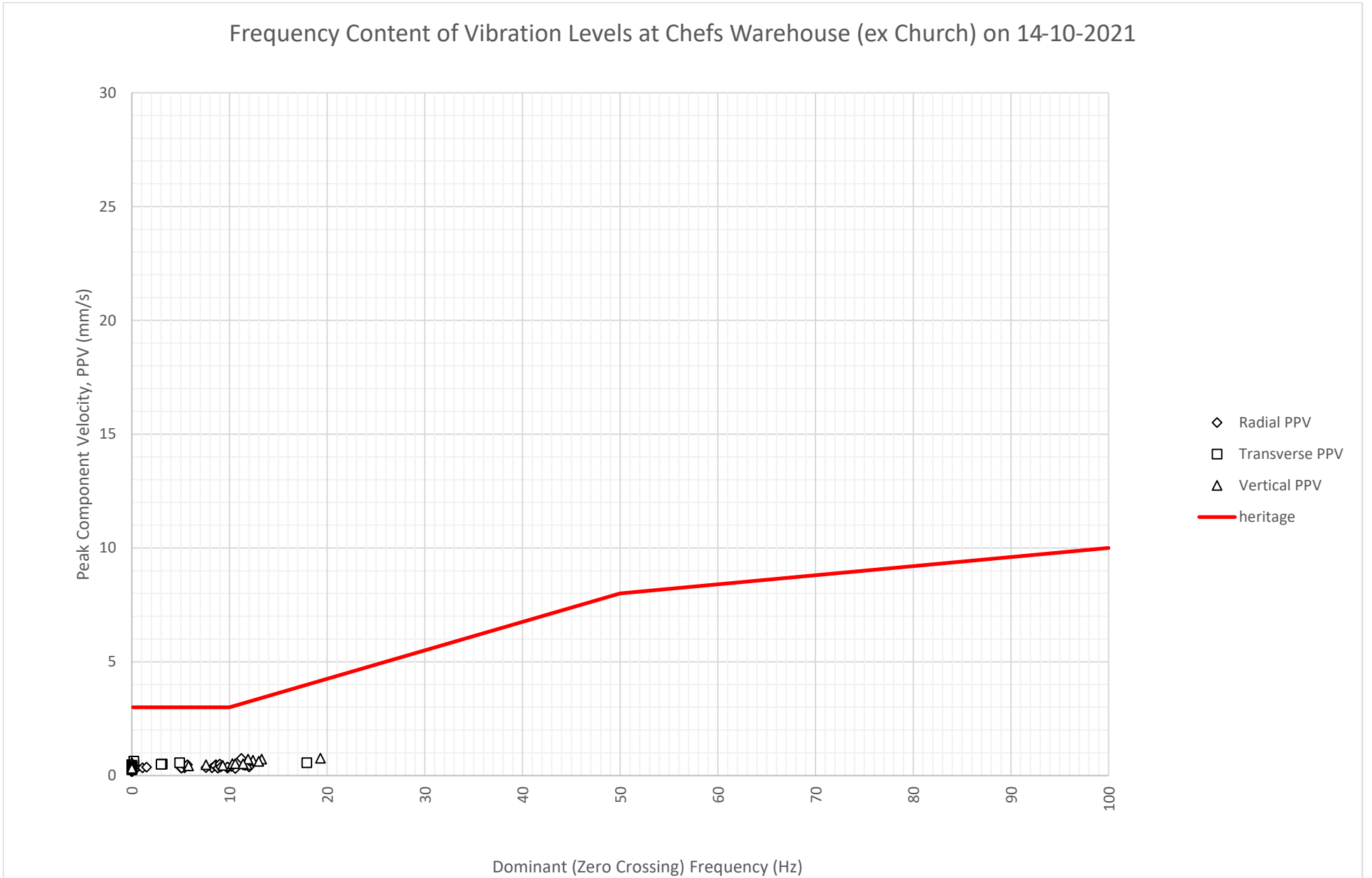

Frequency Content of Vibration Levels at 1 Margaret St. Redfern on 1-11-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
residential

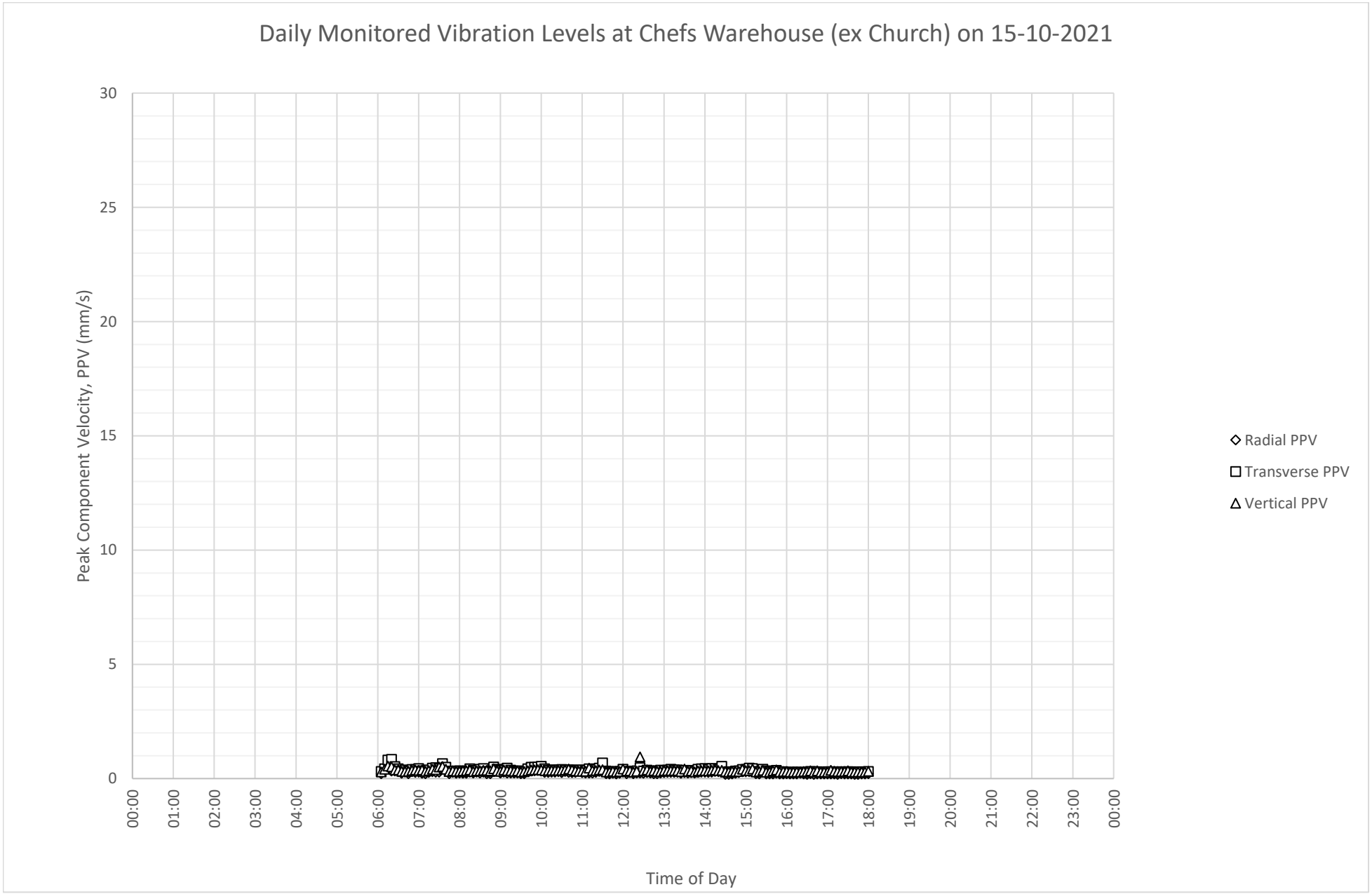
APPENDIX 2 – VIBRATION MONITORING DATA – RECEIVER 2-EX CHURCH

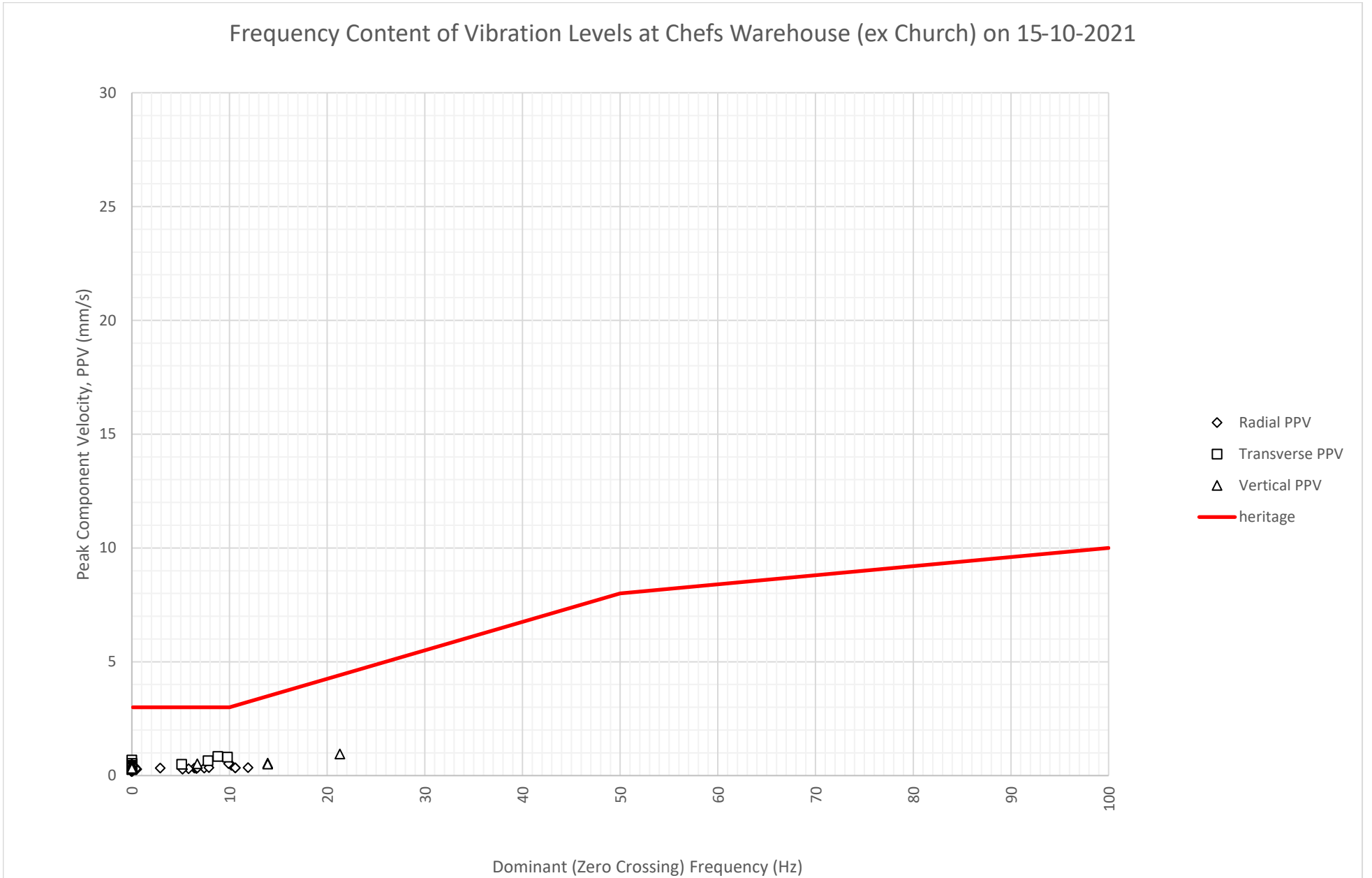

Daily Monitored Vibration Levels at Chefs Warehouse (ex Church) on 13-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

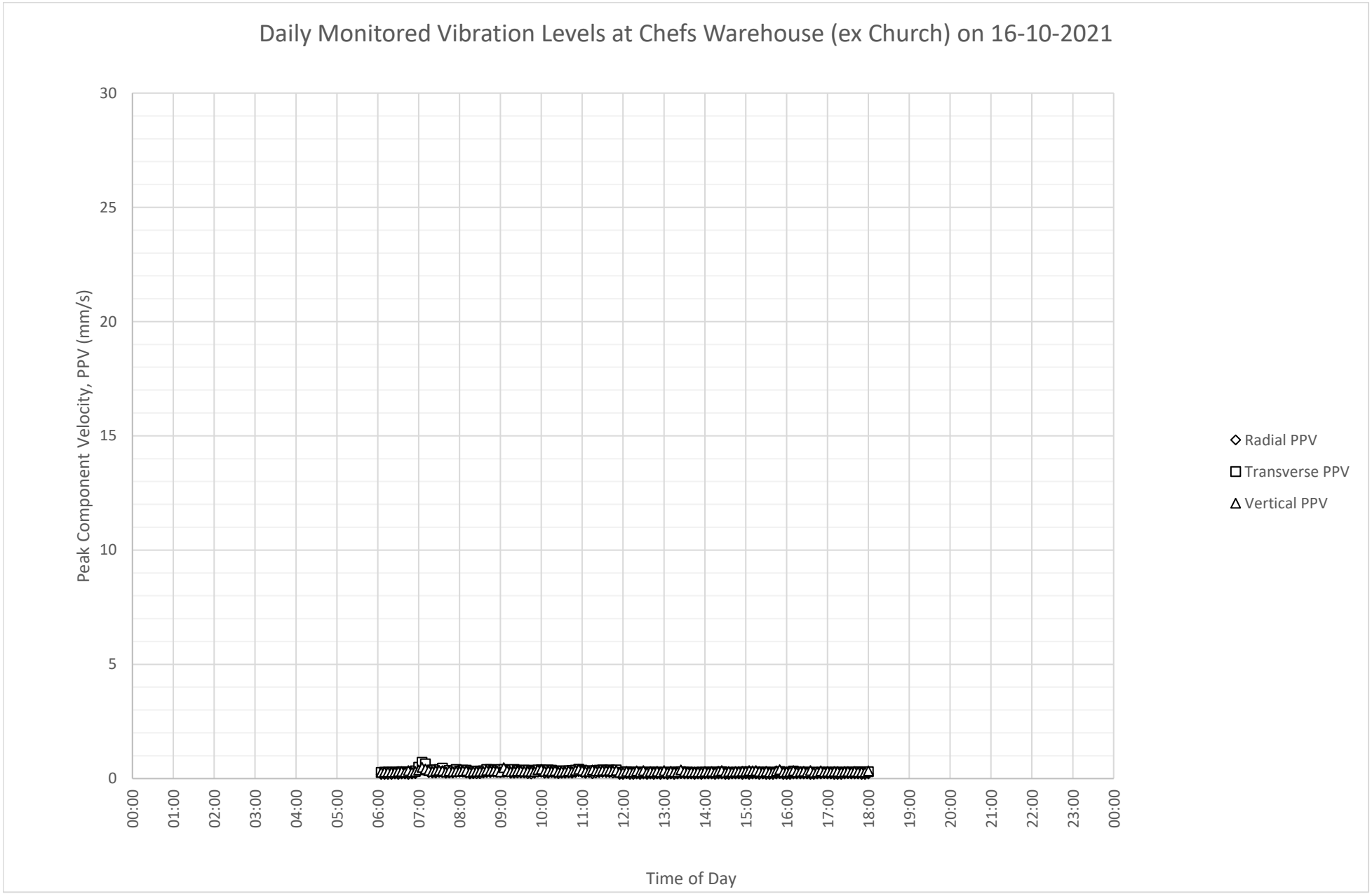

Frequency Content of Vibration Levels at Chefs Warehouse (ex Church) on 13-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage

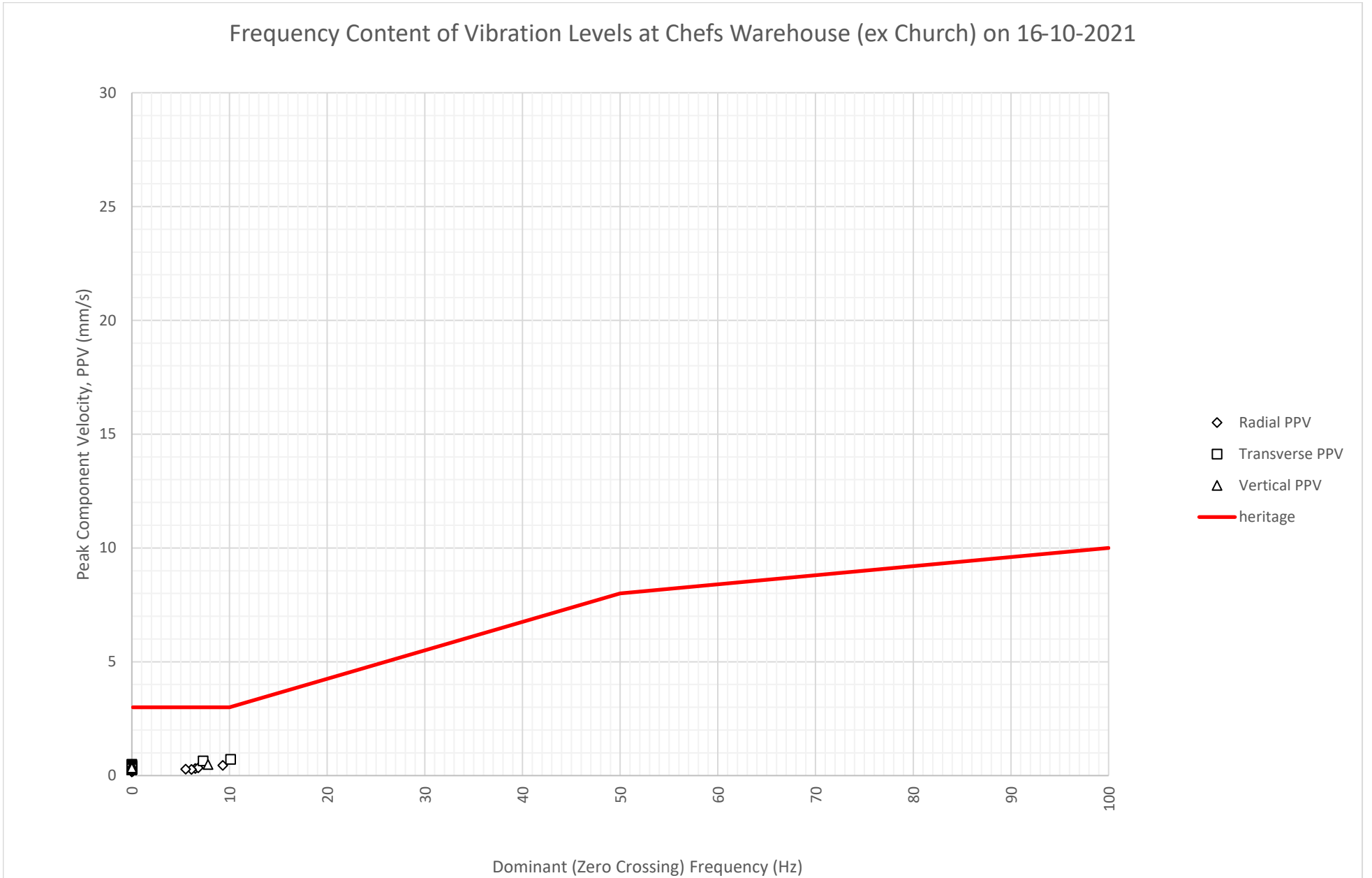

Daily Monitored Vibration Levels at Chefs Warehouse (ex Church) on 14-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

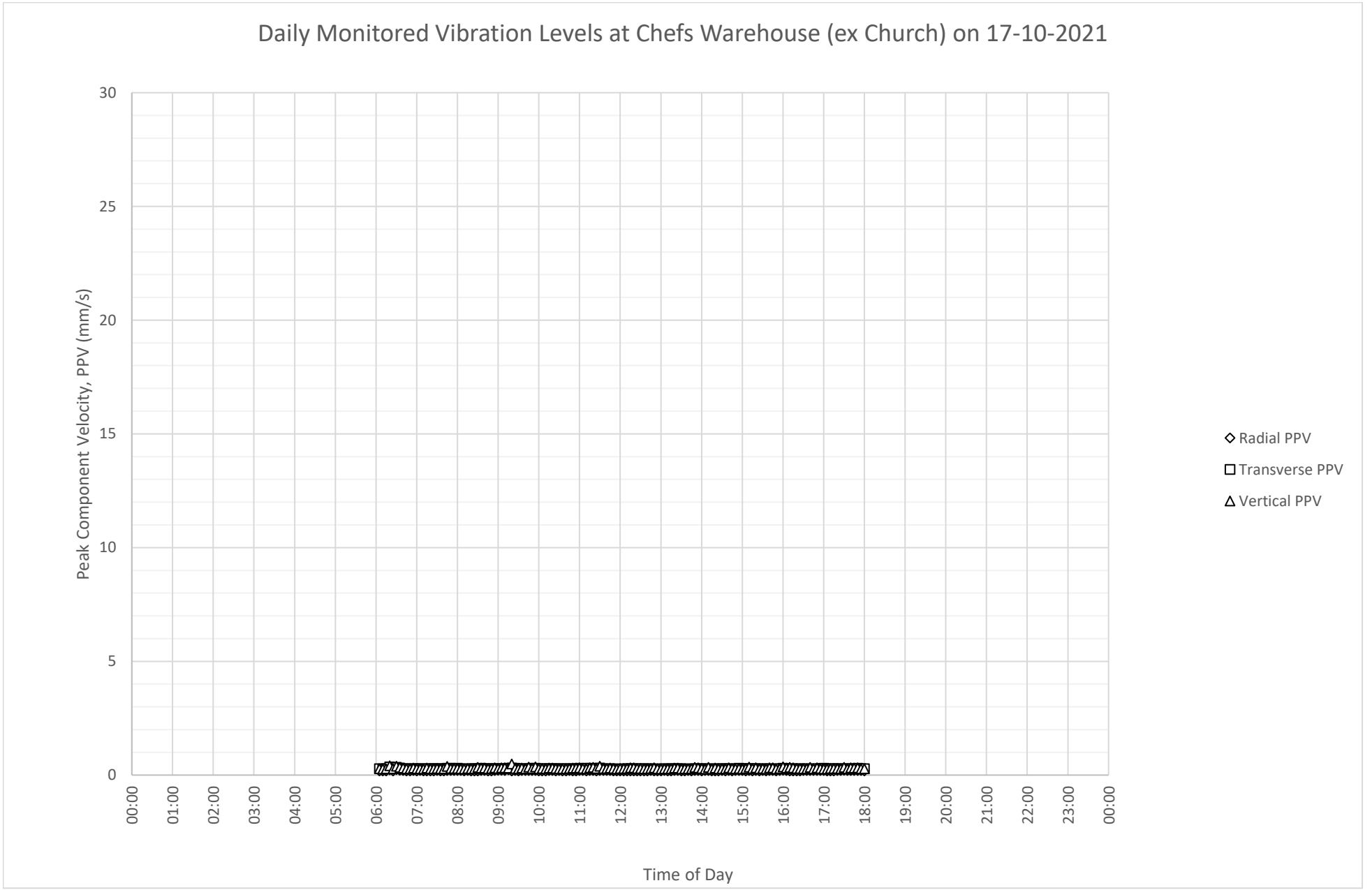

Frequency Content of Vibration Levels at Chefs Warehouse (ex Church) on 14-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage

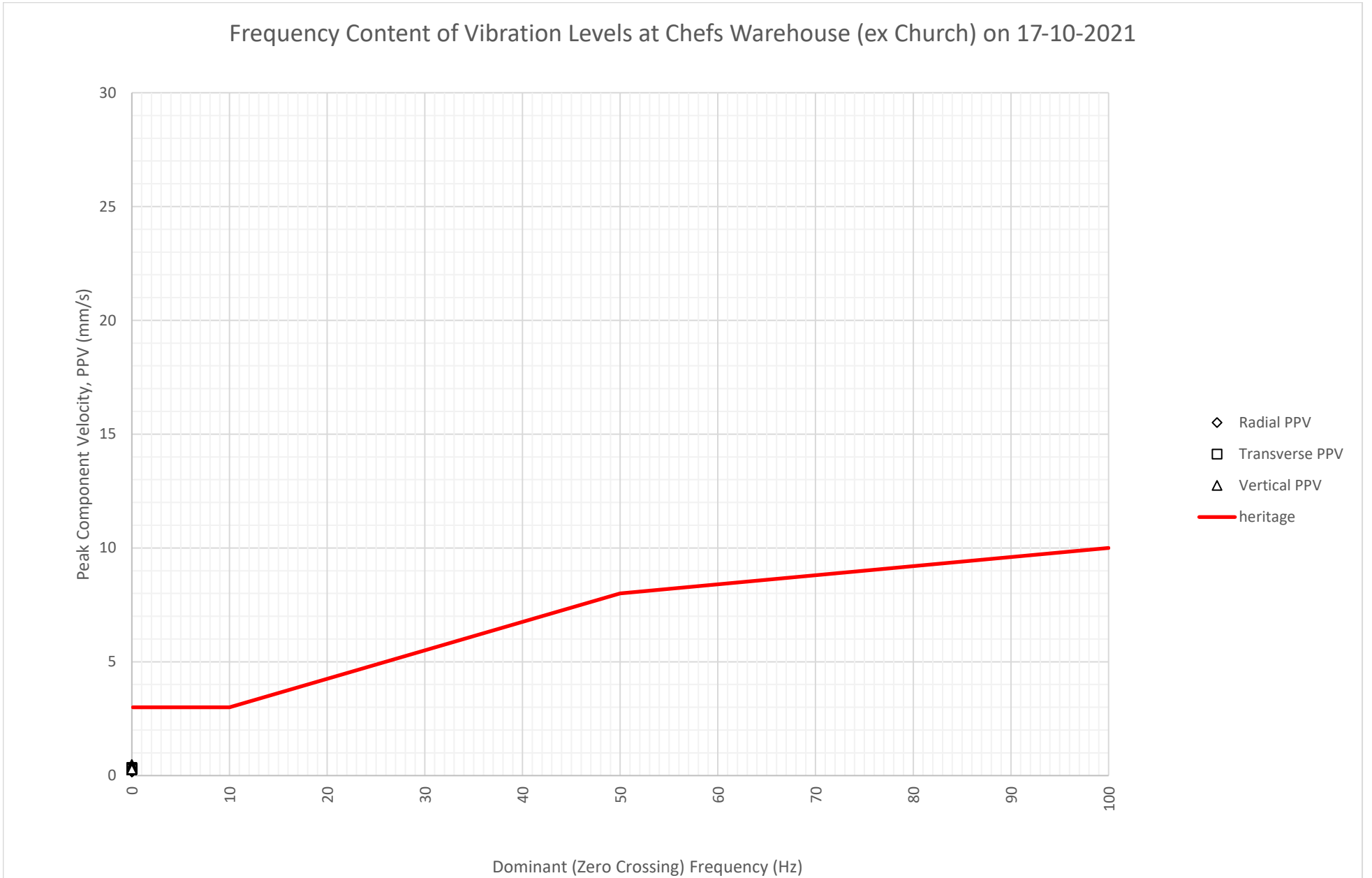

Daily Monitored Vibration Levels at Chefs Warehouse (ex Church) on 15-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

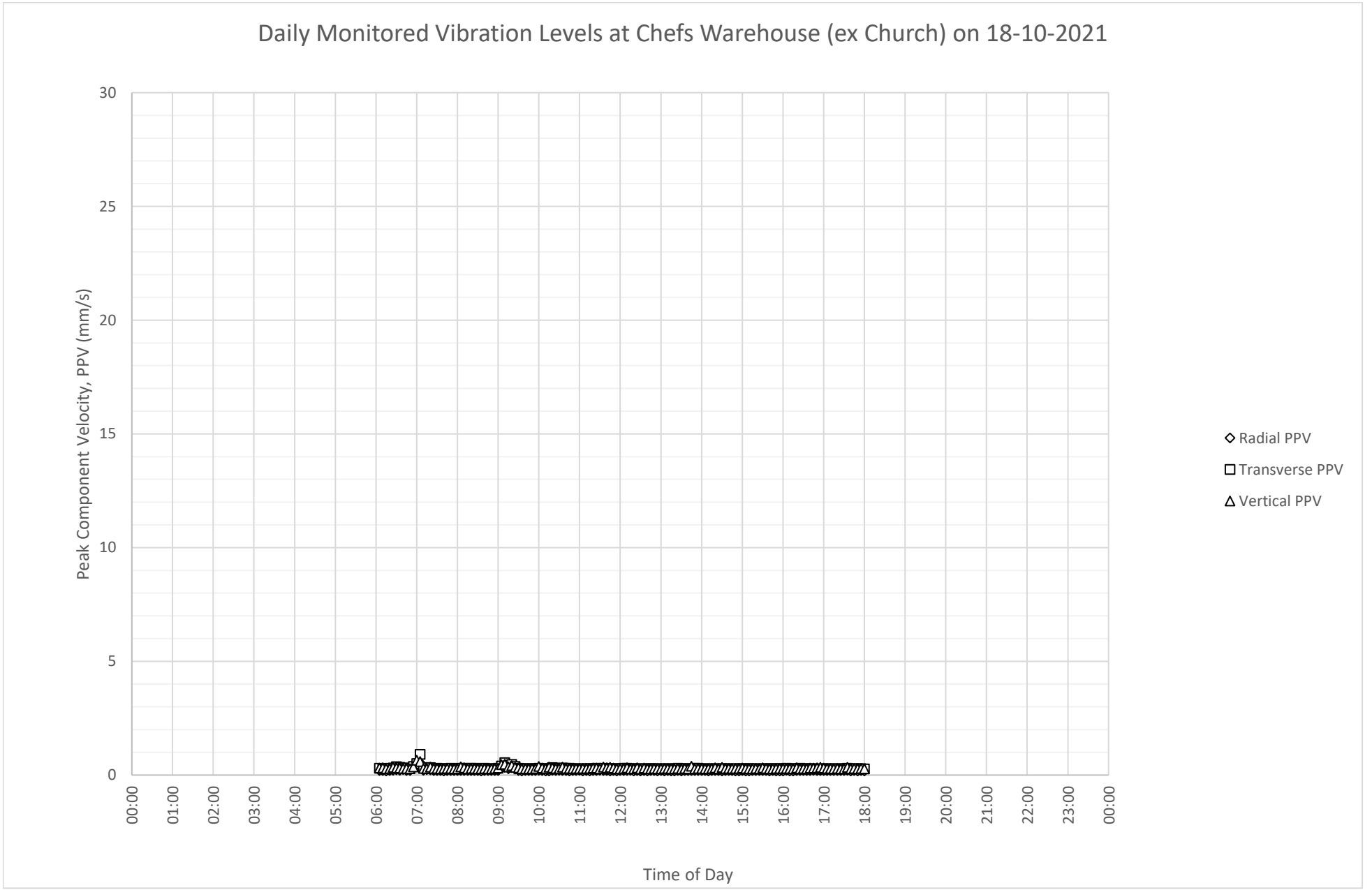

Frequency Content of Vibration Levels at Chefs Warehouse (ex Church) on 15-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage

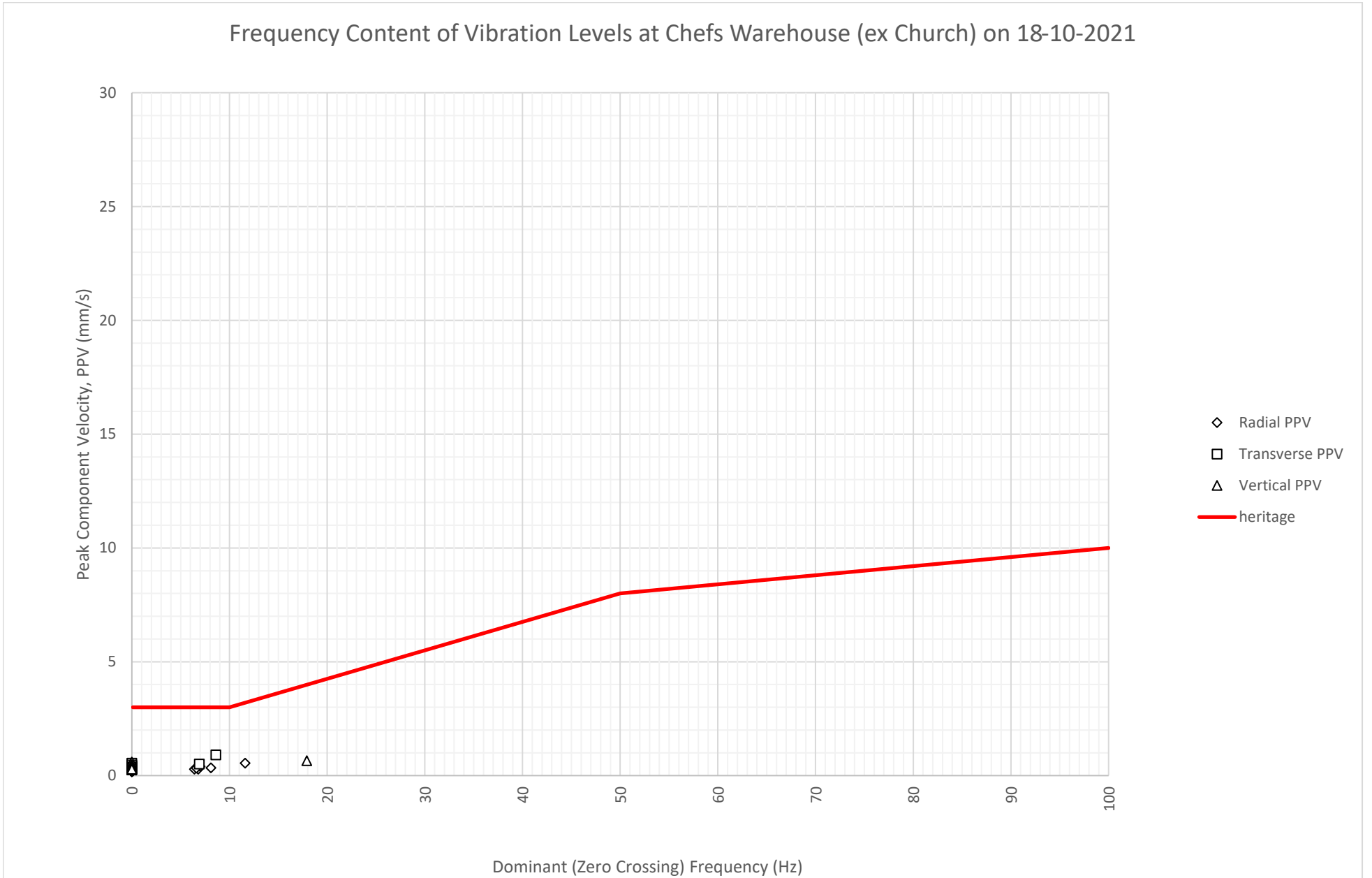

Daily Monitored Vibration Levels at Chefs Warehouse (ex Church) on 16-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

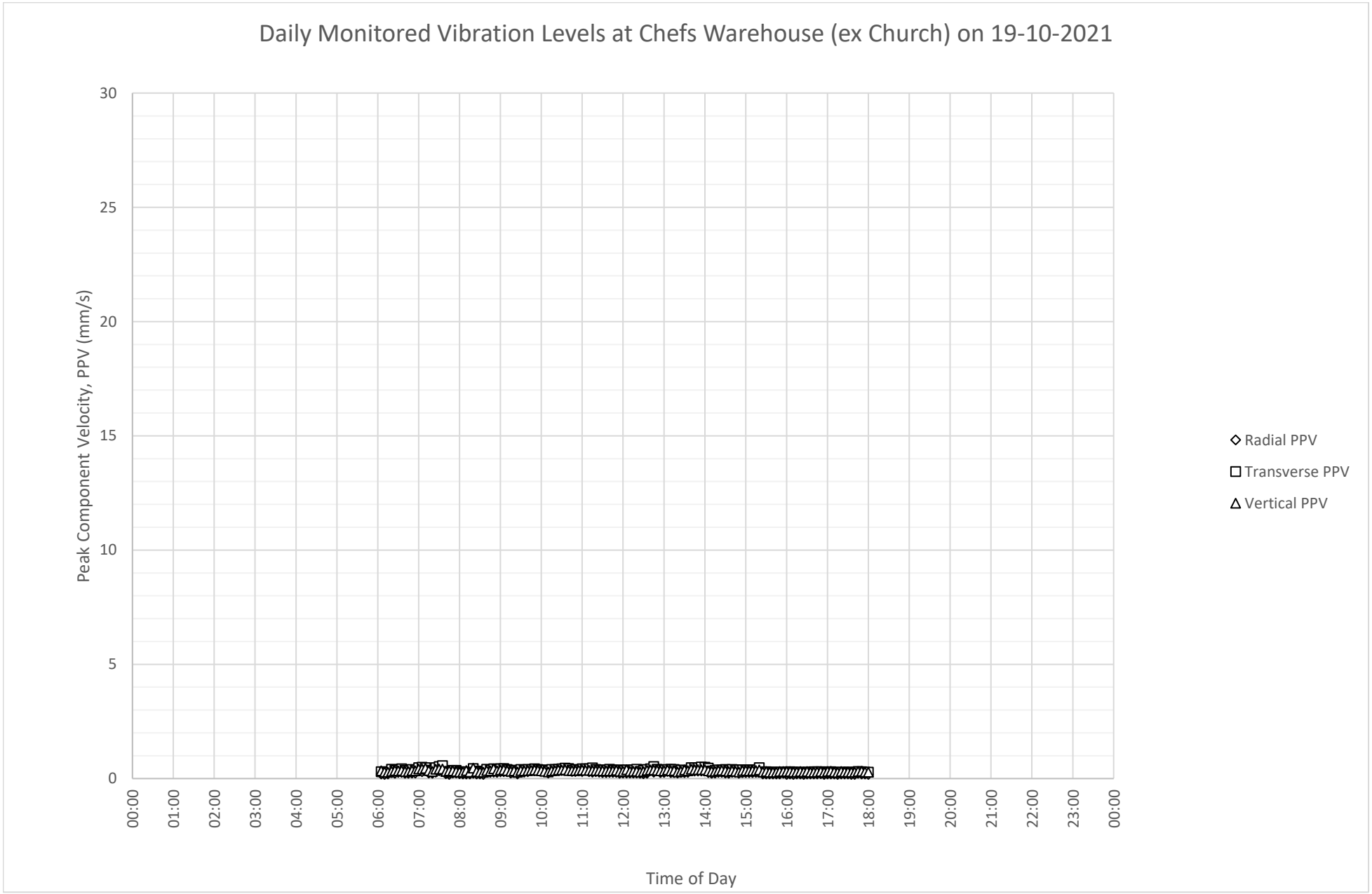

Frequency Content of Vibration Levels at Chefs Warehouse (ex Church) on 16-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage

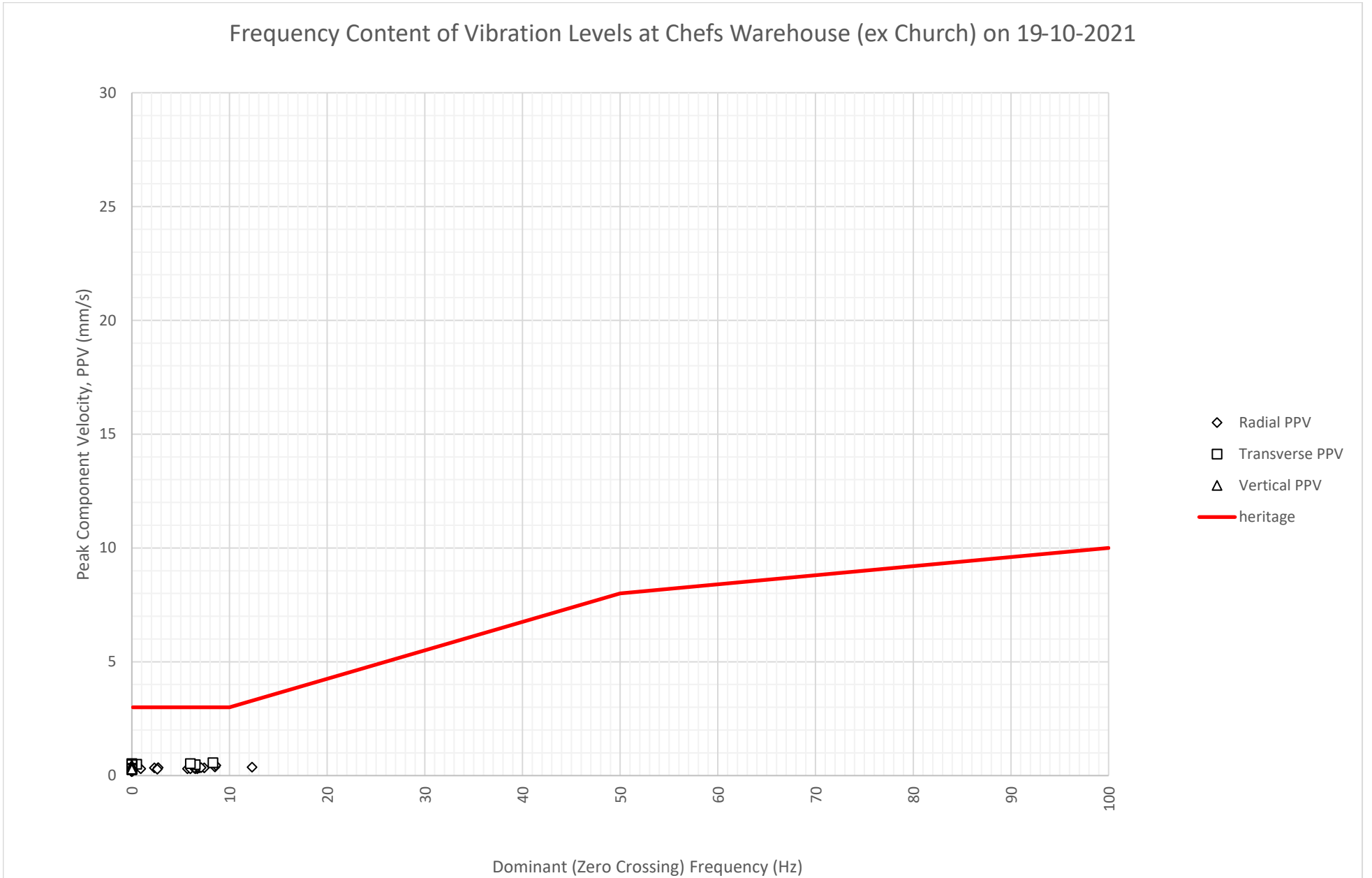

Daily Monitored Vibration Levels at Chefs Warehouse (ex Church) on 17-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

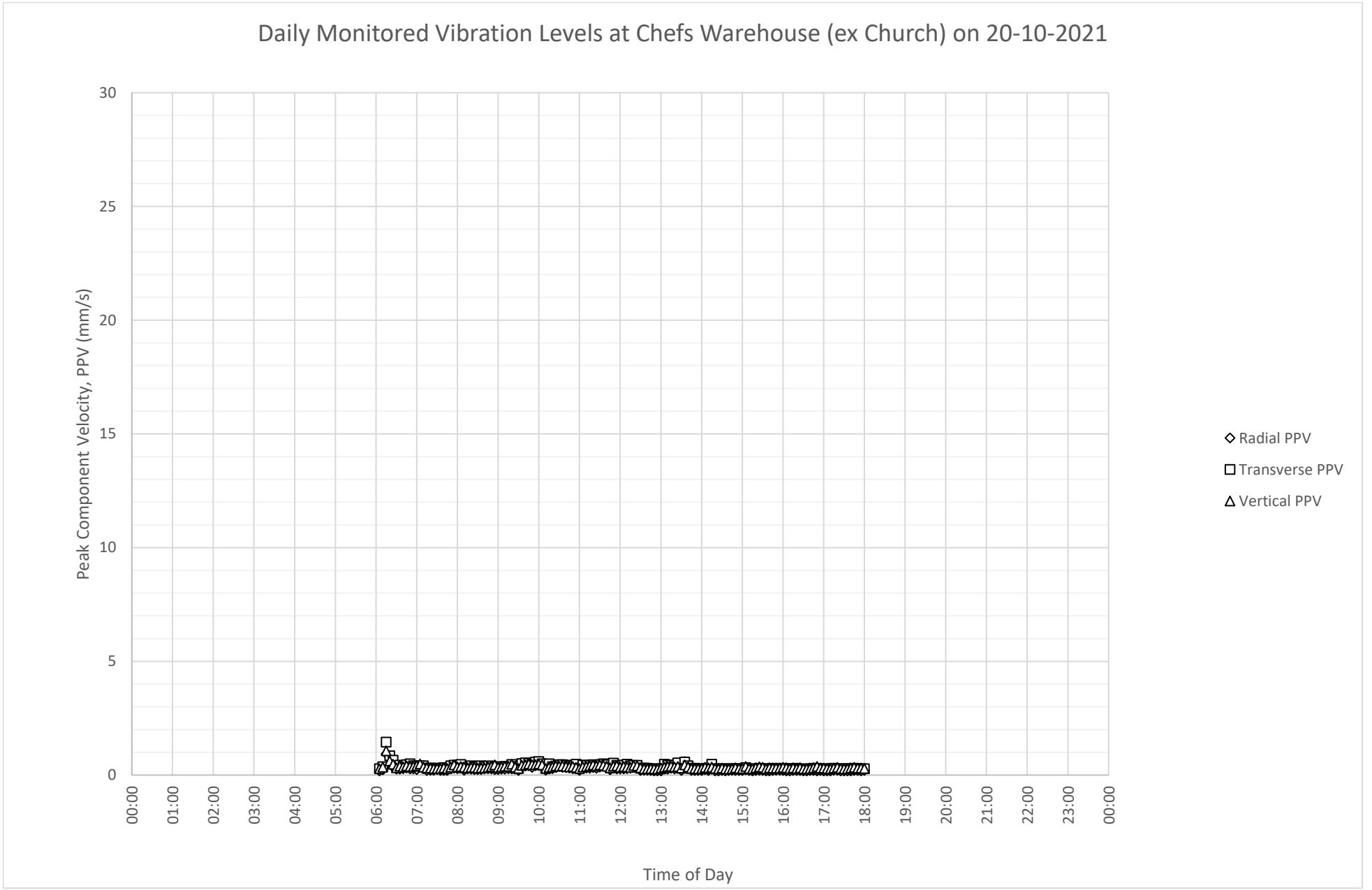

Frequency Content of Vibration Levels at Chefs Warehouse (ex Church) on 17-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage

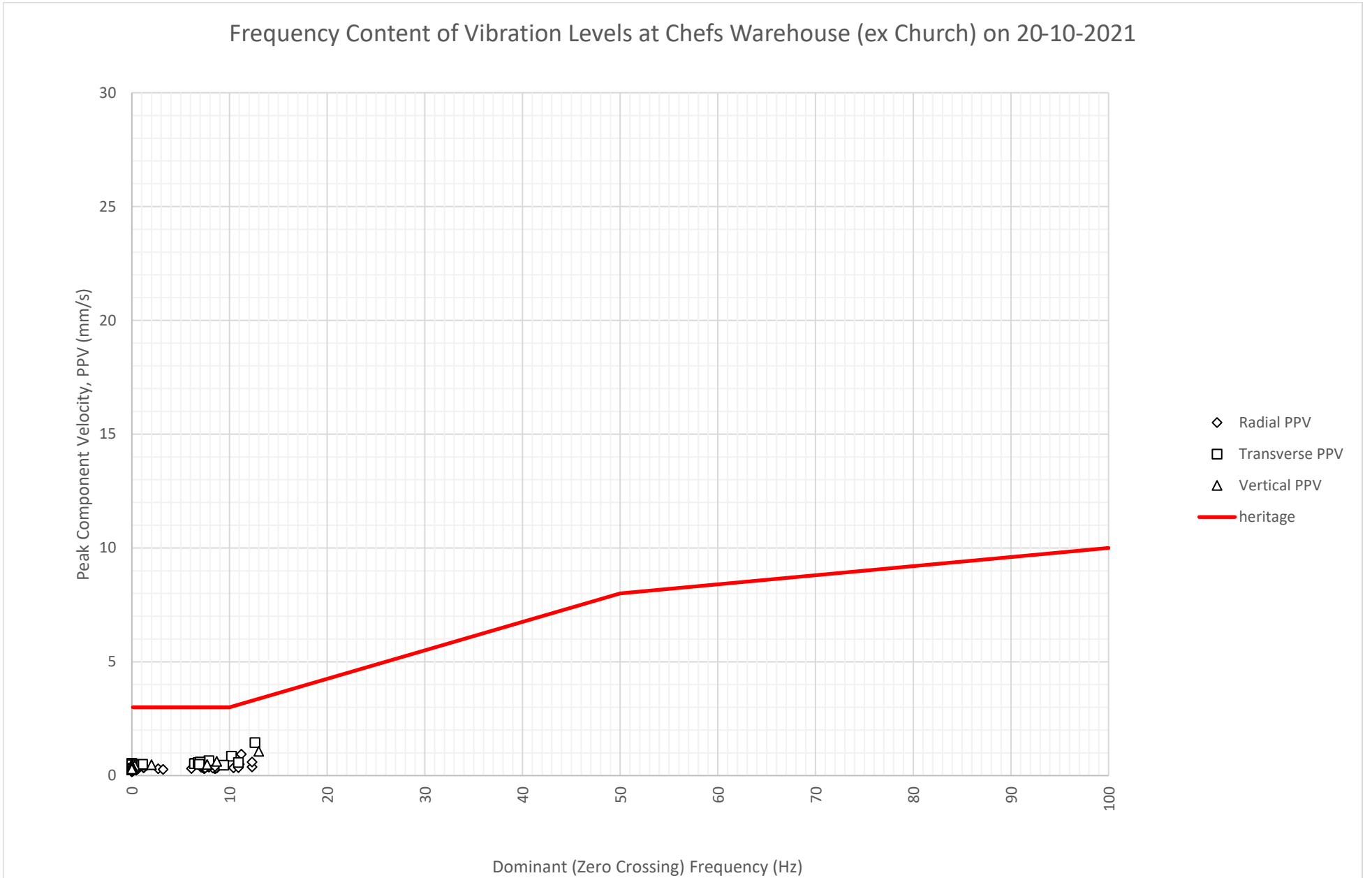

Daily Monitored Vibration Levels at Chefs Warehouse (ex Church) on 18-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

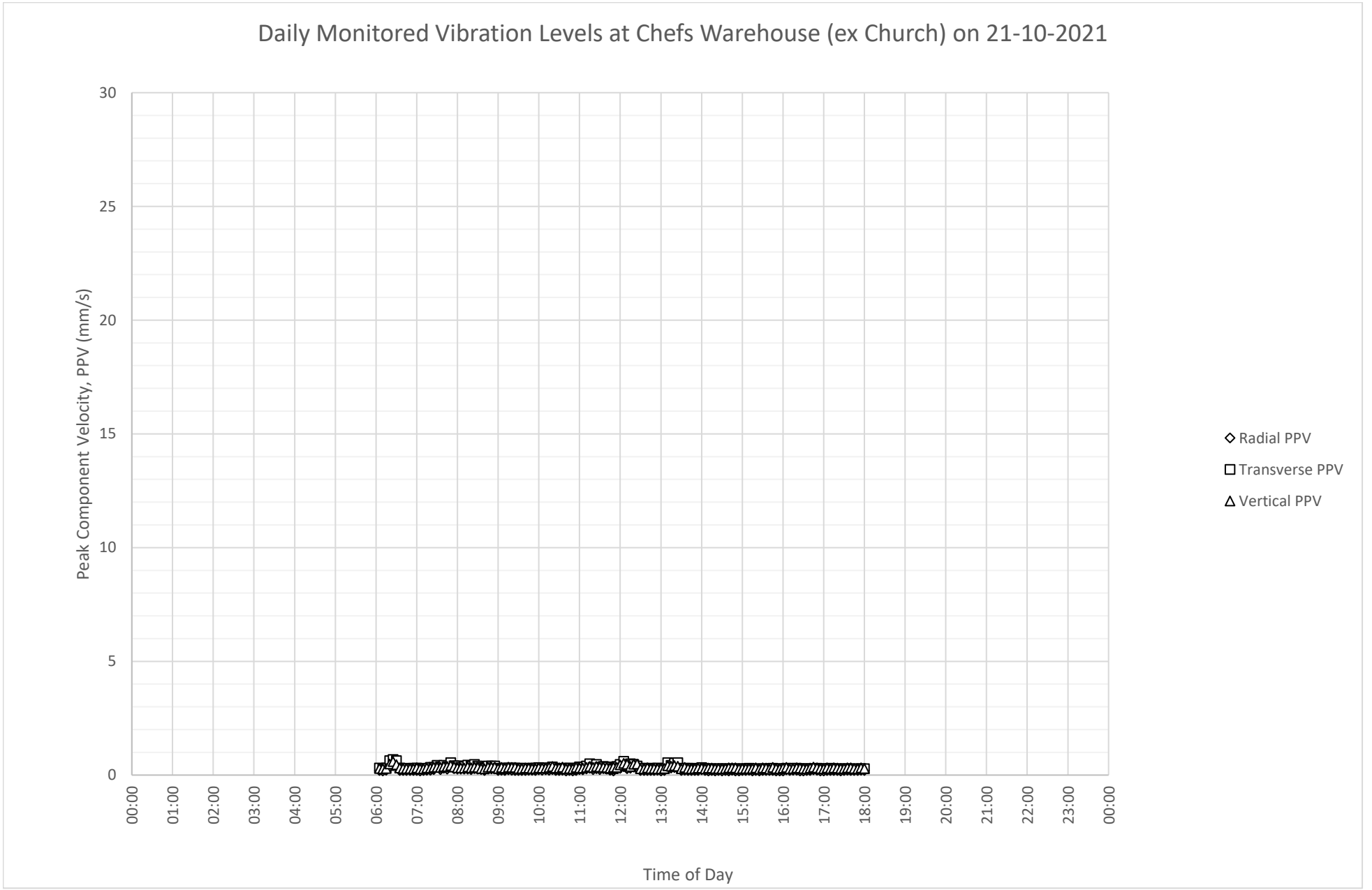

Frequency Content of Vibration Levels at Chefs Warehouse (ex Church) on 18-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage

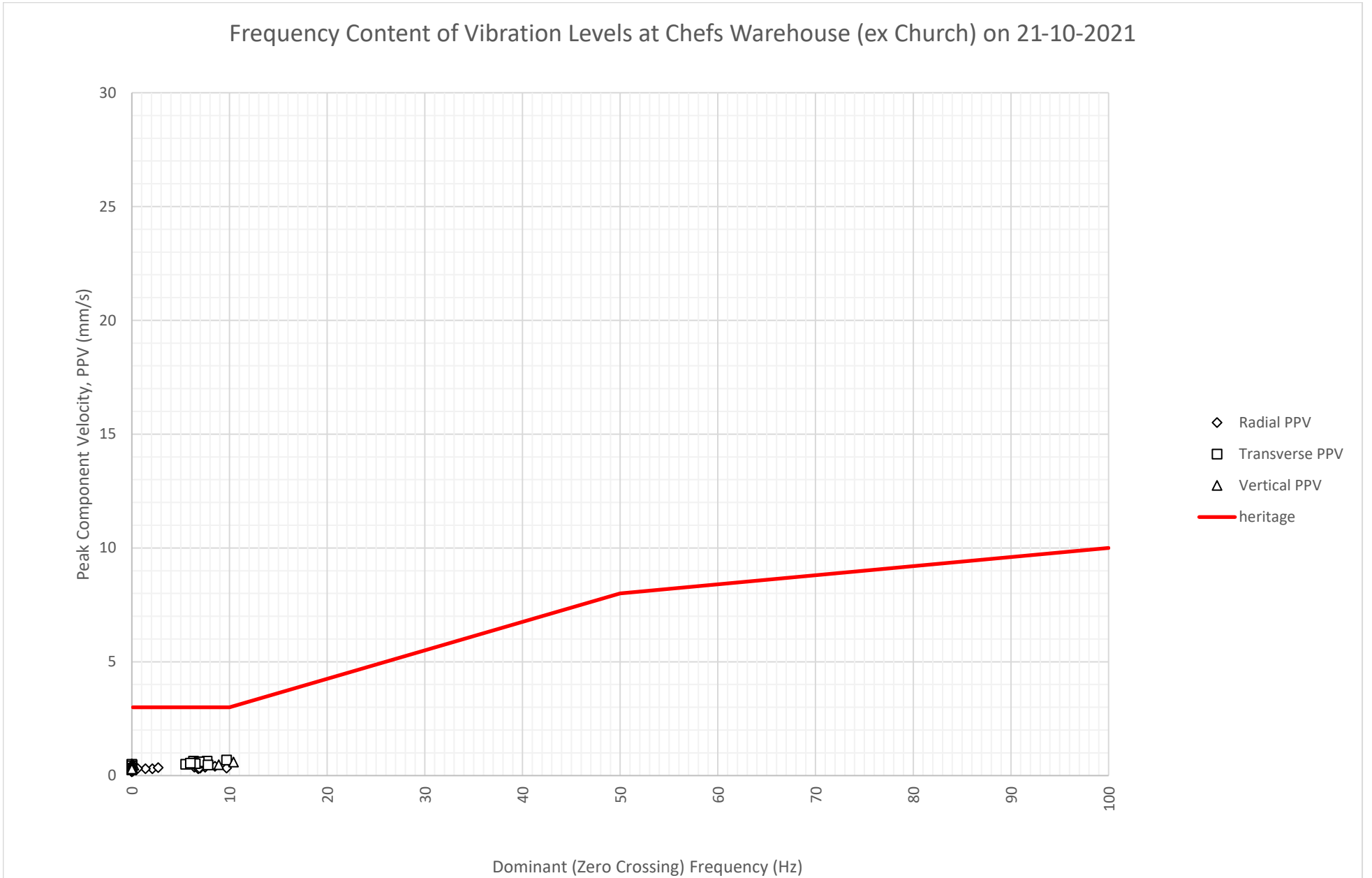

Daily Monitored Vibration Levels at Chefs Warehouse (ex Church) on 19-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

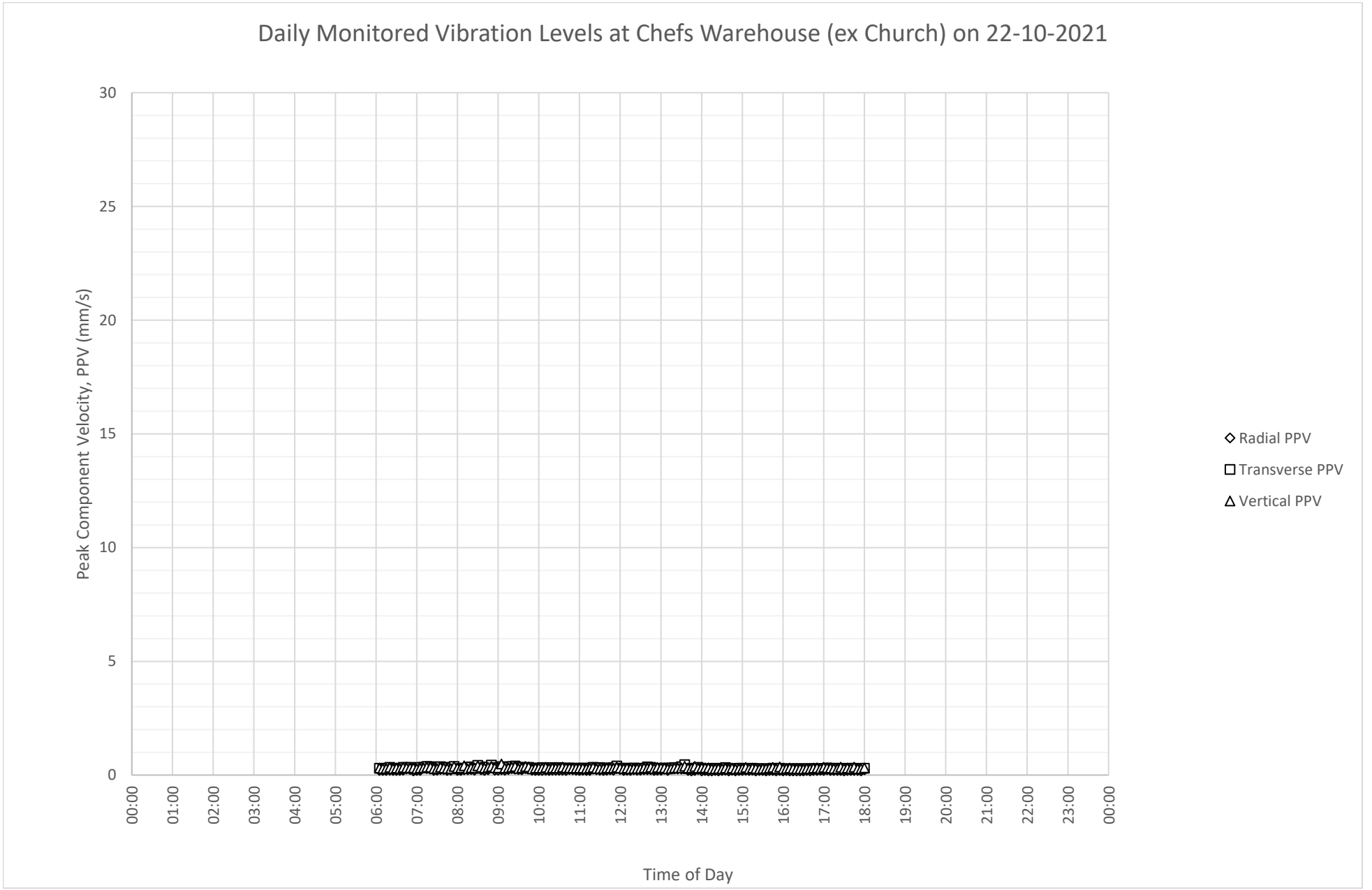

Frequency Content of Vibration Levels at Chefs Warehouse (ex Church) on 19-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (ex Church) on 20-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chefs Warehouse (ex Church) on 20-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (ex Church) on 21-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chefs Warehouse (ex Church) on 21-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (ex Church) on 22-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
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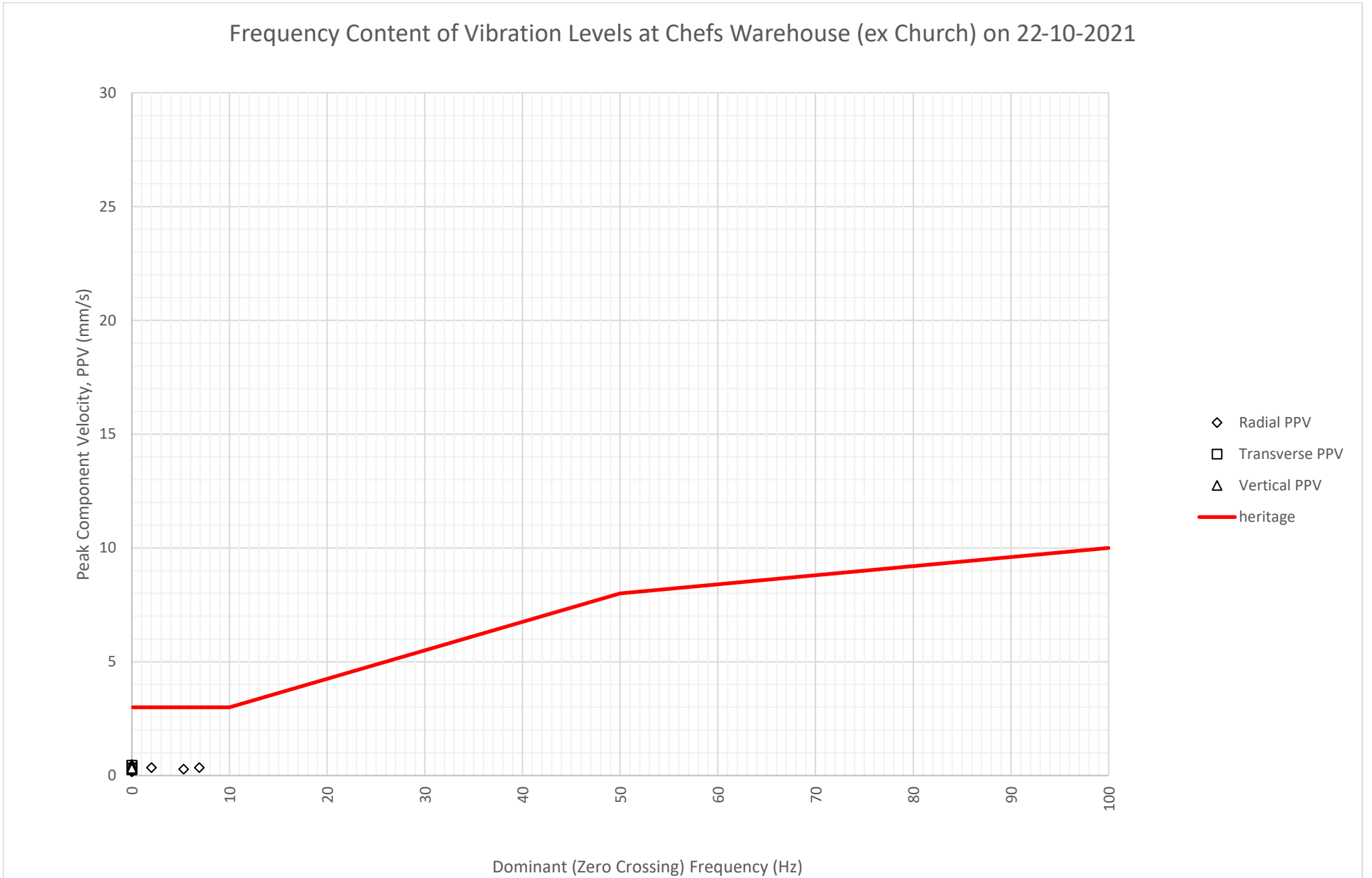
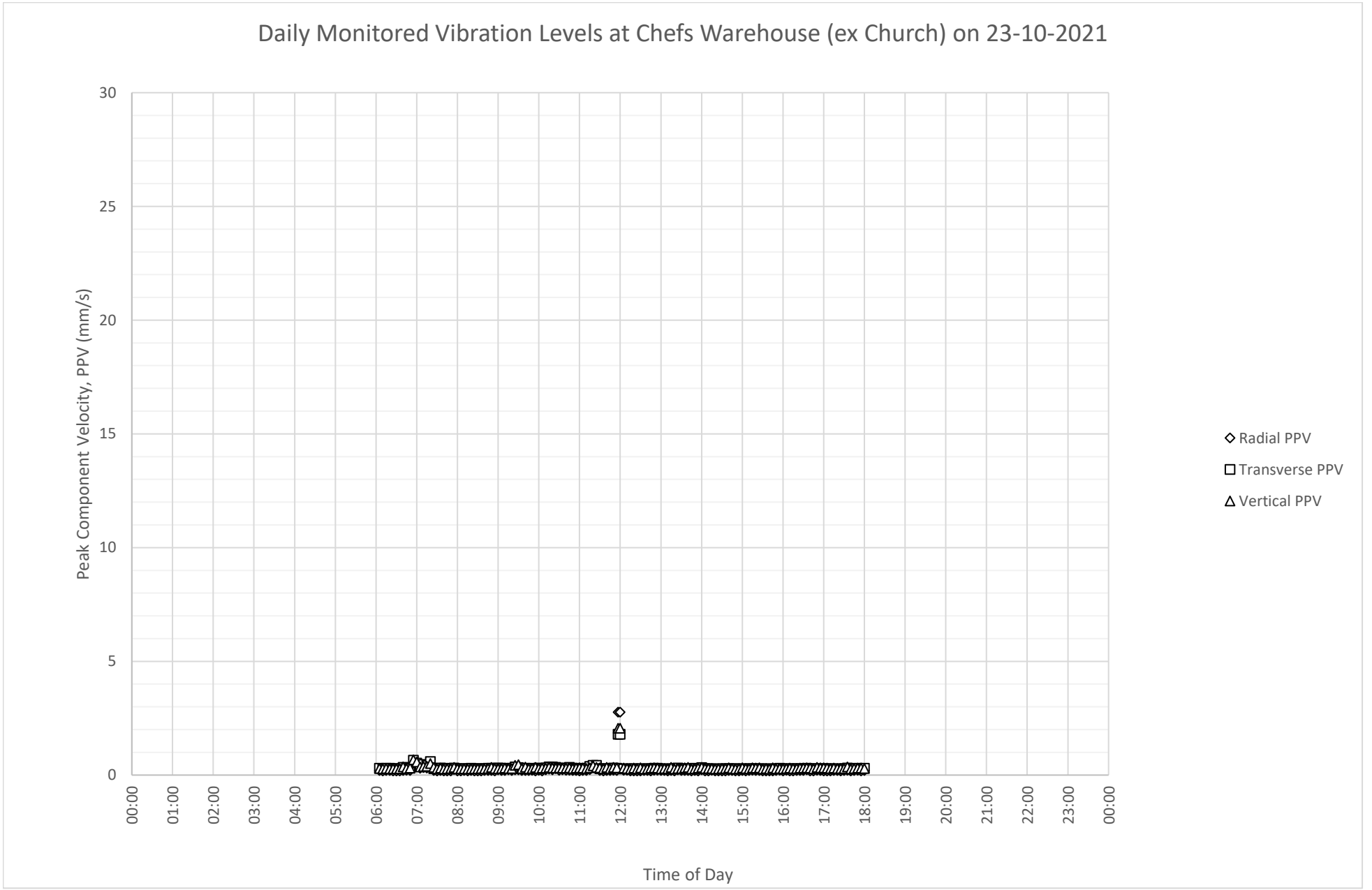
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chefs Warehouse (ex Church) on 22-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (ex Church) on 23-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
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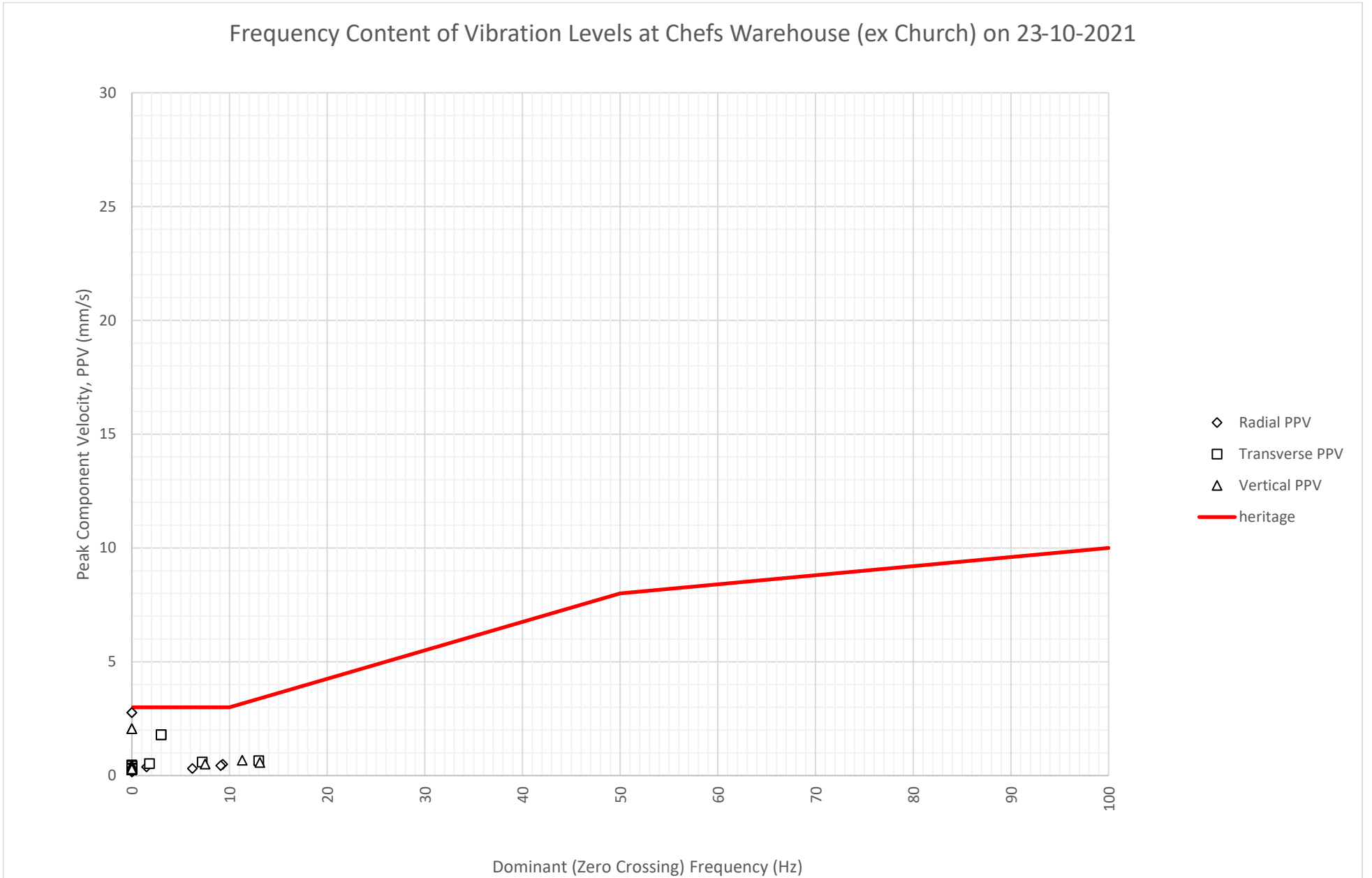
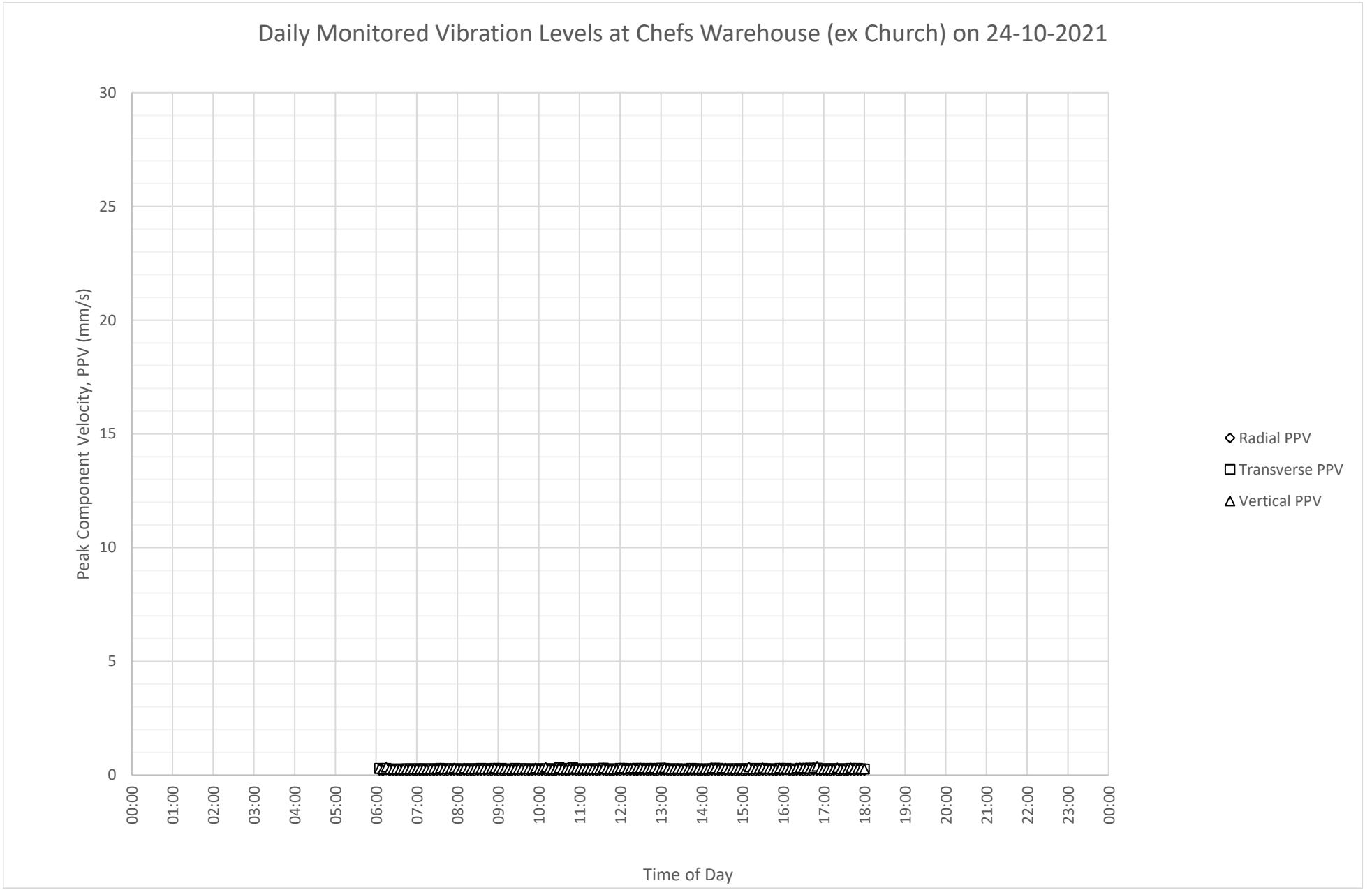
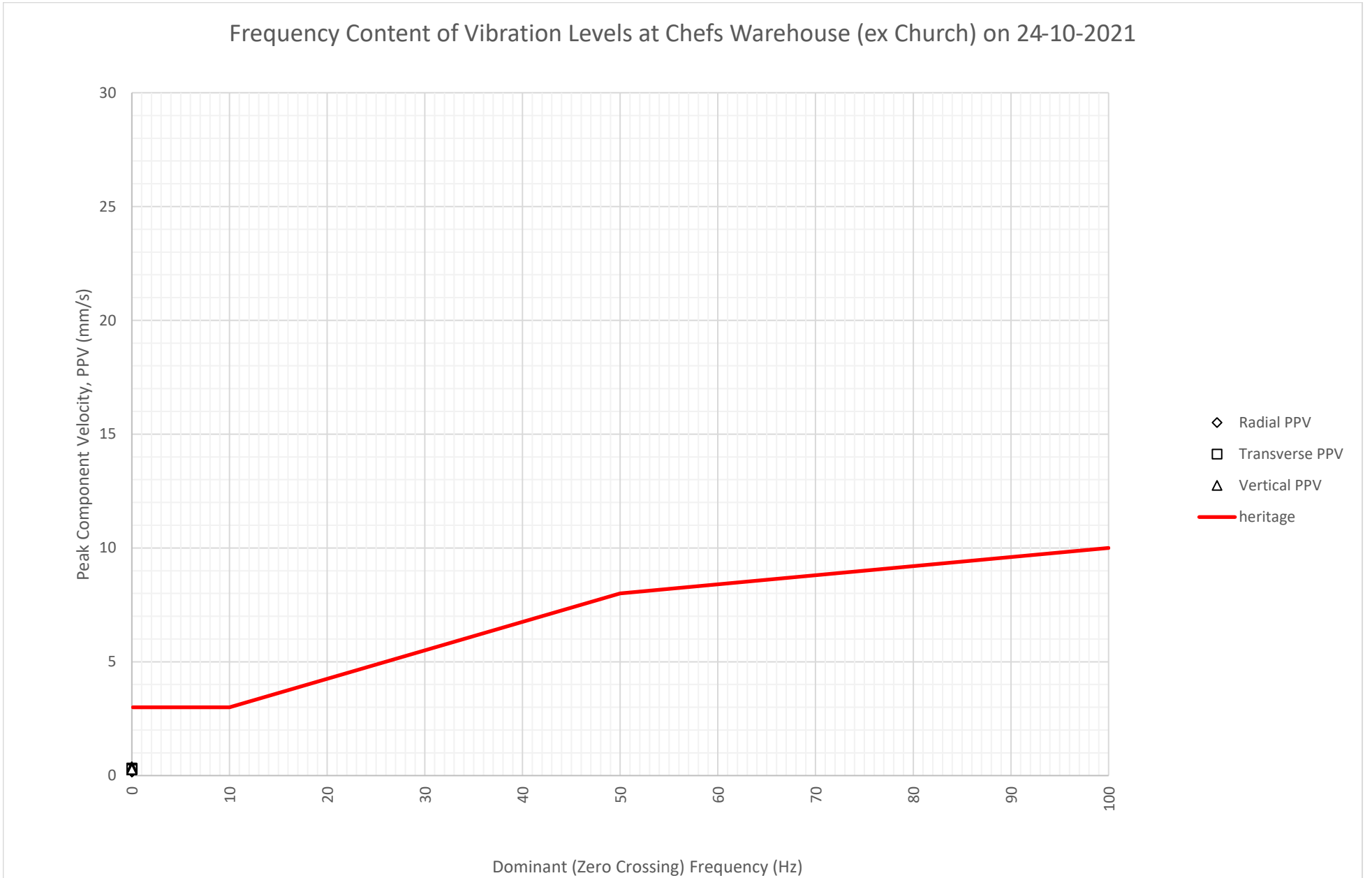
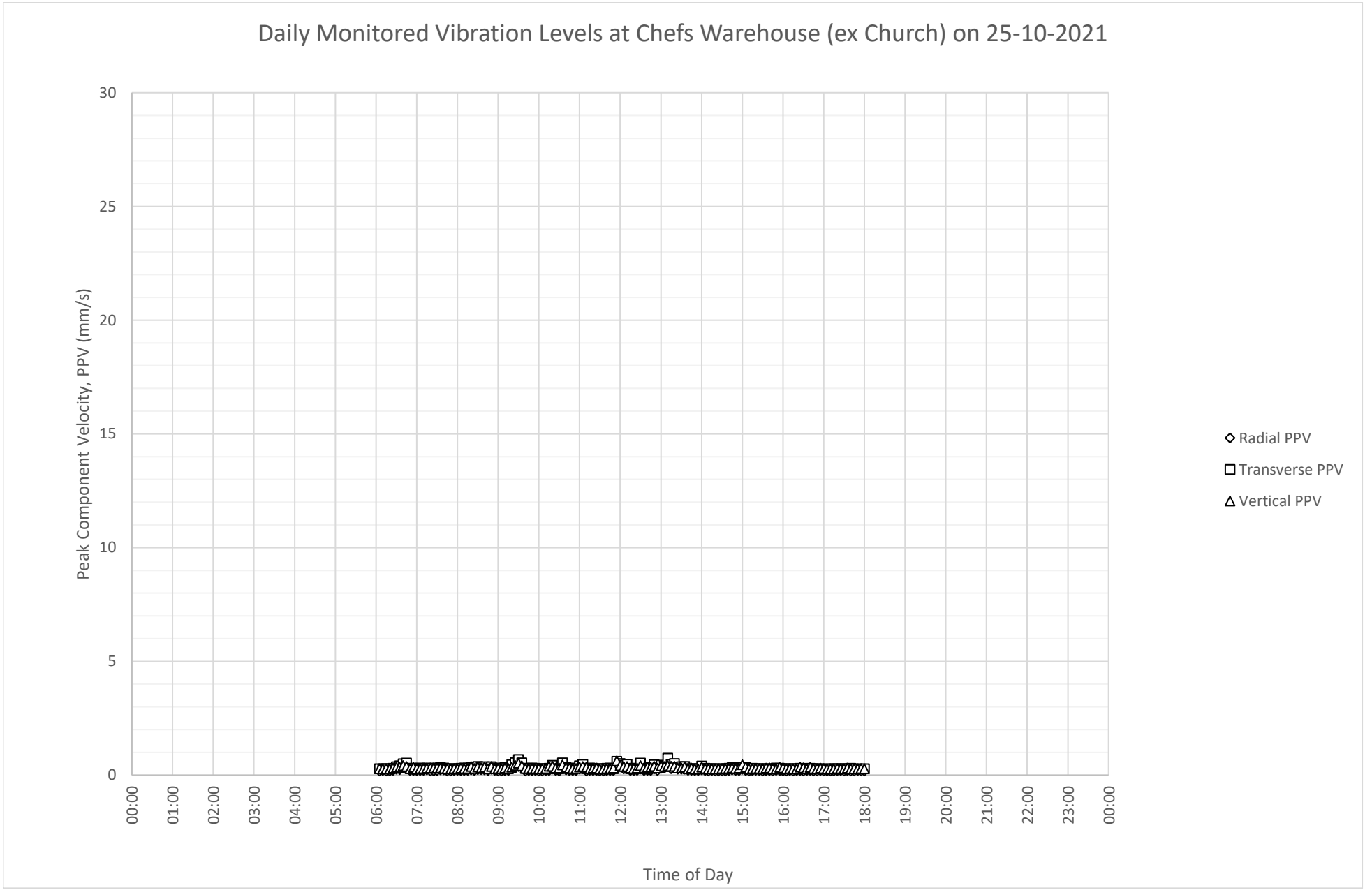
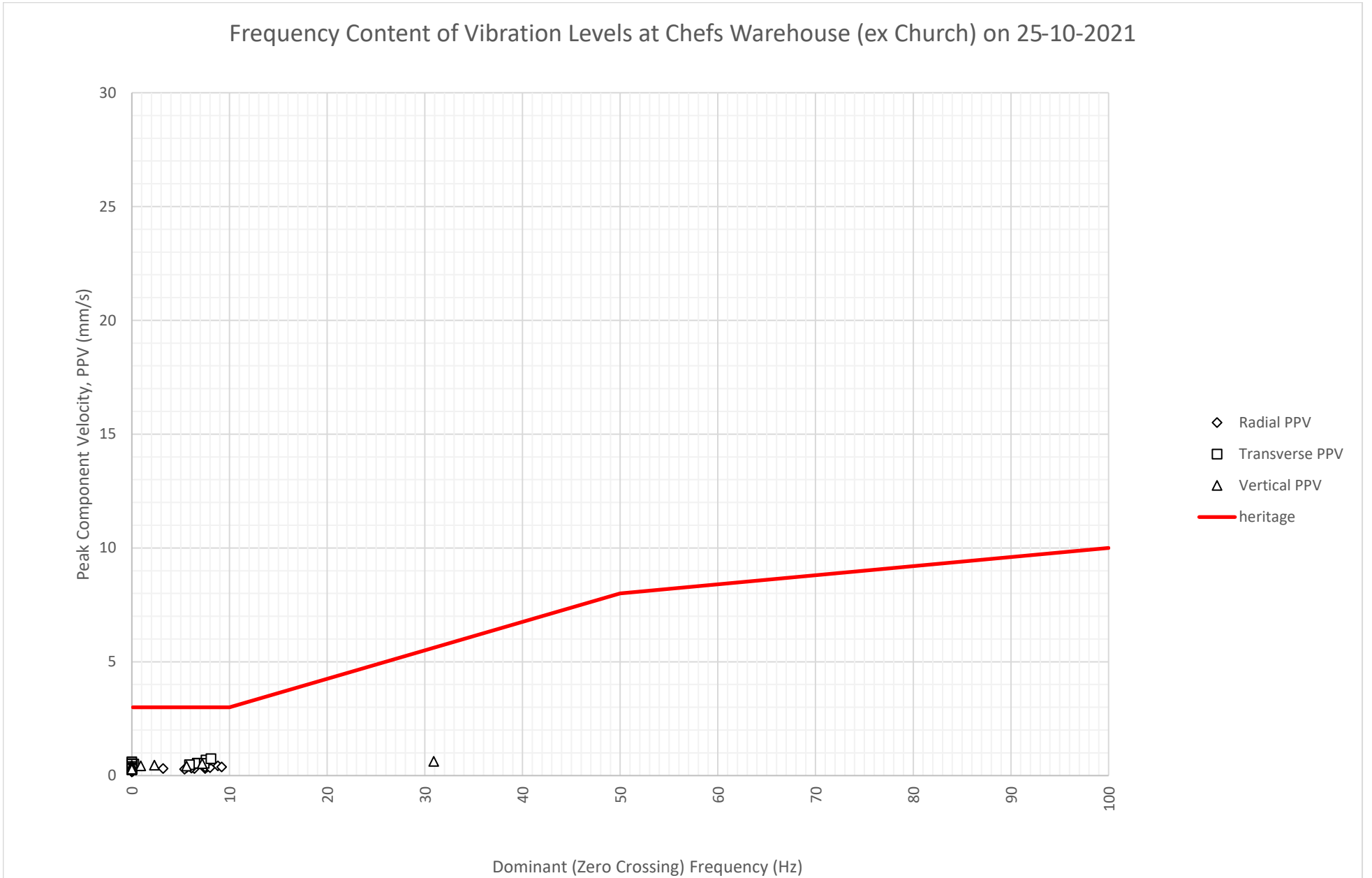
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

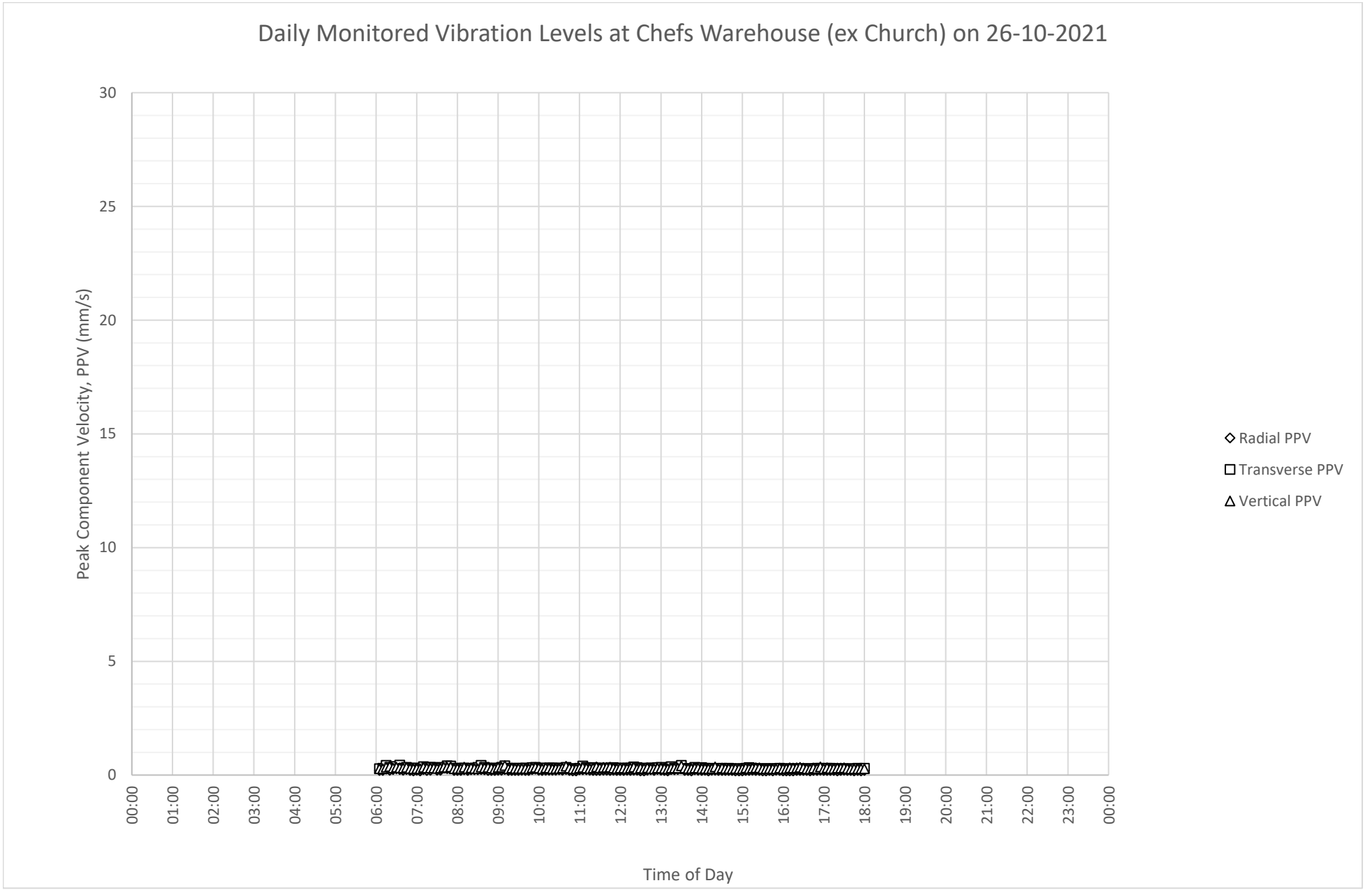

Frequency Content of Vibration Levels at Chefs Warehouse (ex Church) on 23-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage

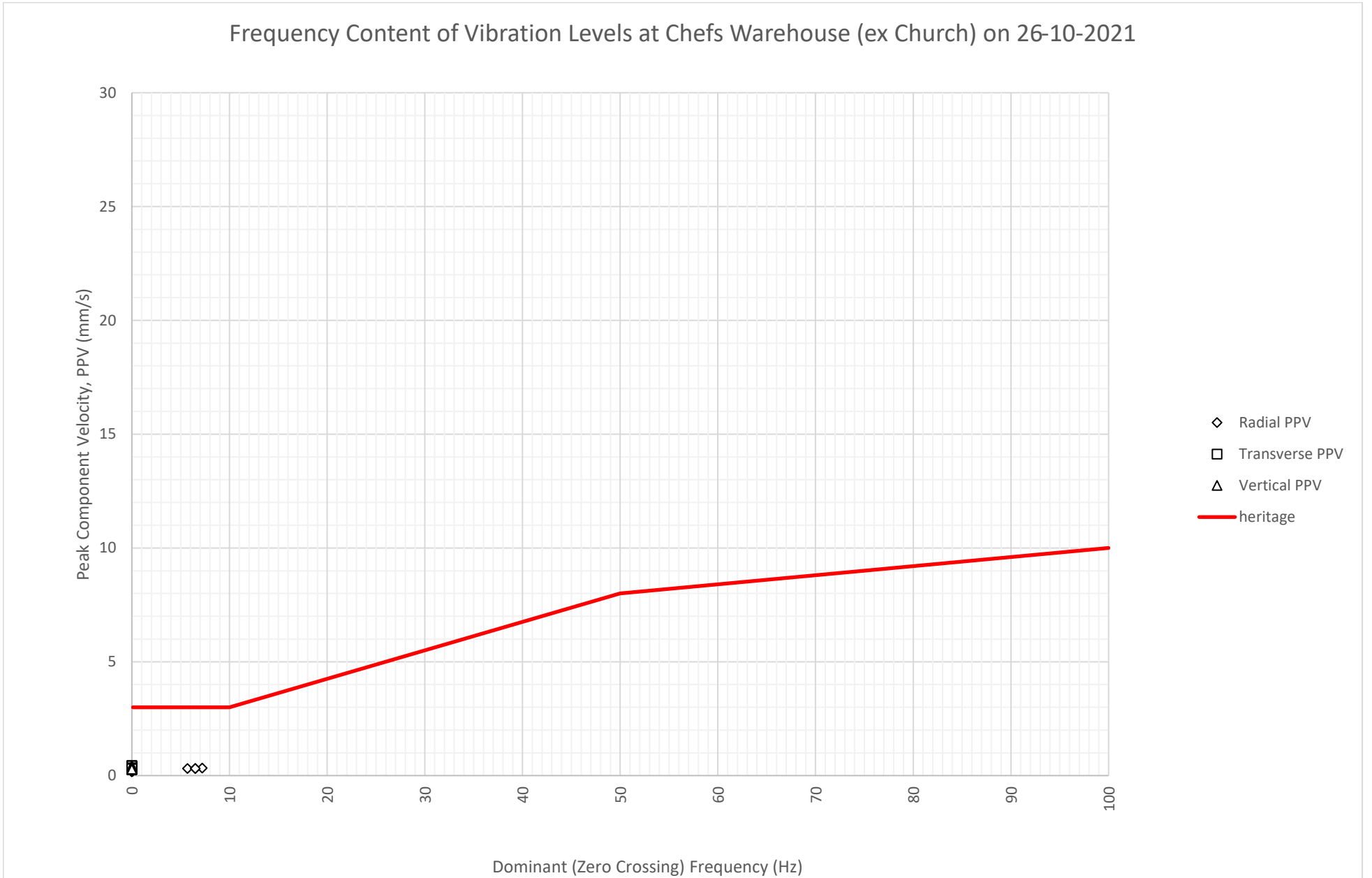

Daily Monitored Vibration Levels at Chefs Warehouse (ex Church) on 24-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV

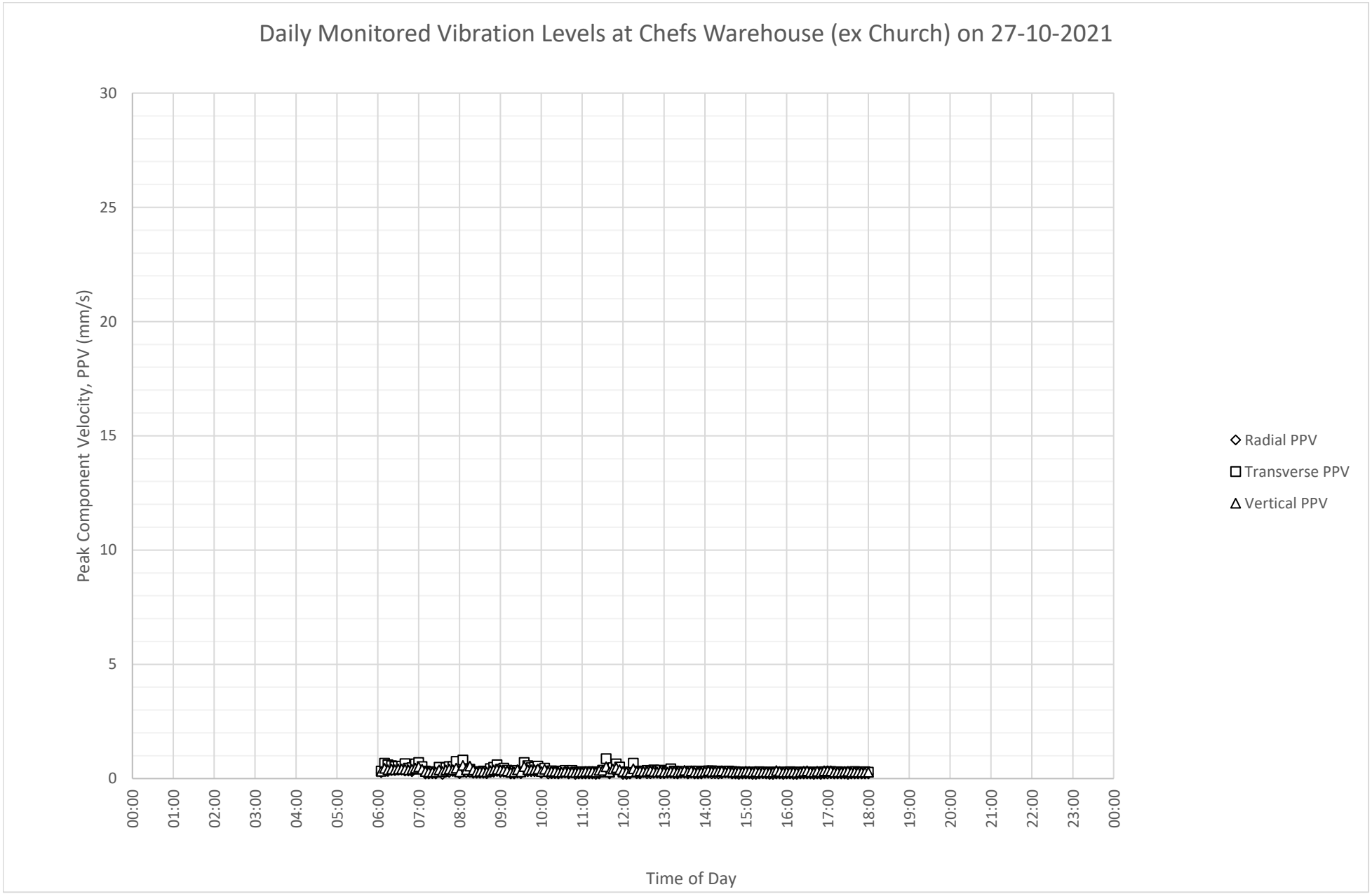

Frequency Content of Vibration Levels at Chefs Warehouse (ex Church) on 24-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (ex Church) on 25-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chefs Warehouse (ex Church) on 25-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (ex Church) on 26-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chefs Warehouse (ex Church) on 26-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (ex Church) on 27-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
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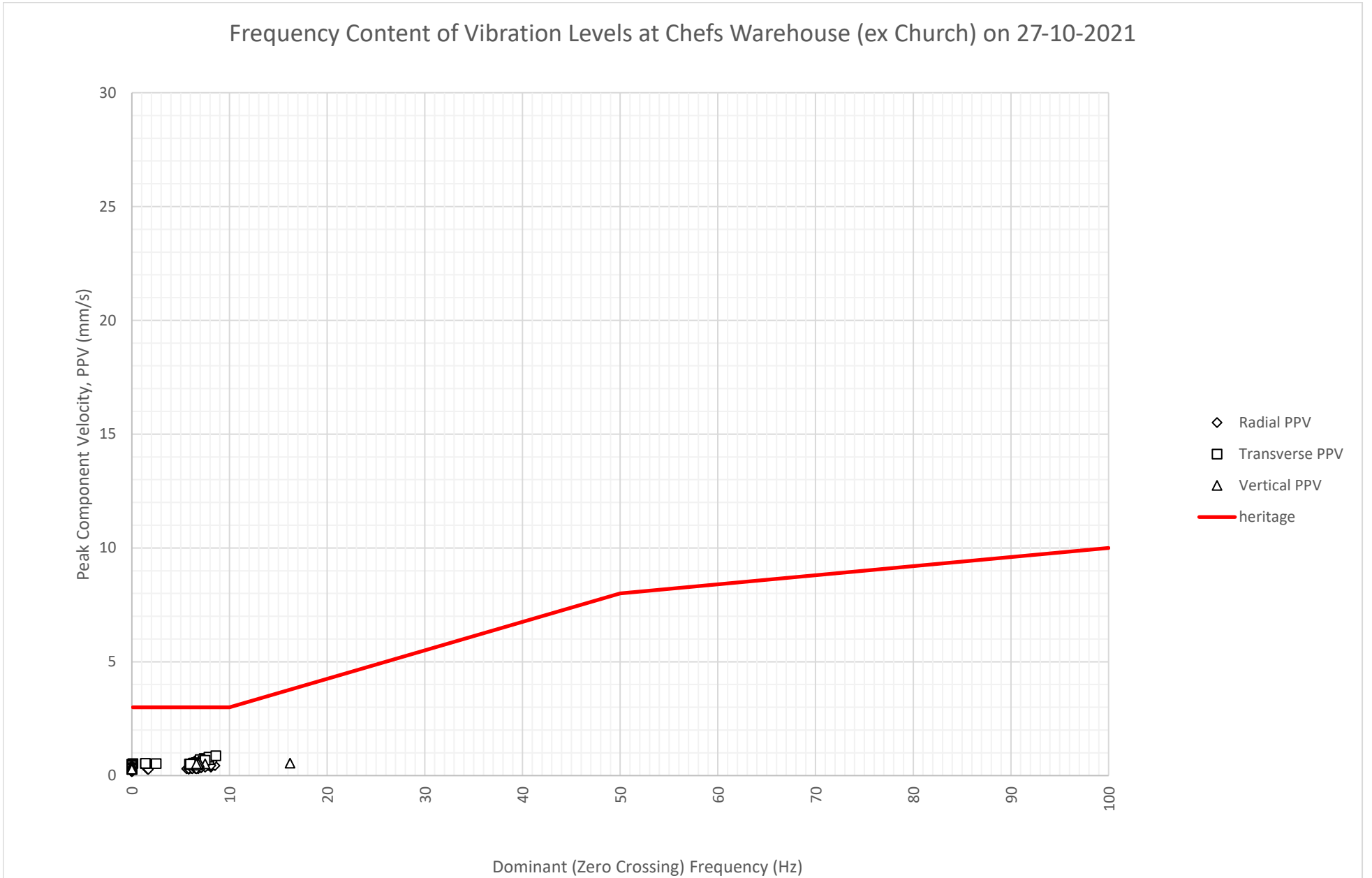
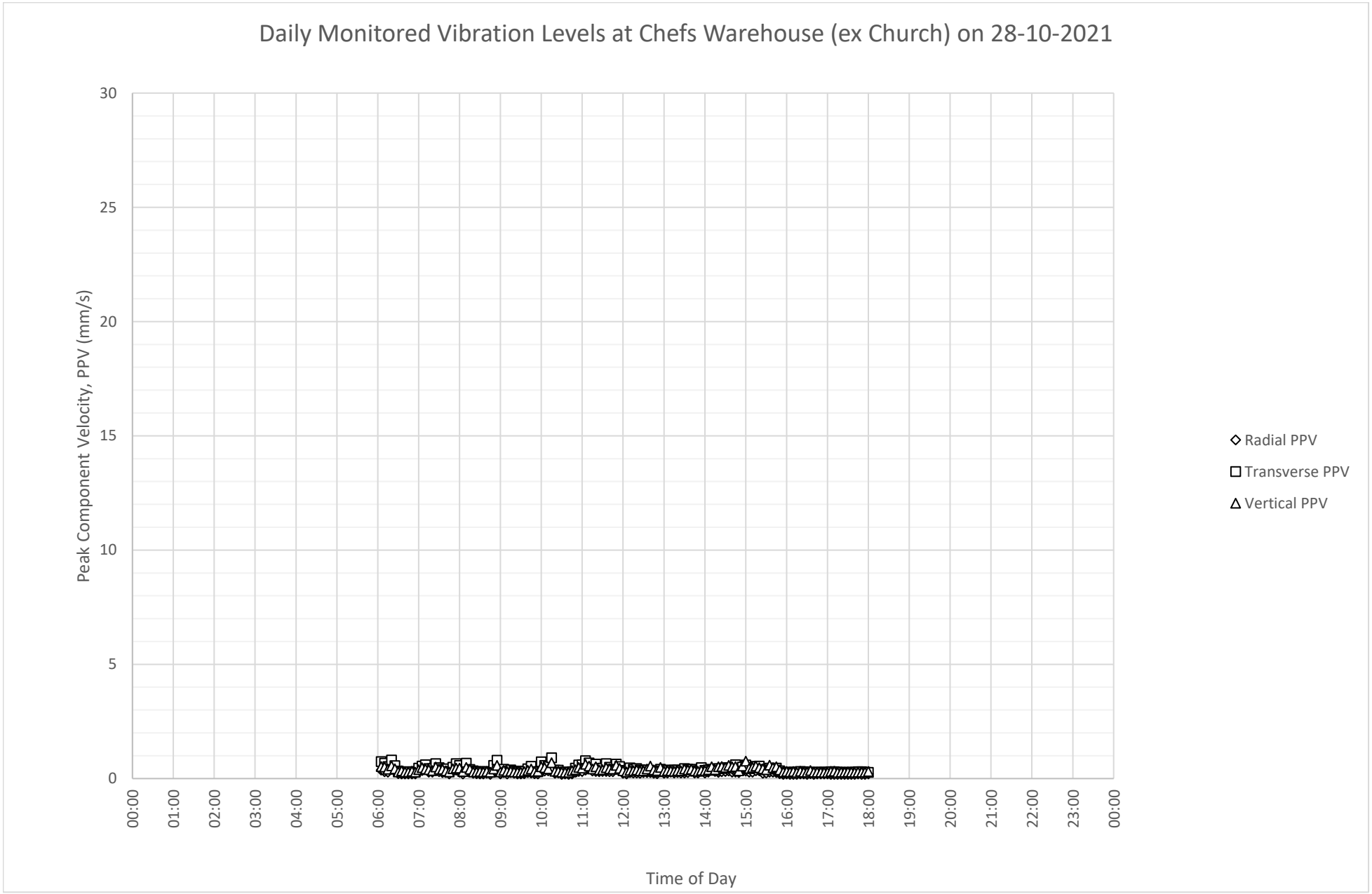
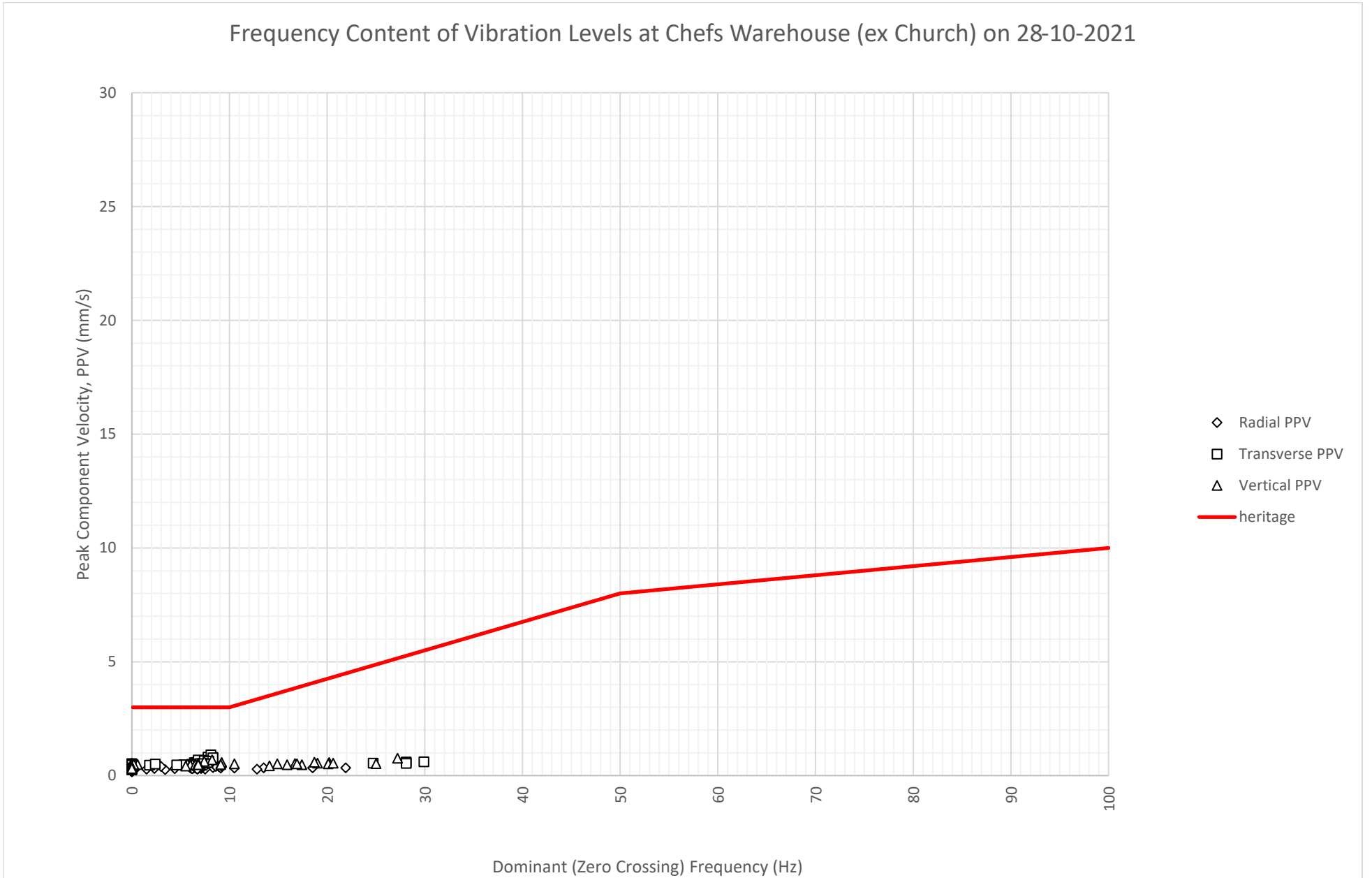
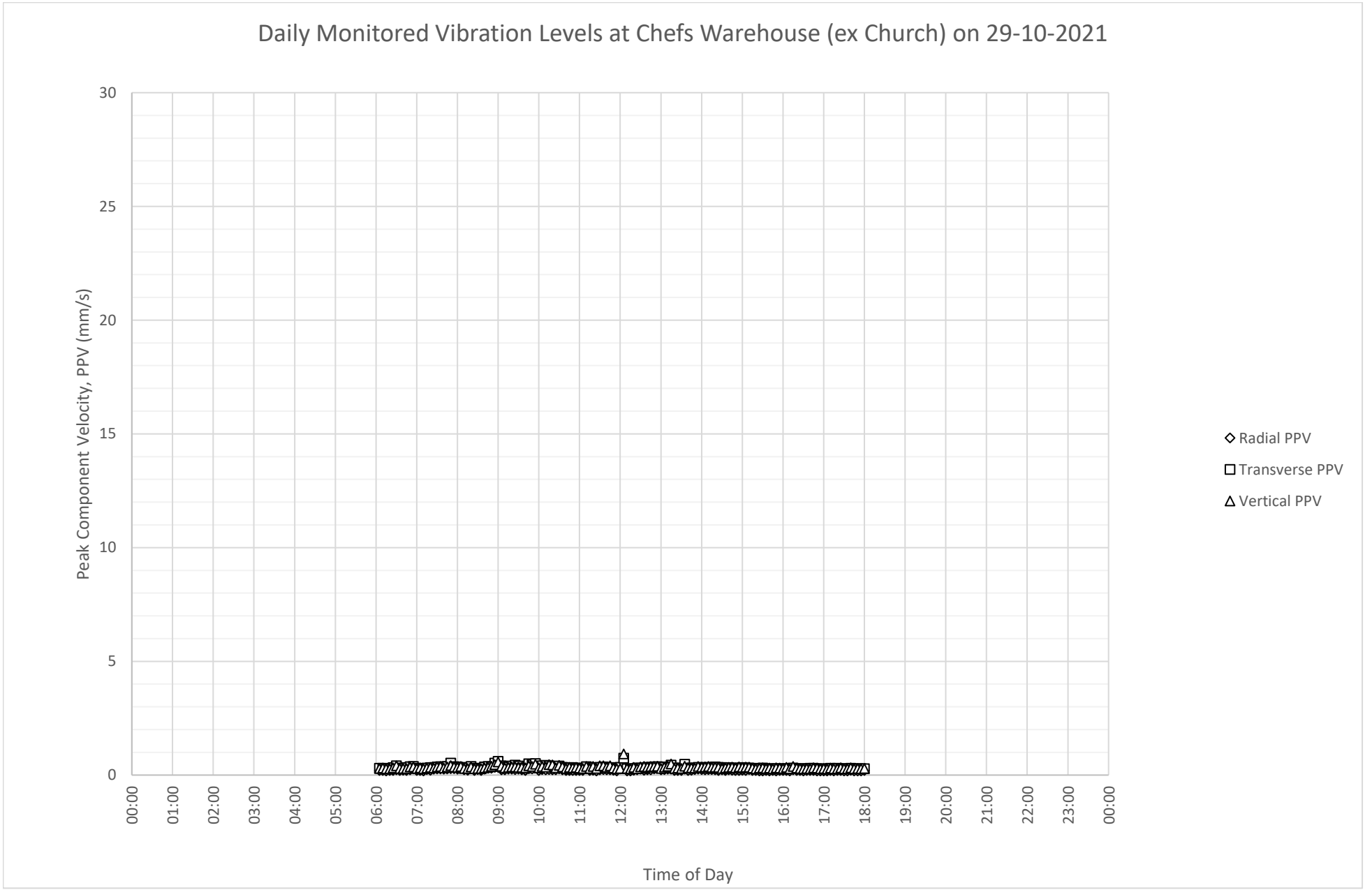
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chefs Warehouse (ex Church) on 27-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (ex Church) on 28-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chefs Warehouse (ex Church) on 28-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (ex Church) on 29-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
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12:00
13:00
14:00
15:00
16:00
17:00
18:00
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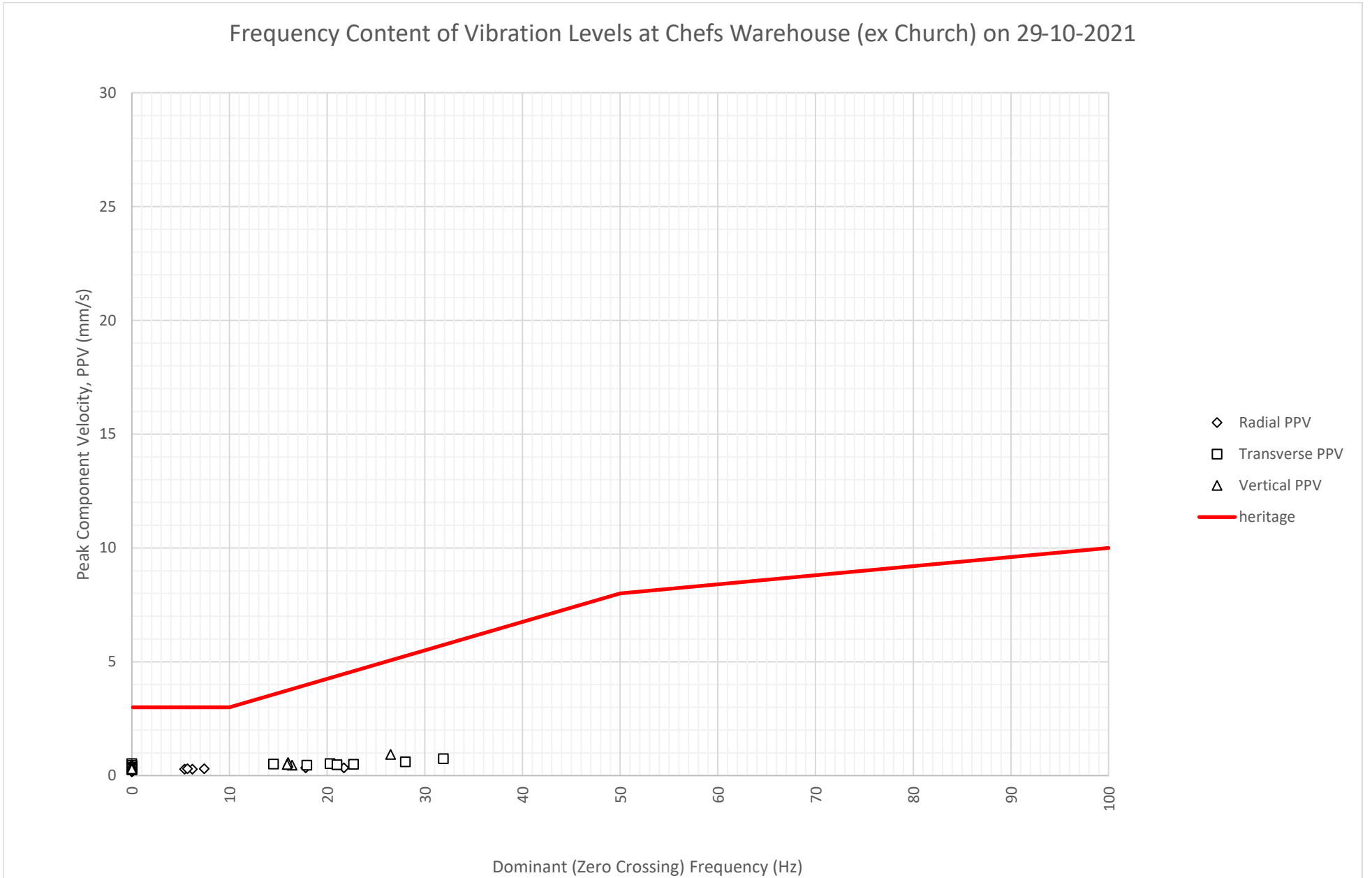
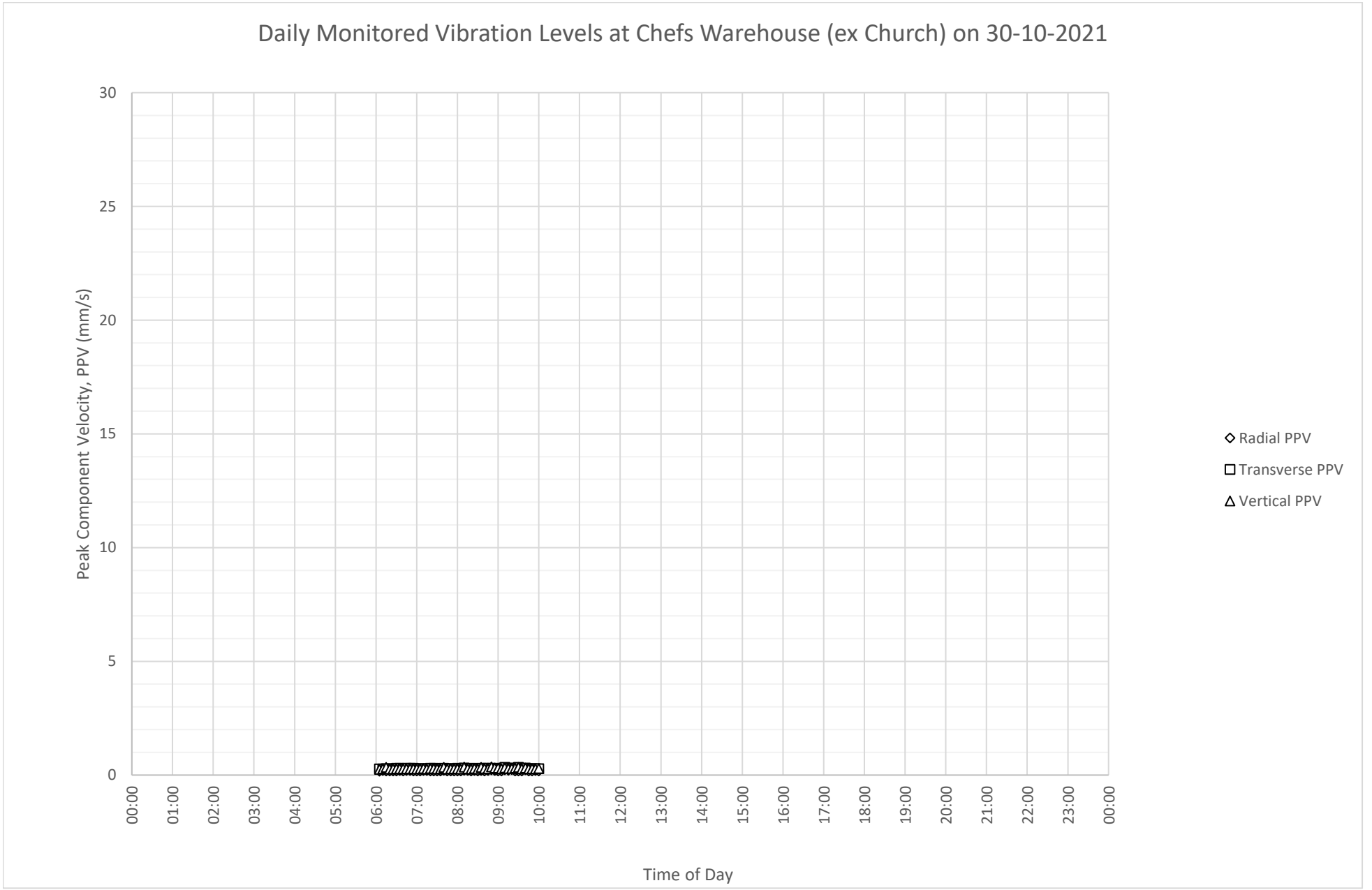
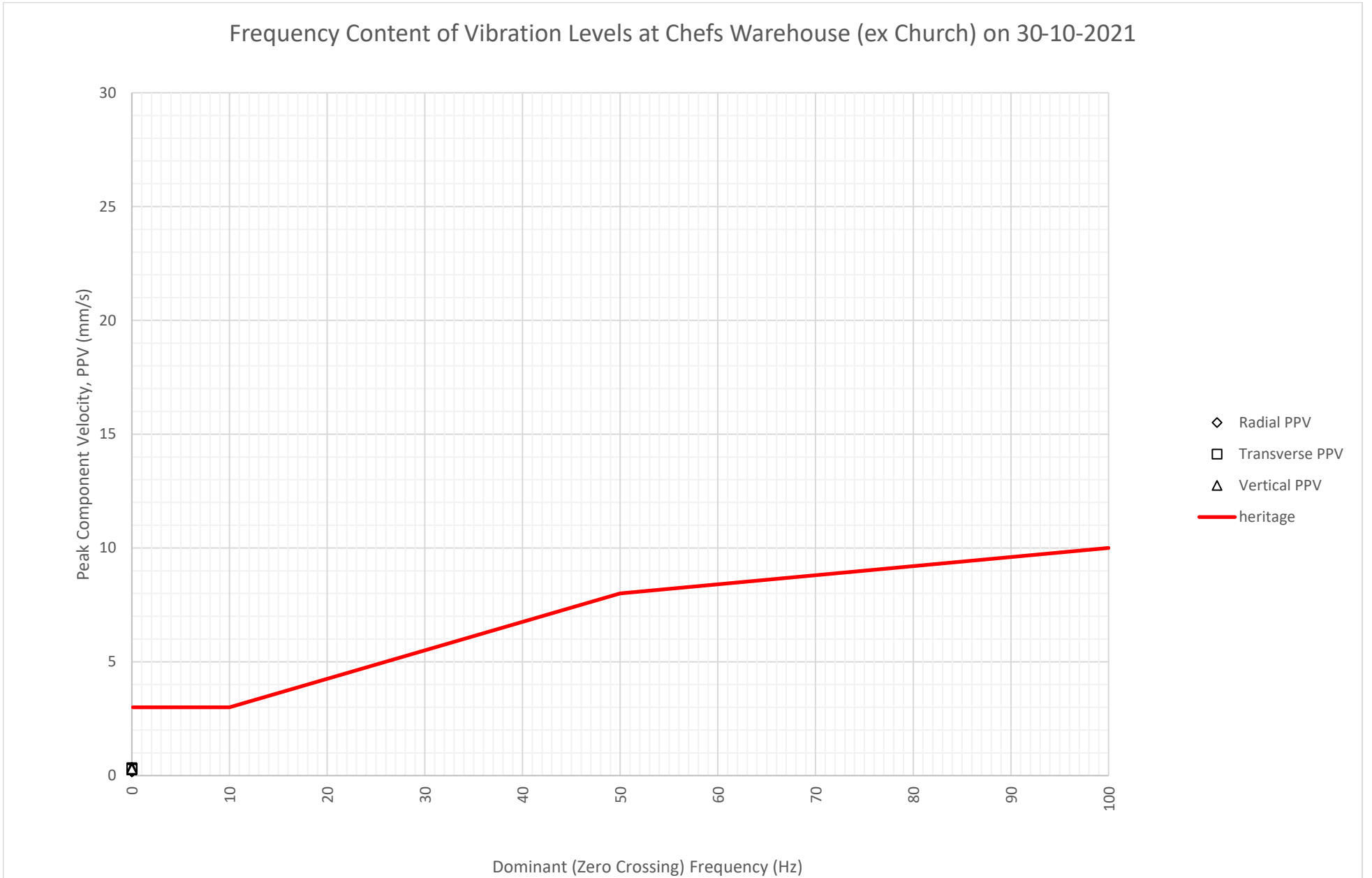
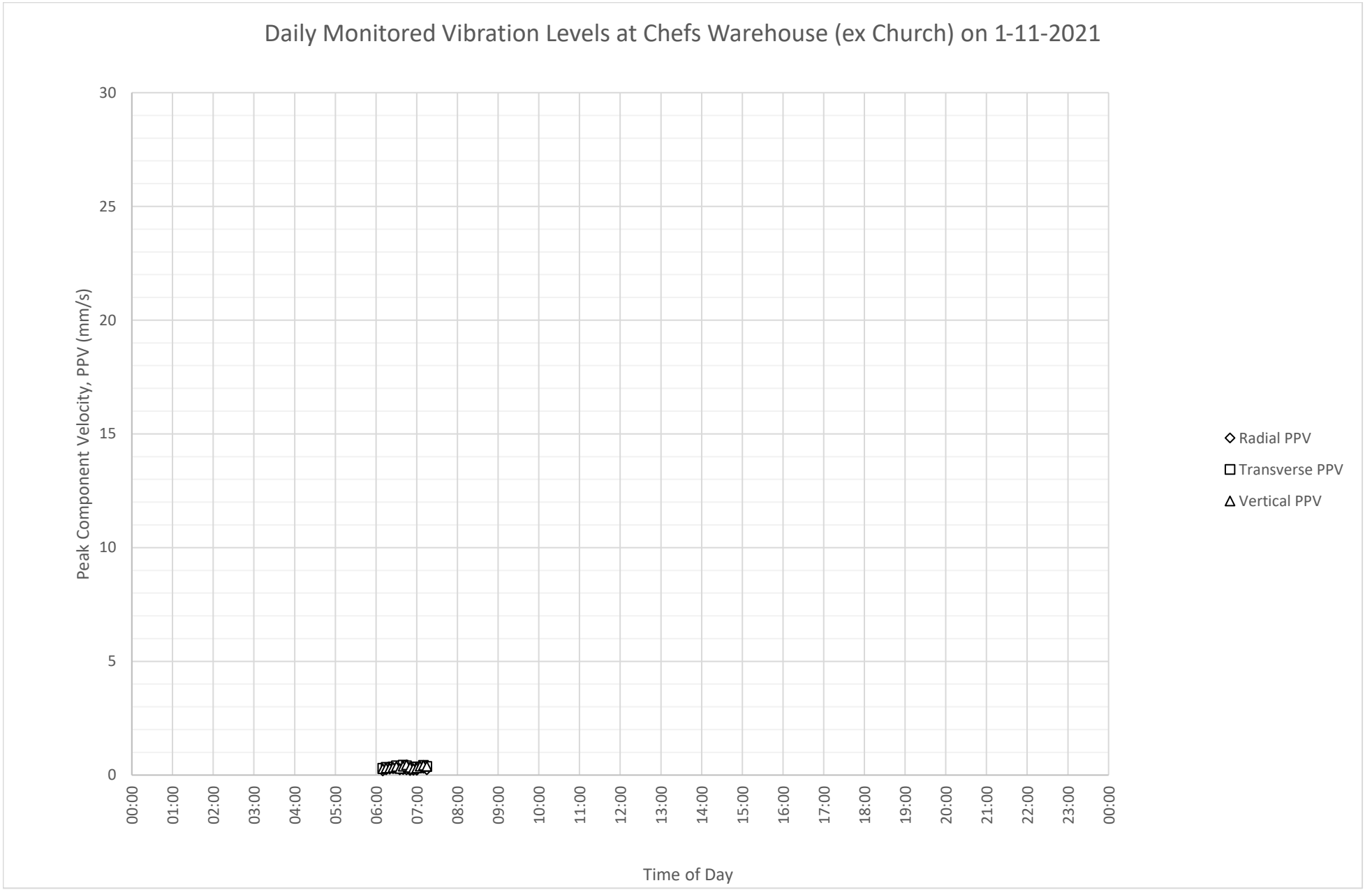
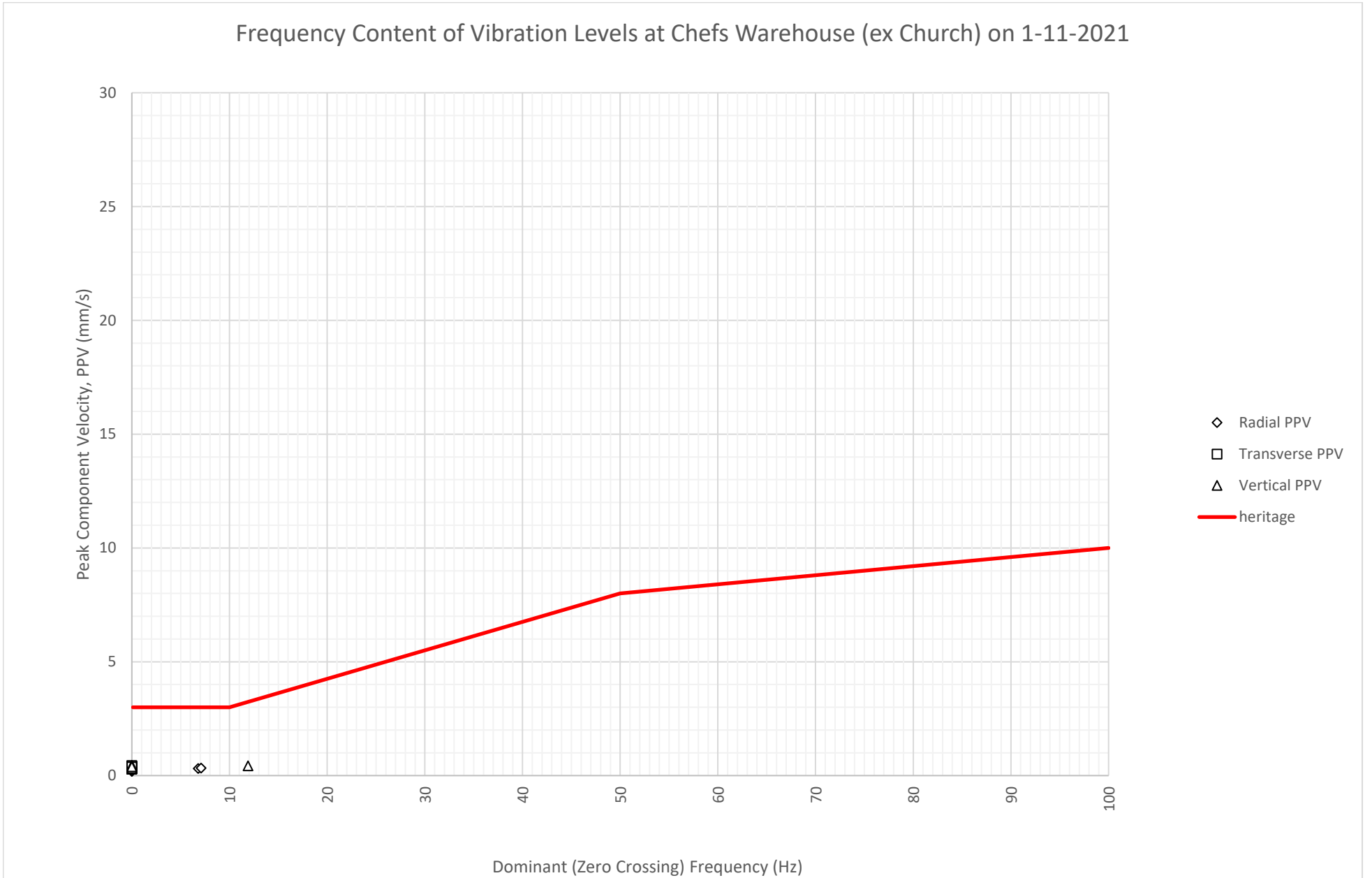
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chefs Warehouse (ex Church) on 29-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (ex Church) on 30-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chefs Warehouse (ex Church) on 30-10-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage


Daily Monitored Vibration Levels at Chefs Warehouse (ex Church) on 1-11-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
Radial PPV
Transverse PPV
Vertical PPV


Frequency Content of Vibration Levels at Chefs Warehouse (ex Church) on 1-11-2021
Peak Component Velocity, PPV (mm/s)
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Dominant (Zero Crossing) Frequency (Hz)
Radial PPV
Transverse PPV
Vertical PPV
heritage