26 May 2015

The General Manager
Coffs Harbour City Council
Locked Bag 155
COFFS HARBOUR NSW 2450

Our ref: 22/17122 16398
Your ref:

Att: Renah Givney, Development Assessment Planner

Dear Renah

DA 1031/15 - Proposed Subdivision at Lot 198 DP 1191172, Lot 98 DP 1165173, 1452 Solitary Islands Way, Sandy Beach
Response to Council's Request for Additional Information

Reference is made to Council's letters dated 15 August 2014, 7 October 2014, 31 March 2014 in relation to the above development application. Please find outlined below a response to each of the issues raised by Council.

1 Engineering Issues

1.1 Owner's Consent

Owner's consent is still forthcoming from the adjoining landowner, Sandy Beach Mill Pty Ltd. The staging plan has been modified to reflect this fact with Stages 3, 4 and 5 all reliant upon the existing intersection with Solitary Islands Way. This access is considered satisfactory to cater for the expected increases in traffic as a result of Stages 3, 4 and 5. It is foreshadowed that by the time Stages 3 and 4 are constructed the proposed access road through the northern property will have been constructed and handed to Council as public road, negating the need for owner's consent.

1.2 Lot Layout

A revised lot layout has been prepared and a total of 123 lots are now proposed within four (4) separate stages as follows:

- Stage 3 – 45 lots
- Stage 4 – 34 lots
- Stage 5 – 28 lots
- Stage 6 – 16 lots

The proposed lots range in size from 452m^2 to 1,345m^2.

A copy of the revised subdivision plan is attached to this letter.

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The ultimate sequencing of the staging would be dependent upon the upgrade of the existing Solitary Islands Way and Seacrest Boulevard intersection and the construction of the new intersection on Solitary Islands Way with the Sandy Beach Mill subdivision (see below).

1.3 Traffic Generation

It is noted that the proposed subdivision would incorporate a total of 123 lots. The RTA (now Roads and Maritime Services) *Guidelines to Traffic Generating Developments* estimates that low density residential lots generate in the order of 9 vehicles movements per day and 0.85 vehicle movements per peak hour. This would equate to about 1,107 daily movements and 105 peak hour movements for the proposed subdivision.

Two access points from Solitary Islands Road are proposed for the estate. The southern access (Seacrest Boulevard / Solitary Islands Way intersection) exists and is currently catering for Stages 1 and 2 of the estate. The northern access is to be constructed as part of the imminent Sandy Beach Mill development which has now received construction certificate approval and has a number of presales.

Both intersections were identified in the Hearns Lake / Sandy Beach Development Control Plan as being Austroads Type B and C intersections respectively. Council has now collected developer contributions via the Hearnes Lake/ Sandy Beach Release Area Developer Contributions Plan from Stages 1 and 2 for the upgrade of the southern intersection and it is anticipated that with the approval and subsequent development of Stage 3, this intersection would need to be upgraded.

Upon completion of the intersection upgrade, it is expected it would have the capacity to cater for all traffic generated by all remaining stages, especially if the northern access is constructed by this time. Stage 6 would proceed upon access being available through the northern Sandy Beach Mill development.

The Traffic Impact Assessment prepared by Bitzios for the Sandy Beach Mill development found that a CHR(S) treatment would be required to service the subdivision and states:

> *"The CHR(S) treatment is noted to provide spare capacity for additional development within the access catchment area (eg. Additional dwellings to the south of the access)."*

Using the same in/out directional traffic splits for AM and PM peak shown in the Bitzios report and with an additional 66 peak trips for the northern portion of the proposed subdivision, it was found that the CHR(S) treatment for the right hand turn into the Sandy Beach Mill development would be sufficient to cater for 2024 traffic. In terms of the left hand turn into the Sandy Beach Mill Subdivision, the Bitzios report found that a trigger threshold for a CHR(S) treatment would be approximately 56 dwellings or approximately 70% occupancy of the subdivision and that minimum BAR and BAL turn treatments would suffice up to this point.

Given the imminent development of the Sandy Beach Mill development and the developer contributions at Council's disposal to upgrade the intersections, the proposed subdivision can proceed without having any undue impacts on the level of service and capacity of Solitary Islands Way.

1.4 Stormwater Management Plan

A revised stormwater management plan has been prepared for the subdivision and is attached.

- The revised stormwater management strategy includes the following:
  - A modification to the existing bio retention basin to the north of Stages 1 and 2. Low flows from the northern end of the development (Area C) will be directed through the bio retention basin prior to discharge from the site.
  - A proposed new swale running parallel to Oceanic Drive and grading towards a new bio retention basin to the north-east. Low flows from the central area of the development (Area B) will be directed through the bio retention basin prior to discharge from site.
  - A proposed new swale running parallel to Zenith Avenue and Road No. 1 surrounding the northern extent of the park area. This swale will collect runoff from the road and lots on the higher, western end of the development (Area A), and discharge flows through the existing bio retention basin.
  - A MUSIC file has been sent under separate cover and represents the developed and pre-developed scenarios for the site. The music model has been developed in accordance with the South East Queensland Music Modelling Guidelines and indicates that the development satisfies the criteria outlined in councils Water Sensitive Urban Design (WSUD) policy.
- Correspondence with Council engineers indicates that the proposed bio retention basin will not be required to mitigate any increase in flows, as the downstream environment contains a significant amount of storage and the impact of the development will be minimal on this area.
- The DRAINS model including the existing development and basin was simulated in order to determine and confirm the existing flow regime and peak flood levels and discharges from the existing basin.
  - The original plans issued for construction of the existing development indicate the western edge of Oceanic Drive, adjacent to the existing basin has an elevation of 6.117 mAHD.
  - A peak discharge of 3.96 m3/s and a peak flood level of 5.72 mAHD was noted for the existing development model in the 1 in 100 Year ARI flood event. This indicates that the existing basin will pass the 1 in 100 Year ARI storm event without overtopping.
  - The additional area of 1.57 ha (representing area A) was then added to the basin and the model re-simulated. The peak discharge from the basin increased to 4.81 m3/s with a velocity of 4.81 m/s, and the peak flood level increased to 5.77 mAHD. This corresponds to an increase of flood levels in the existing basin of 50mm.
- The revised lot layout and proposed regrading of the site should allow adequate drainage of the site. Some interallotment drainage along the rear of Lots 311 – 314 may be required.

1.5 Sediment and Erosion Control Plan

An indicative sediment and erosion control plan has been prepared and is attached to this letter.

1.6 Filling

Filling at the site would be dictated by the stormwater requirements for the site. The following points will determine the quantities of fill at the site:

- Natural surface on the downstream eastern end of the site is approximately 5.0 mAHD.
- The filter media for the bioretention basin would be approximately 0.6m in depth. This would put the basin floor at approximately 5.6 mAHD, with subsoil pipes daylighting to natural surface through the basin wall.
- Twin 675mm diameter pipes are proposed for trunk drainage through the northern area. The invert of these pipes would be set at 0.3m above the basin floor, or 5.9 mAHD, with a weir provided at this level sized to cater for the 100-year bypass flow.
- Energy dissipators would be provided for the swale and at the outlet of the 675mm pipes to slow velocity of flow entering the swale, and to provide a storage area for coarse sediment upstream of the bio retention area.
- The obvert of the pipes would be approximately 6.575 mAHD at the easternmost point of the development
- Minimum cover for the pipes is 0.6m in the CHCC drainage specifications; this puts the minimum fill level for the lowest western point of the development at 7.175 mAHD, or approximately 2.0m of fill along the eastern boundary of the site in order to cater for internal stormwater reticulation.

1.7 Sewerage and Council Sewer Pump Station

The sewer rising main plans received from Greg Powter of CHCC note the rising main to be 100mm dia. PVC generally installed at minimum cover (600mm) back towards the south eastern portion of the site, adjacent to Stage 2, to Council's existing infrastructure. It should be noted that at this stage Council's designs are referencing "600mm cover" based on natural surface levels in this area and that based on Council's plans filling will be required in the north-east corner of the development.

This will potentially raise the design levels (basin invert) to 5.6m AHD rising to 6.27 m AHD at the southern end of the swale. Given the proximity of the swale and drainage outlet structures to the existing Council easements further advice from Council would be sought on this matter during the construction certificate, with respect to Council's assets becoming constructed over, and made deeper by filling.

Council (Greg Powter) has advised however that the rising main can always be diverted if necessary.

2 Acoustic Assessment

A Road Traffic Noise Assessment has now been prepared and addresses the following:

- Development Near Rail Corridors and Busy Roads – Interim Guideline, NSW Department of Planning, 2008;
- State Environmental Planning Policy (Infrastructure) 2007 (SEPP);
- NSW Road Noise Policy, EPA, 2011;

- AS 2107:2000 Acoustics – Recommended design sound levels and reverberation times for building interiors; and
- AS3671:1989 Acoustics – Road Traffic noise intrusion – Building siting and construction.

The report is required addresses and identifies:

- Traffic noise impacts on the proposed subdivision
- Identification of lots affected by traffic noise
- Details of the required noise mitigation measures, demonstrating that noise affected lots will comply with the requirements of Clause 102 of the Infrastructure SEPP.

3 Reserves

It is understood that Council's 2010 Sports Facilities Strategy removed the Sandy Beach facility and determined it was no longer required and the Hearnes Lake/ Sandy Beach Release Area Developer Contributions Plan was amended in 2014 to reflect this.

It is also understood that contributions totalling $135,164 have been paid by AV Jennings for District Open Space Facilities and to date $124,620 has been spent on the West Woolgoolga facility and that the remainder will also be spent on that facility in the short term.

4 Vegetation Management Plan

The Vegetation Management Plan (VMP) completed for Stages 1 and 2 in March 2010 considered the total future development of the site as shown in Figures 2 and 3 of the VMP (GHD, 2010). The VMP also assessed all of the vegetation across the site, including the vegetation contained in the proposed environmental zoned land (likely to be E2 under Coffs LEP 2013) along the eastern portion of the site.

An addendum VMP was subsequently prepared by Coffs Coast Bush Regeneration Group in December 2012 in response to Council's request for alterations relating to the weed control and revegetation specifications in the original VMP. The Coffs Coast Bush Regeneration Group has undertaken the initial works described in that VMP and have the follow up works in their program.

Given the initial works undertaken by Coffs Coast Bush Regeneration Group and the natural regeneration of the land to be dedicated to Council, any offsetting requirement for the area already assessed as part of the original VMP would be more than covered by the land to be dedicated to Council. Furthermore and as acknowledged by Coffs Coast Bush Regeneration Group in their addendum VMP, given the success of the regeneration, the need for compensatory planting has been negated.

5 Aboriginal Cultural Heritage

Council has now been provided with the *Archaeological Investigation for site of Indigenous cultural significance Sandy Beach* report prepared by Archaeological Surveys and Reports in April 2007. This report assessed all of Lot 21 DP 1070182 now known as Lot 198 DP 1191172 and Lot 98 DP 1165173. In accordance with OEH correspondence, we have been in contact with the Coffs Harbour and District Local Aboriginal Land Council (LALC) in relation to further consultation with the relevant stakeholders

since the salvage works were conducted over the site. It is understood that the only outstanding item relating to cultural heritage for the DA is the reburial of the salvaged artefacts on the site. Correspondence from the LALC is forthcoming and will be forwarded to Council once received.

6 Bushfire

Reference is made to NSW RFS letter dated 13 August 2014 requesting additional information in relation to the asset protection zones along the eastern interface of the proposed subdivision with the proposed environmental zoned land (likely to be E2 under Coffs LEP 2013).

In relation to proposed Lots 317 – 331, an APZ of 27 metres is required in accordance with AS 3959 2009. The required APZ is achieved as a result of an existing 5 metre wide water supply easement, a road reserve width of 18 metre and variable together with a 6 metre wide front building line setback and a proposed bio-retention swale (see dimensions in red). By virtue of the positioning of the easement and the need to maintain access in perpetuity, the required APZ can be sufficiently achieved.

In relation to proposed Lots 332 – 334 and Lot 601, an APZ of 21 metres is required in accordance with AS 3959 2009. The required APZ is achieved as a result of a proposed bioretention basin and access track to provide access to the proposed sewer pump station to be constructed to service both the proposed subdivision and the adjoining subdivision to the north. The access track would sit over the existing 5 metre wide water supply easement and below the existing overhead power line in this location. By virtue of the positioning of the easement and the need to maintain access in perpetuity, the required APZ can be sufficiently achieved. The DP shows the location of the water easements.

We trust the receipt of the above information will allow Council to progress the assessment of the development application. Further information in regard to Aboriginal cultural heritage will be presented in due course.

Sincerely
GHD Pty Ltd

Shaun Lawer
Senior Planner
(02) 6650 5600

Attach: Revised Subdivision and Staging Plan
Revised Stormwater Management Plan
Indicative Sediment and Erosion Control Plan
Road Traffic Noise Assessment
Asset Protection Zone Plan
Deposited Plan

PROPOSED SEWER PUMP STATION (SPS)

PROPOSED 950 m² BIORETENTION BASIN

PROPOSED PUBLIC RESERVE

300
728 m²

PROPOSED ROW FOR ACCESS TO SPS

299
22.16 ha

OCEANIC DRIVE

ROAD 1

ROAD 2

ROAD 3

ROAD 4

ROAD 5

EXISTING BIORETENTION BASIN

PUBLIC RESERVE

APPROX. 180m² BUILDING ENVELOPE

ROAD RESERVE TAPERED FROM 20m WIDE TO 16m WIDE

ZENITH AVENUE

EXISTING DEVELOPMENT

APPROX. 200m² BUILDING ENVELOPE

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APPROX. 200m² BUILDING ENVELOPE

PROPOSED THRESHOLD TREATMENT

APPROVED DEVELOPMENT

SOLITARY ISLANDS WAY

RESIDENTIAL BUILDING LOTS

STAGE 3	45 LOTS (301 - 345 PLUS LOTS 298 - 300)
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TOTAL	123 LOTS

LEGEND:

EXISTING CONTOUR (0.25m INTERVAL)

DUAL OCCUPANCY LOT *

PROPOSED STAGE BOUNDARIES

PROPOSED LOT LAYOUT PLAN

SCALE 1:750

PRELIMINARY

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
A	FOR INFORMATION		ICG			

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DO NOT SCALE

Drawn	I. GOULD	Designer
Drafting Check		Design Check
Approved (Project Director)		
Date		
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved

Client: AV JENNINGS PTY LTD
Project: SANDY BEACH SUBDIVISION STAGE 3
Title: PROPOSED STAGING PLAN SHEET 1 (MAY 2015)

Original Size: A1
Drawing No: 22-17122-SK105
Rev: A

Plot Date: 15 May 2015 - 12:27 PM
Plotted by: Ian Gould
Cad File No: G:\22\17122\CADD\Drawings\22-17122-SK105.dwg

AV Jennings Properties Ltd

Stages 3-6, Sandy Beach Subdivision

Stormwater Management Report

June 2015

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Appendices

1. Introduction

1.1 Preliminaries

This stormwater management plan has been prepared to support a development application to Coffs Harbour City Council for the 123 lot residential subdivision of Lot 198, DP 1191172 and Lot 98 DP 1165173, Solitary Islands Way, Sandy Beach.

This report describes the site, provides an assessment of the existing drainage at the site and presents a stormwater management plan to manage stormwater runoff from the proposed subdivision.

This report has been prepared by GHD. The report has been prepared on behalf of the landowners, AV Jennings Properties Ltd.

1.2 History

The site has been the subject of two (2) separate staged development applications lodged with Coffs Harbour City Council. The first development application for Stage 1 was lodged with Council June 2007 and sought approval for 24 lots within the south-western corner of the property with the remainder of the site contained within a residue lot and concept approval for an additional 116 lots. Development Consent from Coffs Harbour City Council for Stage 1 was granted on 30 April 2008.

The second development application for Stage 2 was lodged with Council in July 2007 and sought approval for 18 lots within the south-eastern corner of the property as part of the concept approval for a total of 140 lots (see Figure 4, attached). Coffs Harbour City Council are currently determining the Stages 3 - 6 application.

1.3 Proposal

The current proposal involves the residential subdivision of the site (excluding Stages 1 and 2) into 123 lots ranging in size from 430m^2 to 1,345m^2 with associated infrastructure including roads, open space areas and public domain works. A revised subdivision plan, prepared as part of the development application, is shown in Appendix A.

2. Subject site

The site is known as Lot 198, DP 1191172 and Lot 98 DP 1165173, Solitary Islands Way, Sandy Beach in the Parish of Woolgoolga, County of Fitzroy, Local Government Area of Coffs Harbour and Locality of Sandy Beach. The property is bound on the east by the Pacific Highway, on the south by the village of Sandy Beach, on the west by Solitary Islands Way and on the north by Double Crossing Creek.

The site is located approximately 1.5km south of Woolgoolga and 20km north of Coffs Harbour. The eastern boundary is 600m from the Pacific Ocean. The regional location of the site is shown in Figure 1.

The site is generally low lying in the eastern half with mild undulating ridges in the western development area. Approximately a quarter of the site has moderate tree cover with the balance either grassland or scattered shrub and regrowth.

The land has been farmed by the Robinson family for the last 40 years predominantly for cattle grazing. There was a small banana plantation in the central area of the site in the 1960's.

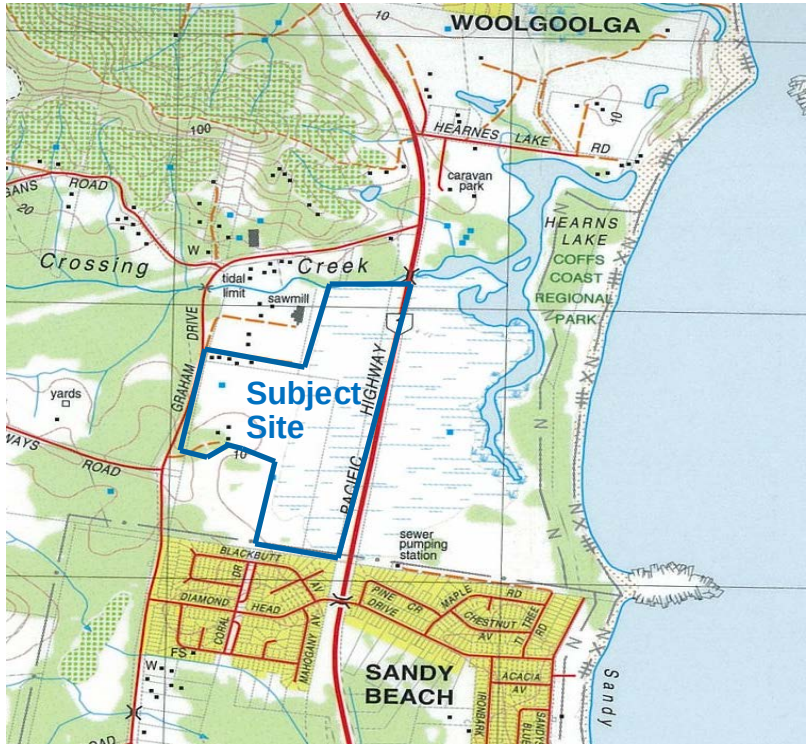

Figure 1 Regional Location

3. Existing drainage and design guidelines

3.1 Existing drainage

The site is located in the Double Crossing Creek catchment west of the highway. Double Crossing Creek drains to Hearns Lake. The proposed Stage 3 release is shown in Appendix A and includes an east-west ridge line in the southern portion of the site. This ridge line results in approximately 20% of the southern topography grading towards the existing bioretention basin that was constructed for Stages 1 and 2. The remainder of the site topography grades northwards towards the adjacent Sandy Beach Mill site. A portion of the site drains eastwards over Oceanic Drive. Much of the northward draining area is lower lying with relatively flat grades.

3.2 Design standards/guidelines

The following design guidelines have been adopted as a basis for the stormwater management strategy formulation:

- Coffs Harbour City Council, Water Sensitive Urban Design Policy, August 2013
- Coffs Harbour City Council, Water Sensitive Urban Design (WSUD) Guideline, Adopted by Council 25 June 2009 and Revised August 2012.
- Coffs Harbours City Council, Development Control Plan 2013.
- Coffs Harbour City Council, Development Specification Design, 0074 Stormwater Drainage (Design).

4. Stormwater management

4.1 Stormwater quantity

The proposed development site, seeks to provide two discharge points along Oceanic Drive, as follows:

- The south draining portion of the site (1.57 ha) will ensure that the minor stormwater system and overland flows will discharge to the existing bioretention basin that was constructed for Stages 1 and 2.
- The north draining portion of the site (8.91 ha) will be raised along the northern boundary via site regrading and will be provided with an eastward grade. This will provide two discharge points discharging to a new proposed bioretention basin near the eastern boundary. The regrading of this portion of the site will prevent overflow to the adjacent Sandy Beach Mill site, containing and managing all stormwater from the subdivision.

The Development Specification Design requires that the minor system be designed for the 20% AEP (5- year) event.

Correspondence has been received from Council indicating that stormwater quantity management for the northern portion of the site is not required, given the significant storage made available in the downstream receiving environment.

A conceptual DRAINS model has been developed for the southern portion of the site in order to confirm that the sizing of the existing bioretention basin is adequately sized to handle the additional flow as a result of the development of the site. The results, tabulated below show that the proposed detention requirements for the site are met using the existing basin constructed for Stages 1 and 2.

Table 1 Detention performance

Flood Event	Existing Peak Discharge (m^3/s)	Developed Peak Discharge (m^3/s)	Existing Flood level (m)	Developed Flood Level (m)	Comments
20% AEP	1.85	2.37	5.57	5.61	40mm Afflux
1% AEP	3.96	4.81	5.72	5.77	50mm Afflux

4.2 Stormwater quality

A MUSIC model was used to model the expected water quality outcomes for the proposed development against the objectives nominated in CHCC's WSUD Policy and Guidelines. The MUSIC model was configured for the site using the baseline parameters as recommended by the policy and guideline. In general the strategy for managing stormwater quality is as follows:

- Using the existing storm water basin constructed for Stages 1 and 2, to manage stormwater quality from the south draining portion of the site.
- Providing a new bioretention basin east of Oceanic Drive to manage stormwater quality from the north draining portion of the site.

The simulation showed that the existing bioretention basin could adequately treat the earlier stages together with the south draining portion of the site, without the need to upsize the existing basin.

For the remainder of the site the combination of the swale drainage, and a 950 m^2 bioretention treatment area was required in the new basin.

The results of the MUSIC simulation, which compare the existing predevelopment conditions with the treated post development case, are tabulated below. The table shows a significant reduction in stormwater pollutants, over the existing site discharges thus meeting Objective Set B in Section 2.1.3.

Table 2 Music Modelling Results

		South draining portion			North draining portion		
Item	Target Reduction	Existing	Developed	Reduction	Existing	Developed	Reduction
Flow (ML/yr)		90.8	88.9	2.1%	59.4	56.6	4.6%
Peak Flow (m3/s)		2.71	2.98	-10%	1.69	1.41	17%
Total Suspended Solids (kg/yr)	80	20300	3100	84.7%	9260	745	92%
Total Phosphorus (kg/yr)	60	37.5	14.6	61.1%	19.6	7.83	60%
Total Nitrogen (kg/yr)	45	187	82.7	55.8%	124	49.5	60.2%
Gross Pollutants (kg/yr)	90	1820	0	100%	1190	0	100%

4.3 Construction phases

Erosion and sedimentation control will be undertaken in accordance with CHCC “Erosion and Sediment Control on Building and Development Sites - Policy and Code of Practice”. Compliance with the Landcom “Blue Book” - Managing Urban Stormwater: Soils and Construction – Volume 1, 4th Edition is also acceptable to Council.

It is envisaged that Stage 3 of the development of works would include the construction of part of Oceanic Drive and the sag pits located adjacent the proposed bio retention basin. During construction, is it proposed that a sediment basin be located at the location of the proposed new bio-retention basin.

Following the completion of this stage of works, the sediment basin would be removed and the proposed bio retention basin installed. Further stages of the development would then connect to the stage 3 stormwater drainage network and the bio retention basin via the sag pits on Oceanic Drive.

4.4 WSUD policy compliance

The redevelopment of the site shall adopt the following strategies to comply with the policy.

Table 3 Objective Set A

	Objective	Action
A.1	To implement 'best practice' stormwater management techniques.	A SWMP is proposed within this report in accordance with CHCC WSUD policy.
A.2	To maintain natural drainage patterns.	The proposed development will not change the general drainage towards Double Crossing Creek
A.3	To maintain watercourses in their natural form, i.e. watercourses should not be piped or channelled.	There are no watercourses within the site, and the development is clear of the adjacent tributaries
A.4	To maintain adequate and intact vegetation buffers around waterways and sensitive areas	Existing vegetation around the perimeter of the site will not be removed.

Table 4 Objective Set B

	Objective	Action
B.1	Construction Phase: Apply Landcom (Blue Book) Erosion and Sediment Control Principles and Procedures	A sediment erosion and control plan has been developed to satisfy this condition.
B2	• 80% reduction in the average annual total suspended solids load • 60% reduction in the average annual total phosphorus load • 45% reduction in the average annual total nitrogen load • 90% reduction in the average annual gross pollutant (size >5mm) load.	A MUSIC model has been prepared to show the proposed treatment measures satisfy these conditions.

5. Summary and conclusions

This stormwater management plan has been prepared to support a development application to Coffs Harbour City Council for a 101 lot residential subdivision of Lot 198, DP 1191172 and Lot 98 DP 1165173, Solitary Islands Way, Sandy Beach. This report describes the site, provides an assessment of the existing drainage at the site and presents a stormwater management plan to manage stormwater runoff from the proposed subdivision, with reference to the Coffs Harbour City Council's (CHCC) Water Sensitive Urban Design Policy.

For the management of stormwater quantity and quality:

- The additional area discharging to the southern portion of the site (1.57 ha) has been assessed and it has been shown that the major and minor stormwater system through the existing bioretention basin that was constructed for Stages 1 and 2, will not be adversely affected by the additional development.
- The north draining portion of the site (8.91 ha) will be raised along the northern boundary via site regrading and will be provided with an eastward grade. This will provide two discharge points discharging into a proposed new bioretention basin east of Oceanic Drive. The regrading of this portion of the site will prevent overflow to the adjacent Sandy Beach Mill site, containing and managing all stormwater from the subdivision.
- Construction stage impacts will be managed in accordance with CHCC "Erosion and Sediment Control on Building and Development Sites - Policy and Code of Practice" and Landcom's "Blue Book" - Managing Urban Stormwater: Soils and Construction – Volume 1, 4th Edition.
- The compliance with Council's WSUD policy and particularly objective Sets A and B has been demonstrated, and MUSIC/DRAINS stormwater modelling results have shown compliance with Council's guidelines.

This report: has been prepared by GHD for AV Jennings Pty Ltd and *may only be used and relied on by AV Jennings Pty Ltd for the purpose agreed between GHD and the AV Jennings Pty Ltd as set out in this report. GHD otherwise disclaims responsibility to any person other than AV Jennings Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible. The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.*

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by AV Jennings Pty Ltd and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

Appendices

Appendix A – Subdivision Plan

PROPOSED SEWER PUMP STATION (SPS)

PROPOSED 950 m² BIORETENTION BASIN

PROPOSED PUBLIC RESERVE

300
728 m²

PROPOSED ROW FOR ACCESS TO SPS

299
22.16 ha

OCEANIC DRIVE

ROAD 1

ROAD 2

ROAD 3

ROAD 4

ROAD 5

EXISTING BIORETENTION BASIN

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DUAL OCCUPANCY LOT *

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PROPOSED LOT LAYOUT PLAN

SCALE 1:750

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Drafting Check		Design Check
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Client: AV JENNINGS PTY LTD
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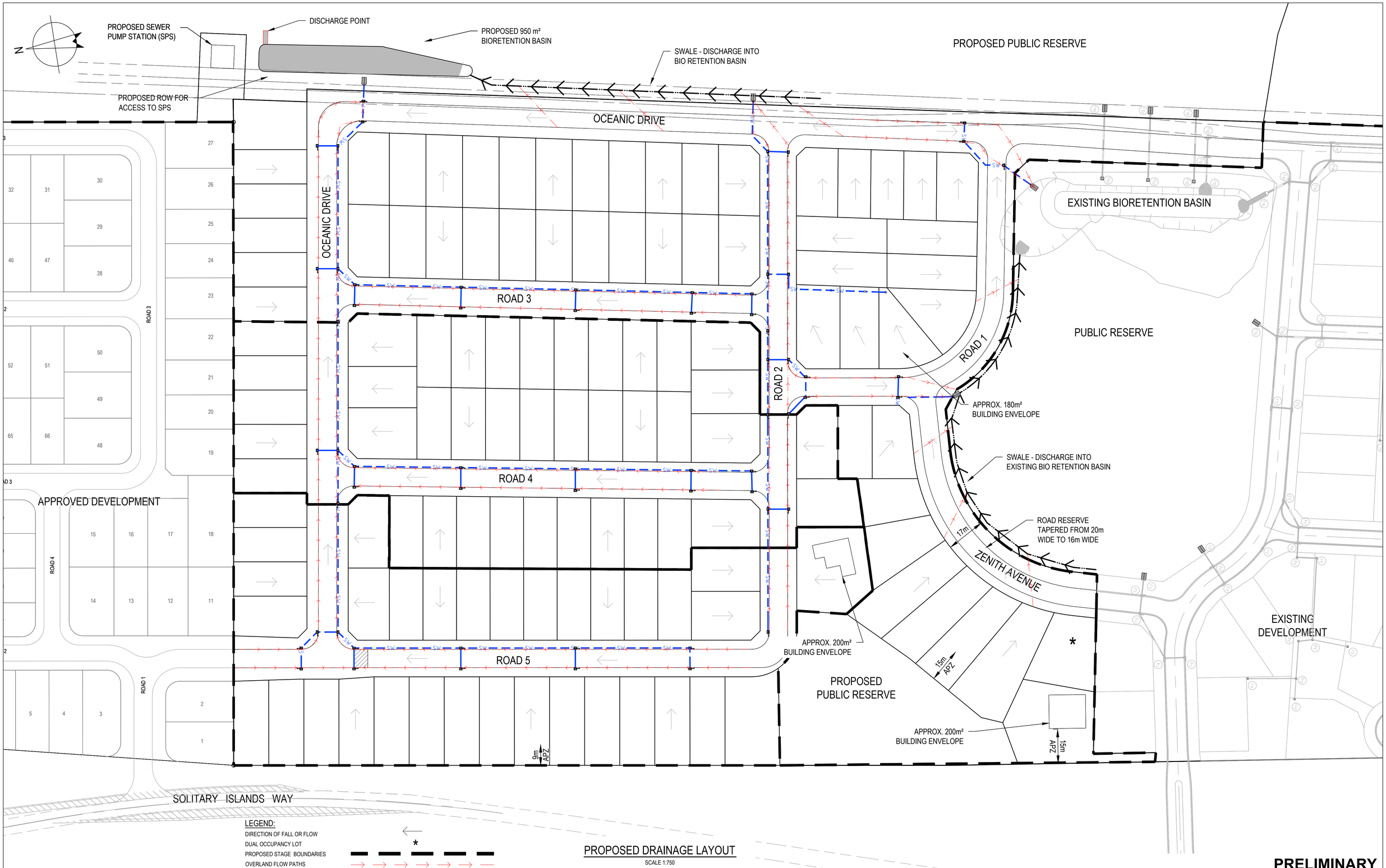
Title: PROPOSED STAGING PLAN SHEET 1 (MAY 2015)

Original Size: A1
Drawing No: 22-17122-SK105
Rev: A

Plot Date: 15 May 2015 - 12:27 PM
Plotted by: Ian Gould
Cad File No: G:\22\17122\CADD\Drawings\22-17122-SK105.dwg

Appendix B – Stormwater Management Plan



PROPOSED DRAINAGE LAYOUT

SCALE 1:750

PRELIMINARY

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
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Drafting Check		Design Check	
Approved (Project Director)			
Date			
Scale AS SHOWN	This Drawing must not be used for Construction unless signed as Approved		

Client: **AV JENNINGS PTY LTD**
Project: **SANDY BEACH SUBDIVISION STAGE 3**
Title: **PROPOSED STORMWATER MANAGEMENT PLAN**

Original Size **A1** Drawing No: **22-17122-SK102** Rev: **A**

Plot Date: 29 May 2015 - 12:28 PM Plotted by: Ian Gould Cad File No: G:\22\17122\CADD\Drawings\22-17122-SK102.dwg

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	R Berg	S Douglas	*S Douglas*	S Lawer	*S Lawer*	Jun 14
1	R Berg	S Douglas		S Lawer		Jun 15

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PROPOSED SEWER PUMP STATION (SPS)

PROPOSED 950 m² BIORETENTION BASIN

PROPOSED PUBLIC RESERVE

PROPOSED ROW FOR ACCESS TO SPS

OCEANIC DRIVE

EXISTING BIORETENTION BASIN

ROAD 1

ROAD 2

ROAD 3

ROAD 4

ROAD 5

APPROX. 180m² BUILDING ENVELOPE

PUBLIC RESERVE

ROAD RESERVE TAPERED FROM 20m WIDE TO 16m WIDE

ZENITH AVENUE

APPROX. 200m² BUILDING ENVELOPE

PROPOSED PUBLIC RESERVE

APPROX. 200m² BUILDING ENVELOPE

APPROVED DEVELOPMENT

SOLITARY ISLANDS WAY

PROPOSED THRESHOLD TREATMENT

LEGEND

- LEVEL SPREADER
- NATURAL GRASSED WATERWAY
- CONSTRUCTED GRASSED WATERWAY
- VEGETATIVE FILTER STRIP
- SEDIMENT FILTER FENCE
- STRAW BALE SEDIMENT FILTER
- CATCHMENT BOUNDARY
- CUT AREA
- FILL AREA
- SS STOCK PILE AREA
- TEMPORARY CONSTRUCTION EXIT
- SB SEDIMENT BASIN
- SEDIMENT TRAP
- DROP DOWN DRAIN
- WATERWAY WITH CHECK DAM
- DIVERSION BANK
- XXX LIMIT OF CLEARING & GRADING
- TEMPORARY PIPE

LEGEND:

EXISTING CONTOUR (0.25m INTERVAL)

DUAL OCCUPANCY LOT *

PROPOSED STAGE BOUNDARIES

PROPOSED LOT LAYOUT PLAN

SCALE 1:750

PRELIMINARY

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
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Client AV JENNINGS PTY LTD

Project SANDY BEACH SUBDIVISION STAGE 3

Title INDICATIVE SEDIMENT AND EROSION CONTROL PLAN

Original Size A1

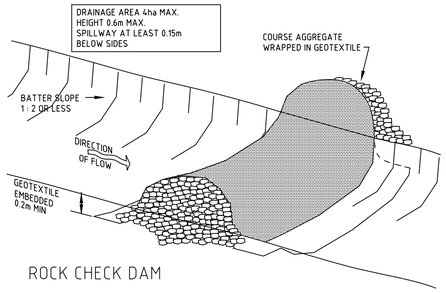
Drawing No: 22-17122-SK110

Rev: A

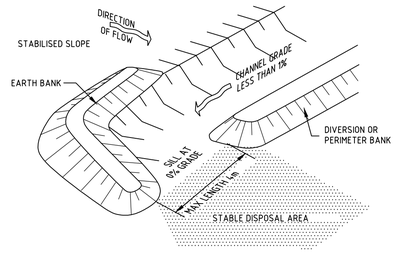
Plot Date: 29 May 2015 - 9:03 AM

Plotted by: Ian Gould

Cad File No: G:\22\17122\CADD\Drawings\22-17122-SK110.dwg



ROCK CHECK DAM



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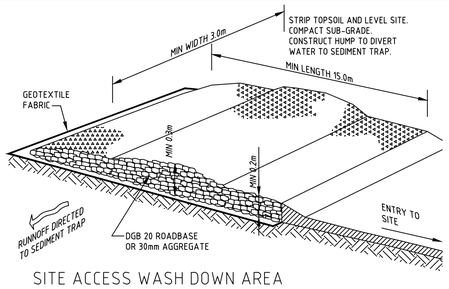
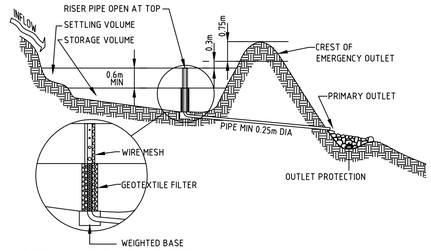
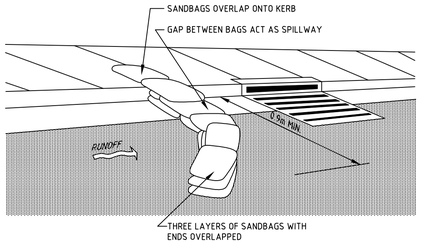


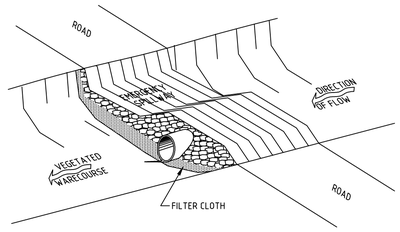
SITE ACCESS WASH DOWN AREA



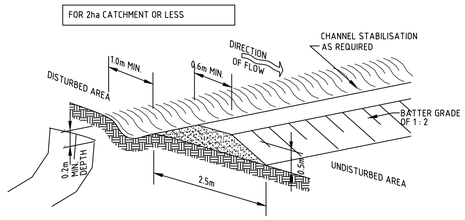
SEDIMENT BASIN SECTION A.A



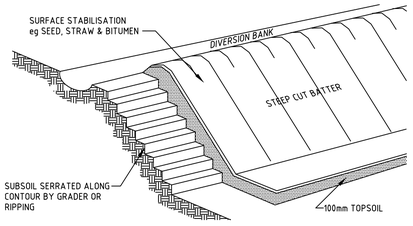
SAND BAG KERB INLET SEDIMENT TRAP



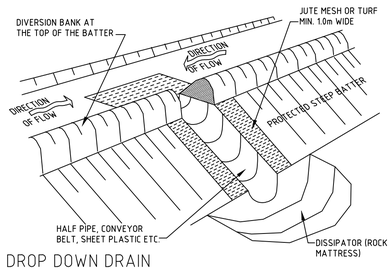
TEMPORARY ACCESS CULVERT



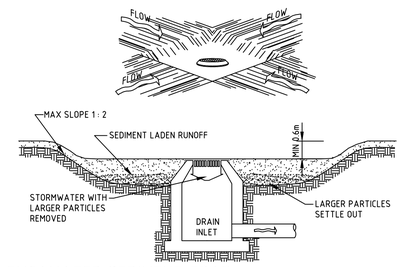
PERIMETER BANK WITH CHANNEL



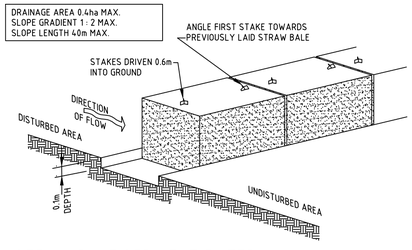
REVEGETATION METHODS
ON STEEP BATTERS



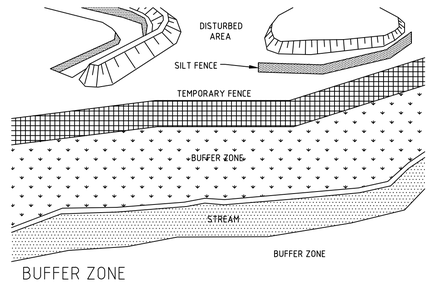
DROP DOWN DRAIN



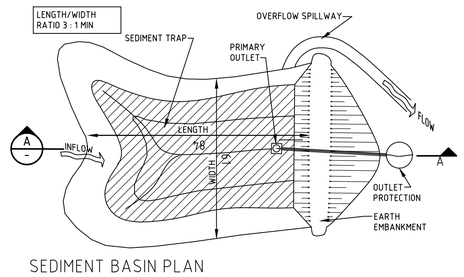
EXCAVATED SEDIMENT TRAP



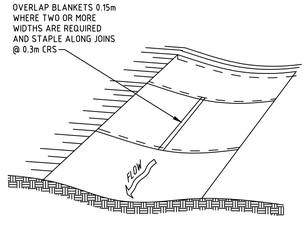
STRAW BALE SEDIMENT FILTER



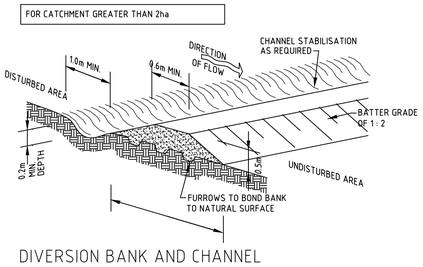
BUFFER ZONE



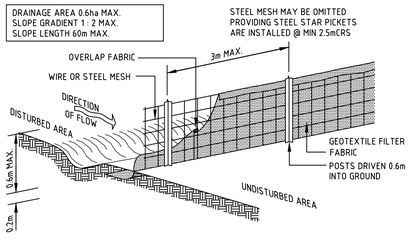
SEDIMENT BASIN PLAN



CONSTRUCTED SPILLWAY CHANNEL



DIVERSION BANK AND CHANNEL



SEDIMENT FENCE

NOTES

G.00 GENERAL

G.01 ALL WORK IS TO BE IN ACCORDANCE WITH THE PLAN AND CONSISTENT WITH N.S.W. DEPARTMENT OF HOUSING 1998, MANAGING URBAN STORMWATER, SOILS AND CONSTRUCTION.

G.02 THE NOMINATED PROJECT MANAGER SHALL BE RESPONSIBLE FOR THE IMPLEMENTATION OF THE EROSION AND SEDIMENT CONTROL PLAN.

G.03 THE PROJECT MANAGER SHALL INFORM ALL CONTRACTORS AND SUB-CONTRACTORS OF THEIR OBLIGATIONS UNDER THE EROSION AND SEDIMENT CONTROL PLAN.

G.04 THE PLAN SHALL INCLUDE A WORKS PROGRAM (eg. GANTT CHART) INCLUDING ACCOUNTABILITY FOR EACH ACTION (ie RESPONSIBILITY/SIGN OFF).

G.05 CONTROL MEASURES SHALL BE IN PLACE PRIOR TO EACH SITE DISTURBANCE.

G.06 SITE DISTURBANCE SHALL BE STAGED WHERE POSSIBLE AND RESTRICTED TO THE WORKS ZONE.

G.07 ALL WORKS ARE TO BE INSPECTED, AND MAINTAINED WHERE NECESSARY, ON A WEEKLY BASIS AND AFTER EACH RUNOFF EVENT.

G.08 FAILURE TO IMPLEMENT ANY PART OF THE PLAN WILL CONSTITUTE A HOLD POINT.

T.00 TOPSOIL MANAGEMENT

T.01 TOPSOIL SHALL INCLUDE A MINIMUM OF THE FIRST 100-150mm OF THE SOIL SURFACE.

T.02 TOPSOIL IS TO BE STRIPPED FROM ALL AREAS THAT ARE TO BE CUT OR FILLED AND STOCKPILED IN AREAS INDICATED ON THE PLAN, AWAY FROM DRAINAGE FLOWPATHS OR STORMWATER INLETS.

T.03 TOPSOIL STOCKPILES ARE TO BE TRACK ROLLED AND WHERE STOCKPILED FOR PERIODS GRAETER THAN 6 WEEKS FURTHER STABILISED (eg. SEEDED WITH AN APPROPRIATE VEGETATIVE COVERCROP OR MULCHED).

T.04 TOPSOIL IS TO BE RE-SPREAD OVER ALL EXPOSED SOIL SURFACES WHERE VEGETATION IS REQUIRED. A MAXIMUM DEPTH OF 50mm SHALL BE PLACED ON SLOPES STEEPER THAN 1 : 3 AND A MINIMUM DEPTH OF 100mm SHALL BE PLACED ON SLOPES LESS THAN 1 : 3.

T.05 WHERE CUT BATTERS ARE TO BE SEEDED, SLOPES EXCEEDING 1 : 2.5 (H : V) SHALL BE ROUGHENED HORIZONTALLY TO ENHANCE THE RETENTION OF TOPSOIL.

T.06 SOIL AMELIORANTS SHALL BE PROVIDED AS DETERMINED BY THE PROJECT MANAGER.

T.07 SEEDBED PREPARATION SHALL BE PROVIDED WHERE TOPSOIL HAS BEEN OVERLY COMPACTED.

T.08 ALL EFFORTS SHALL BE MADE TO ESTABLISH VEGETATION ON ALL EXPOSED SOIL SURFACES IMMEDIATELY EARTHWORKS ARE COMPLETED. THE MINIMUM REQUIREMENT SHALL BE ESTABLISHMENT OF A COVERCROP SPECIES WITH THE INCLUSION OF PERMANENT VEGETATION SPECIES AS APPROPRIATE.

T.09 STOCKPILE SITES, BORROW PITS ETC. SHALL BE REVEGETATED IMMEDIATELY UPON DECOMMISSION.

R.00 REVEGETATION

R.01 REVEGETATION SHALL BE ON-GOING AND PROGRESSIVE.

R.02 WHERE ANY BREAK IN OPERATIONS, OR WHERE WORK IS CEASED IN AN AREA FOR LONGER THAN 4 WEEKS, THE EXPOSED AREA SHALL BE STABILISED (eg. TEMPORARY TOPSOILING AND SEEDING WITH AN APPROPRIATE COVERCROP, MULCHES, BLANKETS/ MATTINGS).

R.03 TOPSOILED AREAS ARE TO BE SEEDED WITH THE FOLLOWING COVERCROP SPECIES:
(a) SEPTEMBER TO FEBRUARY - JAPANESE MILLET (15kg/ha)
(b) MARCH TO AUGUST - ANNUAL RYEGRASS OR CEREAL RYE OR OATS (15kg/ha)
(c) FROM LATE FEBRUARY TO EARLY MARCH AND LATE AUGUST TO EARLY SEPTEMBER A COMBINATION OF SPECIES CAN BE USED

R.04 SUGGESTED PERMANENT GRASS SPECIES INCLUDE:
(a) CARPET GRASS (10kg/ha)
(b) HULLED COUCH (6kg/ha)
(c) KIKUYU (4kg/ha)
(d) WHITE CLOVER (3kg/ha)

R.05 AN NPK 11-34-11 FERTILISER OR SIMILAR AS APPROPRIATE IS TO BE APPLIED AT A RATE OF 200-400kg/ha. CARE IS TO BE TAKEN TO AVOID ANY FERTILISER DIRECTLY ENTERING WATERCOURSES. SCARIFYING OR DIRECT DRILLING CAN IMPROVE SEED STRIKE RATES.

R.06 THE CONTRACTOR SHALL PROVIDE SUITABLE SEED BED PREPARATION PRIOR TO THE SOWING OF VEGETATION SEED SPECIES.

R.07 REVEGETATION WORKS SHALL BE MAINTAINED/ENHANCED (eg. RESEEDING, FERTILISING, WATERING) UNTIL A MINIMUM OF 70% GROUND COVER IS ESTABLISHED.

R.08 A STRIP OF TURF SHALL BE PROVIDED AND MAINTAINED IMMEDIATELY BEHIND KERB WHERE FOOTPATH AND SITE DISTURBANCE HAS OCCURRED AND COMPLIMENTED BY ADDITIONAL STRIPS ACROSS THE FOOTPATH AT REGULAR INTERVALS WHERE RUNOFF IS EXPECTED TO FLOW ALONG THE SAID FOOTPATH.

E.00 EROSION CONTROL

E.01 STORMWATER DRAINAGE AND CULVERTS NEED TO BE INSTALLED EARLY TO CATER FOR STORM RUNOFF.

E.02 SOIL MATERIAL STOCKPILES SHALL BE LOCATED AWAY FROM DEPRESSION FLOWLINES.

E.03 BARRIER OR SIMILAR FENCING IS TO BE USED TO PROTECT NO-GO AREAS.

E.04 SITE ACCESS SHALL INCLUDE A SOIL RETENTION SYSTEM (eg. GRAVEL SHAKEDOWN ZONE).

E.05 TEMPORARY DIVERSION DRAINS/BANKS (AT 3% SLOPE) ARE TO BE SUCCESSIVELY INSTALLED DOWNSLOPE (eg. ROAD FORMATIONS) AT PRIOR TO ANY BREAKS IN CONJUNCTION (eg. WEEKENDS). SEDIMENT TRAPS ARE TO BE PLACED AT THEIR OUTLETS.

E.06 ALL DIVERSION BANKS SHALL BE STABILISED.

E.07 NO MORE THAN 150m OF TRENCHING TO BE OPEN AT ANY ONE TIME.

S.00 SEDIMENT CONTROL

S.01 THE NEED FOR SEDIMENT CONTROL MEANS THAT EROSION CONTROL HAS NOT BEEN ACHIEVED.

S.02 SEDIMENT FENCING IS TO BE INSTALLED TO THE MANUFACTURERS SPECIFICATIONS AND:
(a) BE SPACED SUCCESSIVELY DOWNSLOPE NO GREATER THAN 50m APART AND APPROXIMATELY AT EVERY 1m FALL IN GROUNDSLOPE
(b) BE INSTALLED TO THE CONTOUR
(c) HAVE THE ENDS TURNED UPSLOPE 500mm WHERE APPROPRIATE TO CREATE STORAGE

S.03 SEDIMENT TRAPS SHALL BE INSTALLED IN ACCORDANCE WITH PLAN DETAILS. THEY WILL:
(a) BE AS LARGE AS PRACTICAL
(b) BE CONSTRUCTED TO SUIT EXPECTED FLOW CONDITIONS
(c) BE LOCATED APPROXIMATELY EVERY 1m FALL IN GROUNDSLOPE
(d) PROVIDE FOR SAFE OVERFLOW

S.04 SEDIMENT CONTROLS ARE TO BE LOCATED AS CLOSE TO DISTURBED AREAS AS PRACTICAL.

S.05 TRAPPED SEDIMENT TO BE REMOVED TO AN APPROPRIATE NOMINATED LOCATION.

S.06 TEMPORARY CONTROL MEASURES SHALL REMAIN IN PLACE UNTIL CATCHMENT THEY ARE SERVING IS STABILISED (FOR GRASS THIS WILL MEAN 70% GROUNDCOVER).

S.07 PROVIDE SEDIMENT BAGS IN KERB & GUTTER UPSTREAM OF EXISTING KERB INLET PITS UNTIL DISTURBED AREAS ARE ADEQUATELY STABILISED.

S.08 PRIOR TO APPROVAL OF STORMWATER PIPES AND PITS, PREVENT RUNOFF DRAINING INTO PIPE SYSTEM BY SAND BAGGING AND DIVERSION TO OTHER CONTROL MEASURES.

S.09 ON COMPLETION OF PITS, CONSTRUCT SEDIMENT TRAPS IN ACCORDANCE WITH DETAILS UNTIL EARTHWORK ZONES ARE STABILISED WITH GRASS COVER.

PRELIMINARY

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
A	FOR INFORMATION					

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Drawn J.M.KAMA		Designer
Drafting Check		Design Check
Approved (Project Director)		
Date		
Scale AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client **AV JENNINGS PTY LTD**
Project **SANDY BEACH SUBDIVISION STAGE 3**
Title **SEDIMENT AND EROSION CONTROL DETAILS**

Original Size **A1** Drawing No: **22-17122-SK111** Rev: **A**

Plot Date: 29 May 2015 - 9:04 AM Plotted by: Ian Gould Cad File No: G:\22\17122\CADD\Drawings\22-17122-SK110.dwg

AV Jennings Properties Ltd

Proposed Residential Subdivision, Solitary Islands Way, Sandy Beach

Road Traffic Noise Assessment

May 2015

Table of contents

Table index

Figure index

Appendices

Glossary of acoustic terms

Abbreviation	Definition
AADT	Annual average daily traffic
ABL	Assessment background level. The single figure background level representing each assessment period – day, evening and night.
dB	Decibel is the unit used for expressing the sound pressure level (SPL) or power level (SWL) in acoustics.
dB(A)	Frequency weighting filter used to measure 'A-weighted' sound pressure levels, which conforms approximately to the human ear response, as our hearing is less sensitive at very low and very high frequencies.
INP	NSW Industrial Noise Policy (DECC, 2000)
$L_{Aeq(period)}$	Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
$L_{A90(period)}$	The sound pressure level that is exceeded for 90% of the measurement period. Commonly referred to as background noise level.
L_{Amax}	The maximum sound level recorded during the measurement period.
Noise sensitive receiver	An area or place potentially affected by noise could include: • Residential dwellings • Educational institutions, libraries, childcare centres, hospitals or place of worship • Active (e.g. sports field, golf course) or passive (e.g. national park) recreational areas • Commercial or industrial premises
Rating background level (RBL)	The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period.

1. Introduction

1.1 Purpose of this report

GHD Pty Ltd (GHD) has been engaged by AV Jennings Properties Ltd to assess potential road traffic noise impacts from the Pacific Highway on a proposed residential subdivision of Lot 198, DP 1191172 and Lot 98 DP 1165173, Solitary Islands Way, Sandy Beach.

1.2 Scope of work

The scope of works in completing the acoustic assessment was as follows:

- Initial desktop review of the proposal site.
- Review of existing and previous noise studies in the area, as applicable.
- Undertake unattended noise monitoring at two locations. The monitoring will provide details of the existing levels of traffic noise within the proposal site.
- Undertake attended noise measurements at each of the unattended noise logging locations to supplement the unattended measurements.
- Identify applicable noise criteria for residential development within the proposal site.
- Create a road traffic noise model encompassing the proposal site using CadnaA software, and validate predicted noise results with unattended measurement data.
- Assess the predicted noise levels against the relevant noise criteria
- Advise on the required construction categories within the proposed subdivision to achieve applicable residential internal noise criteria.

1.3 Limitations

This report: has been prepared by GHD for AV Jennings Properties Ltd and *may only be used and relied on by AV Jennings Properties Ltd for the purpose agreed between GHD and the AV Jennings Properties Ltd as set out in section 1.1 and 1.2 of this report.*

GHD otherwise disclaims responsibility to any person other than AV Jennings Properties Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in section 1.4 of this report. GHD disclaims liability arising from any of the assumptions being incorrect.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Site conditions may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

1.4 Assumptions

Previous reports have been reviewed and/or referenced in preparing this assessment. The following reports are assumed to be factual and still relevant:

- Sandy Beach, Coffs Harbour Road Traffic Noise Assessment, prepared by Heggies, September 2008.
- Sapphire to Woolgoolga Environmental Assessment, prepared by Connell Wagner, November 2007

2. Existing environment

2.1 The proposal site

The site is referred to Lot 198, DP 1191172 and Lot 98 DP 1165173 Solitary Islands Way, Sandy Beach. The property is bound on the east by the Pacific Highway, on the south by the village of Sandy Beach, on the west by Solitary Islands Way and rural properties beyond and on the north by undeveloped residential land and Double Crossing Creek. The Pacific Highway is a four lane dual carriageway and is approximately 250 metres east of the nearest proposal site boundary.

An aerial image of the site is shown in Figure 2-1. Note that the former timber mill and temporary construction/ stockpile compound for the Pacific Highway Upgrade shown to the north of the proposal has ceased to operate since the date of this image.

Figure 2-1 Aerial of subject site and monitoring locations

2.2 Existing noise environment

2.2.1 Unattended noise monitoring methodology

Unattended noise monitoring was undertaken at two locations within the proposal site between 24 April and 30 April 2015. The selected locations were chosen in order to determine the propagation of road traffic noise from the Pacific Highway across the subject site, and were also considered to be safe and secure locations for noise monitoring equipment. The loggers were retrieved after six days of monitoring due to predicted heavy rain to avoid the risk of damage to the equipment. The Industrial Noise Policy (INP), NSW EPA, provides guidance on background monitoring. Appendix 3.5 of the INP states that "where the background noise levels are affected significantly by nearby road traffic with regular pattern, three days' worth of valid data may be sufficient." The valid data collected between 24 April and 30 April more than fulfilled this guidance.

The noise loggers were programmed to accumulate L_{A90}, L_{A10}, L_{Aeq} and L_{Amax} noise descriptors continuously over sampling periods of 15 minutes for the entire monitoring period. Calibration of the noise loggers was checked immediately before and after measurements using a Larson Davis CAL200 sound level calibrator (serial number 9193).

The noise data collected by the loggers was downloaded and analysed and any invalid data removed. With consideration to the INP, invalid data generally refers to periods of time where average wind speeds were greater than 5 m/s or when rainfall occurred. Concurrent fifteen minute weather data were sourced from the Bureau of Meteorology's (BoM) Coffs Harbour Automatic Weather station.

Details of the noise loggers and locations are provided in Table 2-1.

All sampling activities were undertaken with consideration to the specifications outlined in AS 1055 (1997) *'Description and Measurement of Environmental Noise'* and the NSW INP.

Table 2-1 Unattended noise monitoring details

Monitoring location ID	Logger details	Monitoring location	Site photo
L1	Logger type: RION NL-52 Serial no: 131629	Logger located approximately 260 m from Pacific Highway. Microphone height 1.5 m from ground.	

Monitoring location ID	Logger details	Monitoring location	Site photo
L2	Logger type: RION NL-52 Serial no: 131632	Logger located approximately 375 m from Pacific Highway. Microphone height 1.5 m from ground.	

2.2.2 Unattended noise monitoring results

A summary of measured background L_{A90} and ambient L_{Aeq} noise levels from each logging location are presented in Table 2-2. More detailed data is presented in Appendix A

Table 2-2 Summary of long term monitoring results

Logging location	L_{A90} RBL			L_{Aeq}				
	Day	Evening	Night	Day	Evening	Night	15 hr	9 hr
L1	47	44	40	53	53	52	54	53
L2	44	40	38	49	48	46	50	46

Note 1. Day: 7:00 am to 6:00 pm, Evening 6:00 pm to 10:00 pm, Night 10:00 pm to 7:00 am.
Note 2. L_{Aeq} 15hr (7:00 am to 10:00 pm) and L_{Aeq} 9 hr (10:00 pm to 7:00 am) overall levels calculated from weekdays only.

2.2.3 Attended noise monitoring

Attended noise monitoring was undertaken at the time of deploying each noise logger. Attended noise monitoring allows for characterisation of the ambient acoustic environment. Each logger was monitored for the first two fifteen minute logging periods while notes were taken on the ambient acoustic environment.

During attended monitoring it was noted that construction activities on the lot north of the proposal were audible. Road traffic noise from the Pacific Highway remained the dominant noise source at logger position L1, but construction was the dominant noise source at logger position L2. The night-time period carries more stringent noise criteria since it is a more sensitive time period. Construction activities are not expected to continue during the night-time period, and therefore will not affect this assessment.

Table 2-3 provides a summary of attended monitoring results.

Table 2-3 Attended monitoring results

Location	Date and time	LAeq	LA10	LA90	Observations
L1	24/05/2015 10:30	50	52	45	Pacific Highway road traffic noise dominant noise source: 46 – 60 dB(A) Birds are intermittently audible: 44 dB(A). Reverse beeper noise and occasional engine noise heard from land development underway on lot north of proposal: 42 dB(A). Weather conditions: Clear, sunny, mostly calm.
L1	24/05/2015 10:45	47	49	43	Pacific Highway road traffic noise dominant noise source: 46 – 60 dB(A) Birds are intermittently audible: 44 dB(A). Reverse beeper noise and occasional engine noise heard from land development underway on lot north of proposal: 42 dB(A). Weather conditions: Clear, sunny, mostly calm
L2	24/05/2015 11:45	48	49	45	Construction noise from adjacent lot dominant source: 43 – 47 dB(A). Occasional local traffic on Solitary Islands Way: 42 – 46 dB(A). Truck engine noise on Pacific Highway occasionally audible: 43 – 45 dB(A). Birds and breeze through trees also noted. Weather conditions: Clear, sunny, mostly calm.
L2	24/05/2015 12:00	47	48	43	Construction noise from adjacent lot dominant source: 43 – 47 dB(A). Occasional local traffic on Solitary Islands Way: 42 – 46 dB(A). Truck engine noise on Pacific Highway occasionally audible: 43 – 45 dB(A). Weather conditions: Clear, sunny, mostly calm.

3. Noise criteria

The proposal site has the potential to be impacted by road traffic noise from the Pacific Highway. Because the proposal is a new development near existing road infrastructure, noise criteria for the proposal has been taken from *Development Near Rail Corridors and Busy Roads – Interim Guideline, NSW Department of Planning, 2008*. This guideline refers to the *Infrastructure State Environment Planning Policy, 2007 (SEPP)* for noise goals for sensitive developments near busy roads. The SEPP specifies the following (clause 102):

- L_{Aeq} noise levels are not to exceed 35 dB(A) in any bedroom within the building at any time between 10.00 pm and 7.00 am.
- L_{Aeq} noise levels are not to exceed 40 dB(A) within any other space (other than garage, kitchen, bathroom or hallway) at any time.

The Development Near Rail Corridors and Busy Roads – Interim Guideline presents the noise goals listed above and further adds that airborne noise related to road traffic is calculated as $L_{eq\ (9h)(night)}$ and $L_{eq\ (15h)(day)}$.

Table 3-1 Noise criteria from Development Near Rail Corridors and Busy Roads - Interim Guideline

Residential Buildings		
Type of occupancy	**Noise Level dB(A)**	**Applicable time period**
Sleeping areas (bedroom)	35	Night 10 pm to 7 am
Other habitable rooms (excl. garages, kitchens, bathrooms and hallways)	40	At any time
Non-Residential Buildings		
Type of occupancy		**Recommended Max Level dB(A)**
Educational Institutions including child care centres		40
Places of Worship		40
Hospitals	-Wards	35
	-Other noise sensitive areas	45

Note: airborne noise is calculated as Leq (9h)(night) and Leq (15h)(day).

Table 3-1 shows that the limiting noise criteria for residential buildings is 35 dB(A) $L_{eq\ (9h)\ (night)}$. Compliance with this criterion ensures compliance with less stringent criteria.

4. Assessment of traffic noise

4.1 Model configuration

Acoustic modelling was undertaken using Computer Aided Noise Abatement v4.4 (CadnaA) to predict the effects of road traffic noise on the proposal.

CadnaA is a computer program for the calculation, assessment and prognosis of noise propagation. CadnaA calculates environmental noise propagation according to ISO 9613-2, *"Acoustics – Attenuation of sound during propagation outdoors*". Ground absorption, reflection, and relevant shielding objects are taken into account in the calculations.

The following assumptions were made with regard to the model configuration:

- Road noise impacts were predicted using the UK Department of Transport, "Calculation of Road Traffic Noise" (CORTN 1988) algorithms incorporated into CadnaA.
- Road traffic noise levels were predicted for existing year 2015 and future year 2025.
- Road noise sources where separated into tyre noise, truck engine noise and truck exhaust noise.
- Posted speed limit near the proposal is 110 kilometres per hour.
- Site drawings and digital topographical data were used to position hypothetical buildings. Buildings were modelled based on a height of 5 metres.
- Façade reflection of 2.5 dB was included in the predicted 2025 noise model to account for the presence of building sound reflection.
- A general ground absorption coefficient of 1 was used throughout the model to represent vegetation between the Pacific Highway and the proposal.
- Modelling does not include the presence of barrier fences on the lot boundaries.
- Modelling is based on atmospheric conditions of 10° C and 70% humidity.
- Noise models were assessed under neutral meteorological conditions.

Annual Average Daily Traffic (AADT) data was sourced from the Sapphire to Woolgoolga Environmental Assessment, prepared by Connell Wagner, November 2007. Traffic data used to represent the Pacific Highway near the proposal is presented in Table 4-1. A growth rate of 2.5% was used to estimate 2015 and 2025 traffic volumes, as this growth rate was used in the environmental assessment to project 2031 traffic volumes from 2011 estimates.

Table 4-1 Traffic volumes

Road	Supplied AADT	Estimated 2015 AADT	Estimated 2025 AADT
Pacific Highway north of Fiddaman Rd	18,166 13.5% Heavy vehicles Source year: 2011	20,0552 13.5% Heavy vehicles	25,668 13.5% Heavy vehicles

4.2 Predicted results

The CORTN prediction method was used to calculate road traffic noise using CadnaA.

Model predictions were validated against the noise monitoring results prior to further noise predictions being made. Predicted results were within 1 dB(A) of measured values, providing confidence in the accuracy of noise model predictions.

Figure 4-1 shows the predicted 2015 road traffic noise propagation across the current proposed lot layout.

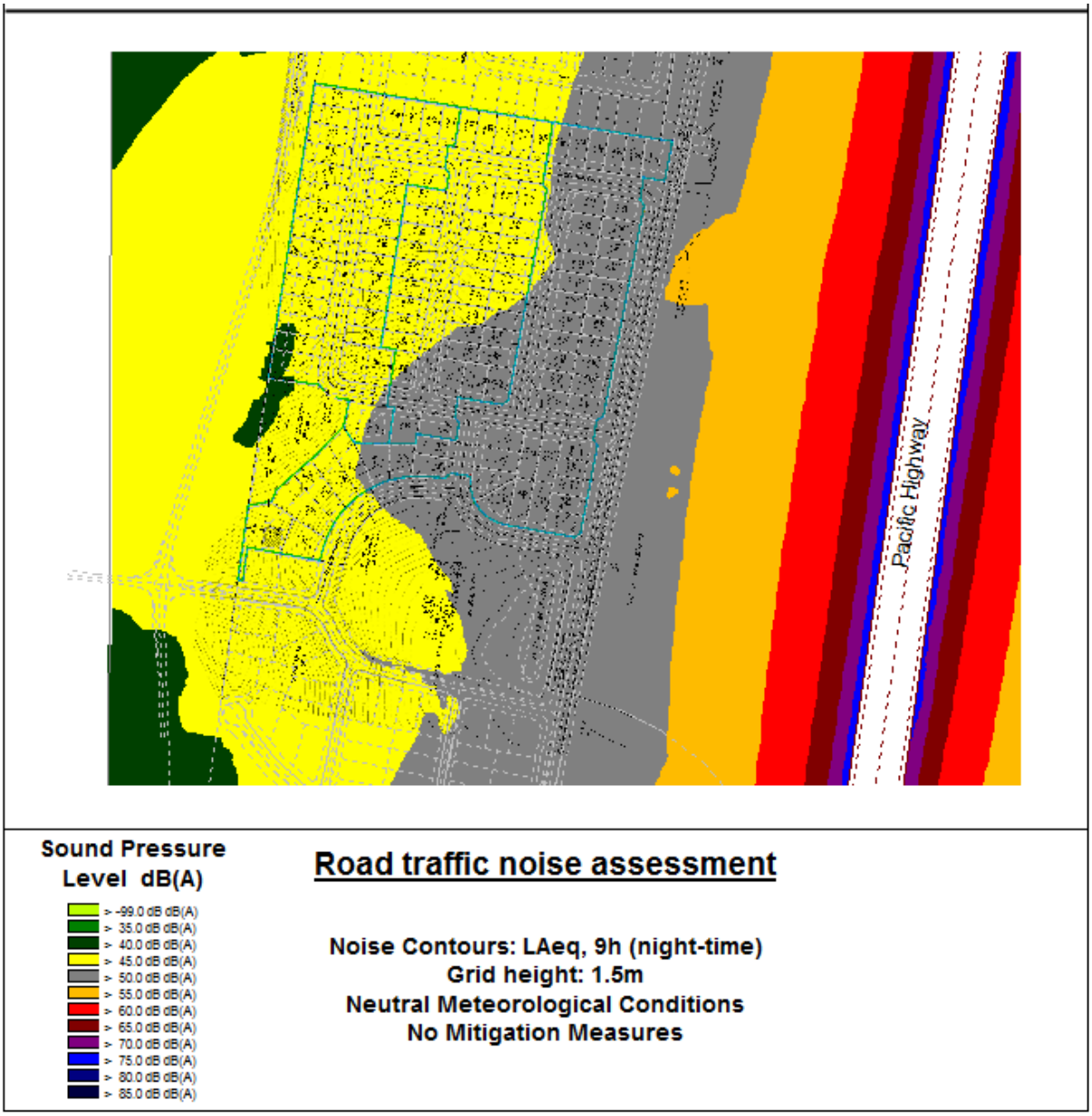


Figure 4-1 Existing predicted road traffic noise (Year 2015) at proposal site

Figure 4-1 shows that the front row of lots facing the Pacific highway is predicted to have the highest receiver levels. The front row of lots therefore will have the most stringent construction category requirements.

Road traffic noise was also predicted for the year 2025 using hypothetical one storey buildings and traffic data from Table 4-1. Predicted 2025 road noise levels at the proposal site are shown in Figure 4-2.

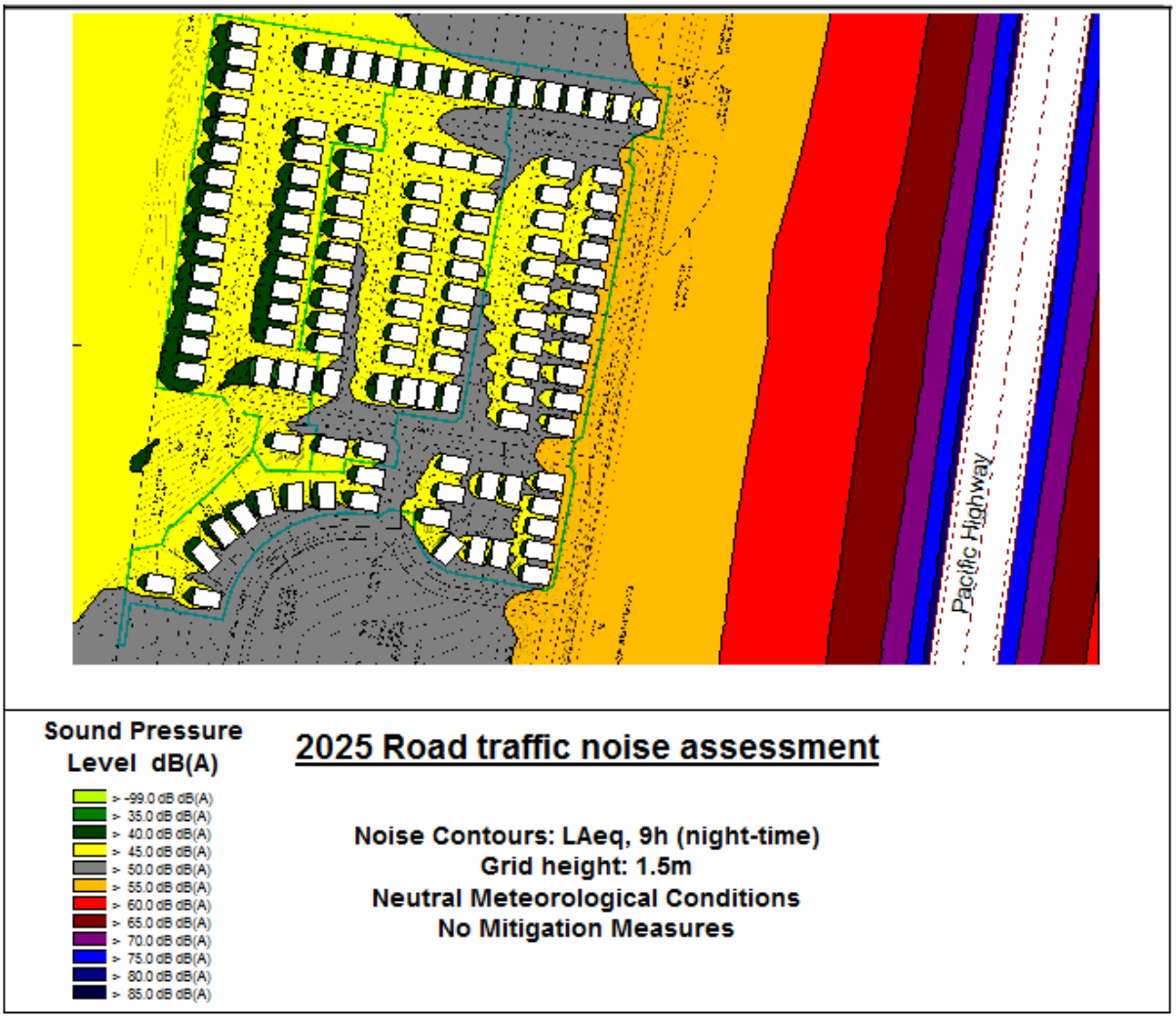


Figure 4-2 Future predicted road traffic noise (Year 2025) at proposal site

External noise levels were calculated for each first storey receiver in the front row facing the Pacific Highway. External levels were calculated at a height of 1.5 m above ground, 1 m from the eastern façade of each house, with 2.5 dB being added to account for façade reflection. This requirement is set out in the NSW Road Noise Policy, EPA, 2011.

All first storey receivers in the front row facing the Pacific Highway were found to have external noise levels ranging between 56 dB(A) and 58 dB(A). Hypothetical second storey receiver levels were also calculated along the front row of houses facing the Pacific Highway at a height of 4.5 m above ground. Second storey external receiver levels ranged between 58 dB(A) and 59 dB(A).

Based on the noise model results, all first storey receivers along the front row facing the Pacific Highway were found to require a noise level reduction of 23 dB(A) in order to achieve the night-time internal noise criteria for sleeping areas. The following section outlines the recommended building construction category with consideration to the *Development Near Rail Corridors and Busy Roads – Interim Guideline*.

4.3 Recommendations

Road traffic noise intrusion into residential buildings should be considered during the design stage of houses for this proposed subdivision, particularly for the houses in the front row facing the Pacific Highway. Situating sensitive rooms such as bed rooms towards the western end of the house is recommended where practicable. Minimising windows that face the Pacific Highway is also recommended.

The internal noise level in sensitive spaces is predicted to comply with the internal criteria provided all windows and doors are closed. The design of the ventilation for these rooms should be such that

occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia.

Appendix C – Acoustic Treatment of Residences, from Development Near Rail Corridors and Busy Roads – Interim Guideline, provides a table of construction material reduction loss values (Rw) required to satisfy each construction category. An excerpt of Appendix C is reproduced in Table 4-2 and Figure 4-3.

Using Table 4-2 and Figure 4-3 as a guide, Construction Category 1 building elements are shown to achieve internal noise criteria. The maximum required noise level reduction found amongst hypothetical second storey receivers was 24 dB(A). Construction Category 1 would be suitable to achieve this noise reduction.

Reduction values and construction samples given in Table 4-2 and Figure 4-3 are provided as a guide only, as the individual design of each house, for example the size of windows facing the Highway, will influence the noise transmission through that element.

Table 4-2 Acoustic performance of building elements

Category of Noise Control Treatment	R_W of Building Elements (Minimum Assumed)		
	Windows / Sliding doors	Frontage Façade	Roof
Category 1	24	38	40
Category 2	27	45	43
Category 3	32	52	48
Category 4	35	55	52
Category 5	43	55	55

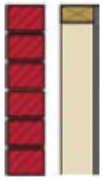
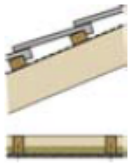
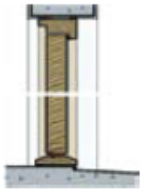
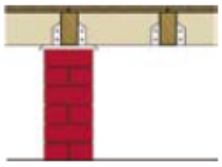
Category No.	Building Element	Standard Constructions	sample
1	**Windows/Sliding Doors**	Openable with minimum 4mm monolithic glass and standard weather seals	
	Frontage Facade	**Timber Frame or Cladding:** 6mm fibre cement sheeting or weatherboards or plank cladding externally, 90mm deep timber stud or 92mm metal stud, 13mm standard plasterboard internally	
		Brick Veneer: 110mm brick, 90mm timber stud or 92mm metal stud, minimum 50mm clearance between masonry and stud frame, 10mm standard plasterboard internally	
		Double Brick Cavity: 2 leaves of 110mm brickwork separated by 50mm gap	
	Roof	Pitched concrete or terracotta tile or metal sheet roof with sarking, 10mm plasterboard ceiling fixed to ceiling joists, R1.5 insulation batts in roof cavity.	
	Entry Door	35mm solid core timber door fitted with full perimeter acoustic seals	
	Floor	1 layer of 19mm structural floor boards, timber joist on piers	
		Concrete slab floor on ground	

Figure 4-3 Standard (or deemed-to-satisfy) construction for Category 1

5. Conclusion

GHD has been engaged by AV Jennings Properties Ltd to assess potential road traffic noise impacts from the Pacific Highway on a proposed residential subdivision of Lot 198, DP 1191172 and Lot 98 DP 1165173, Solitary Islands Way, Sandy Beach.

Background noise monitoring was conducted at two locations within the proposal site. Background monitoring data supplemented with attended measurements were used to validate and calibrate a computer noise prediction model.

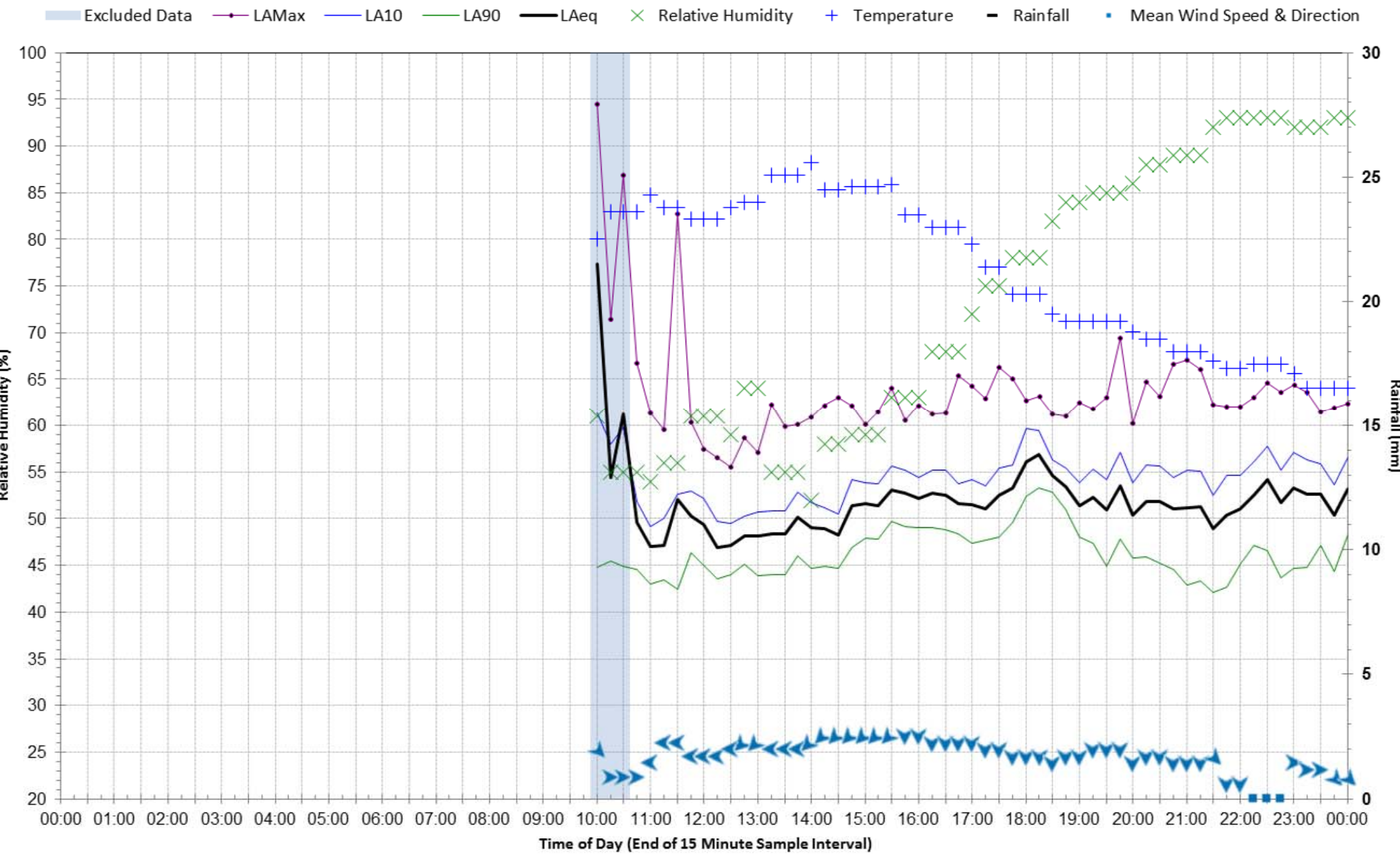
Predicted road traffic noise levels were assessed against internal noise criteria set out in Development Near Rail Corridors and Busy Roads – Interim Guideline. Referring to Appendix C of the guideline, all residential buildings within the current proposed lot layout are expected to achieve the required internal noise levels using Construction Category 1 building materials.

Houses that face the Pacific Highway are also recommended to situate sensitive rooms such as sleeping areas towards the western end of the house. Minimising windows that face the Pacific Highway is also recommended.

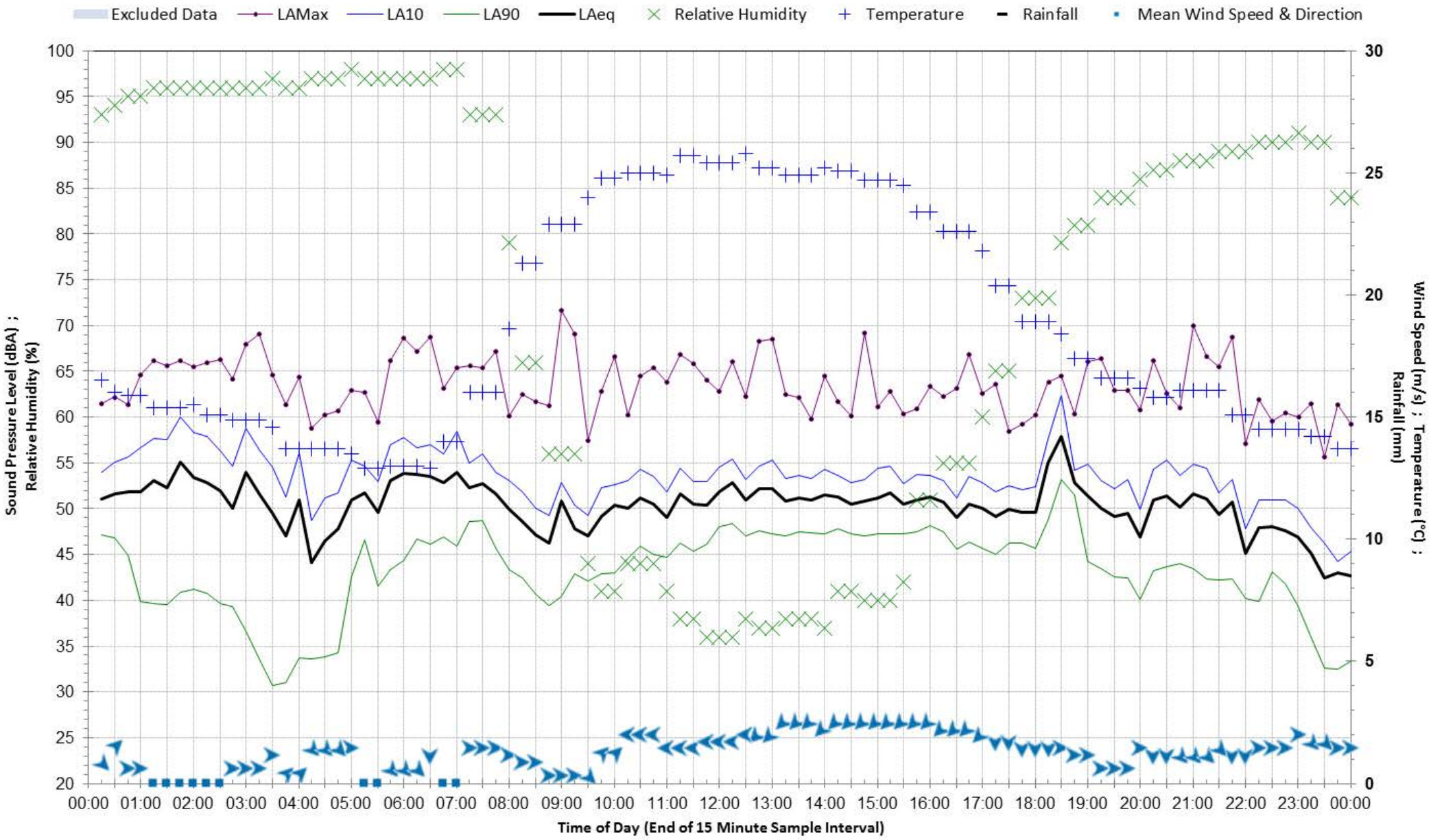
The internal noise level in sensitive spaces is predicted to comply with the internal criteria provided all windows and doors are closed. The design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia.

Appendix A - (Background monitoring charts)

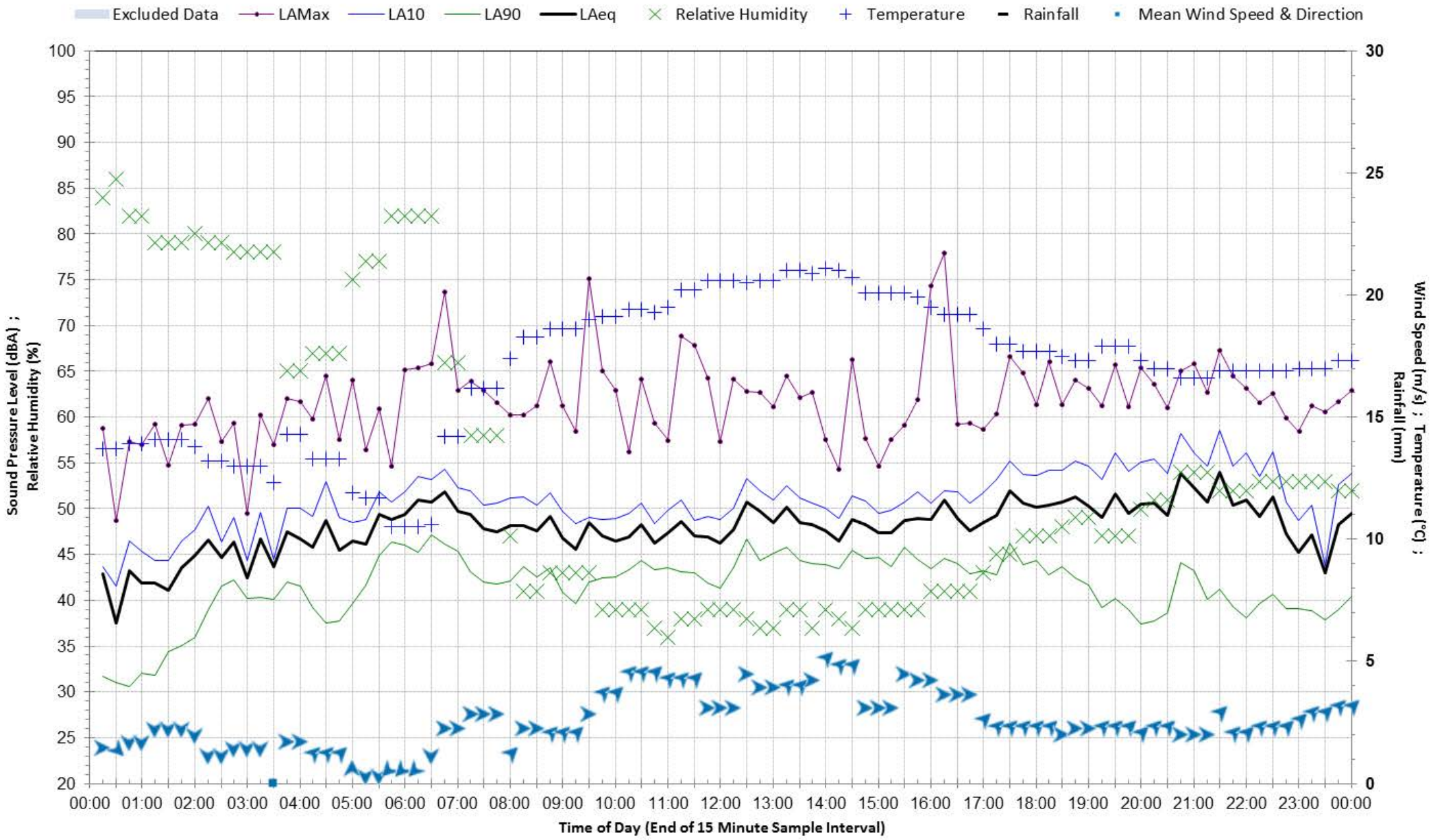
SN 131629 Statistical Ambient Noise Levels
Friday 24 April 2015



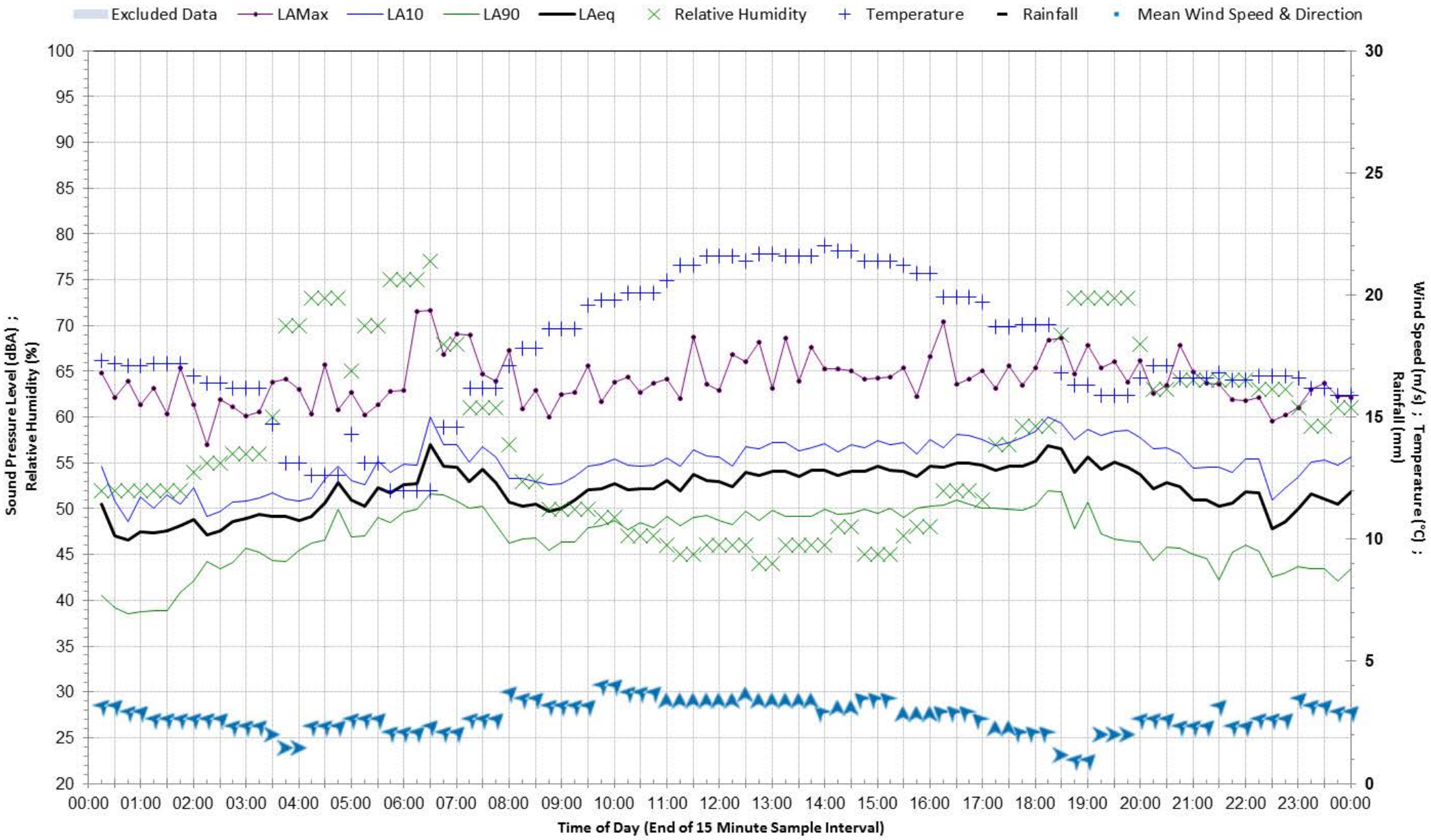
SN 131629 Statistical Ambient Noise Levels
Saturday 25 April 2015



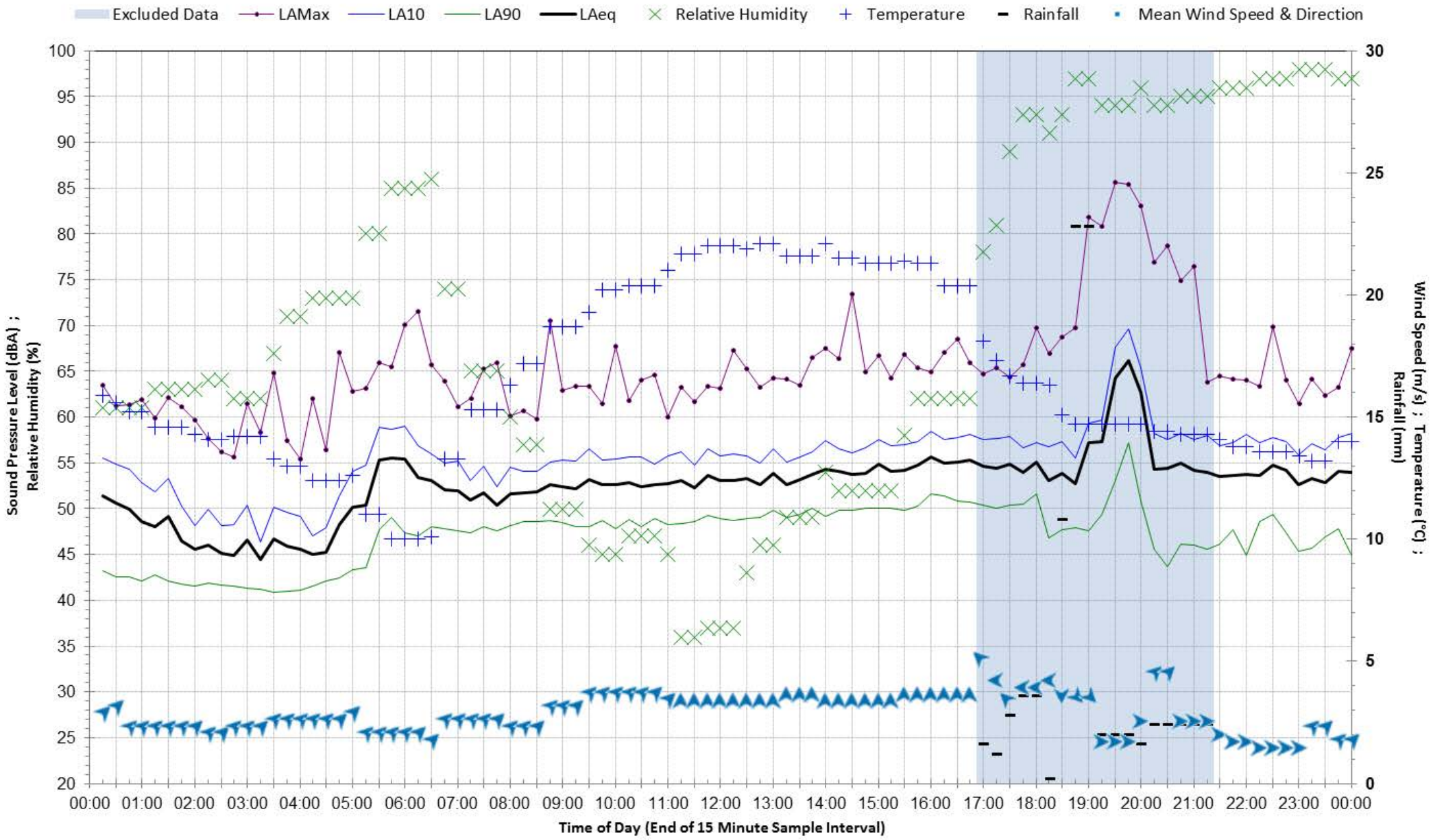
SN 131629 Statistical Ambient Noise Levels
Sunday 26 April 2015



SN 131629 Statistical Ambient Noise Levels
Monday 27 April 2015



SN 131629 Statistical Ambient Noise Levels
Tuesday 28 April 2015



SN 131629 Statistical Ambient Noise Levels
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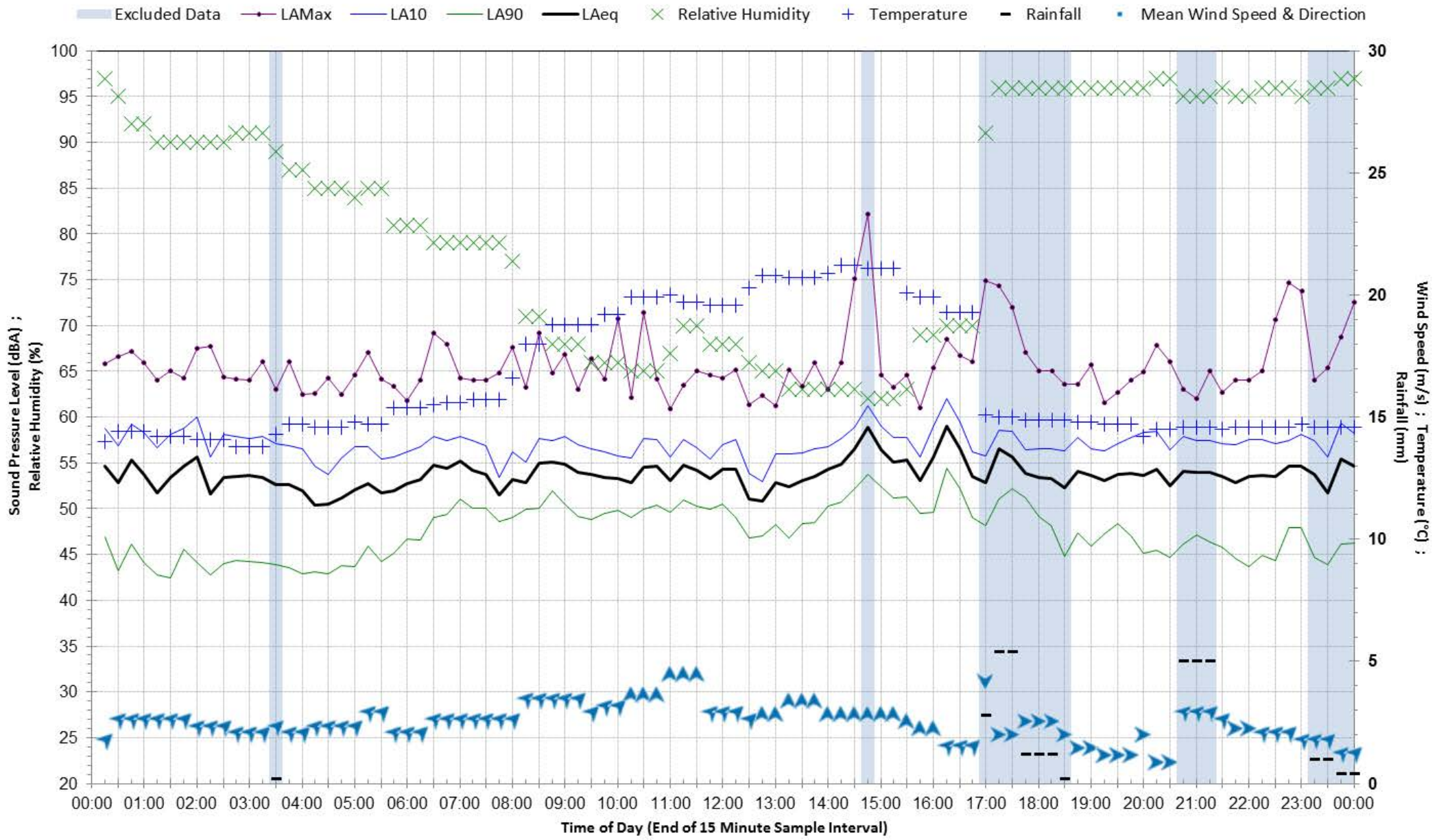
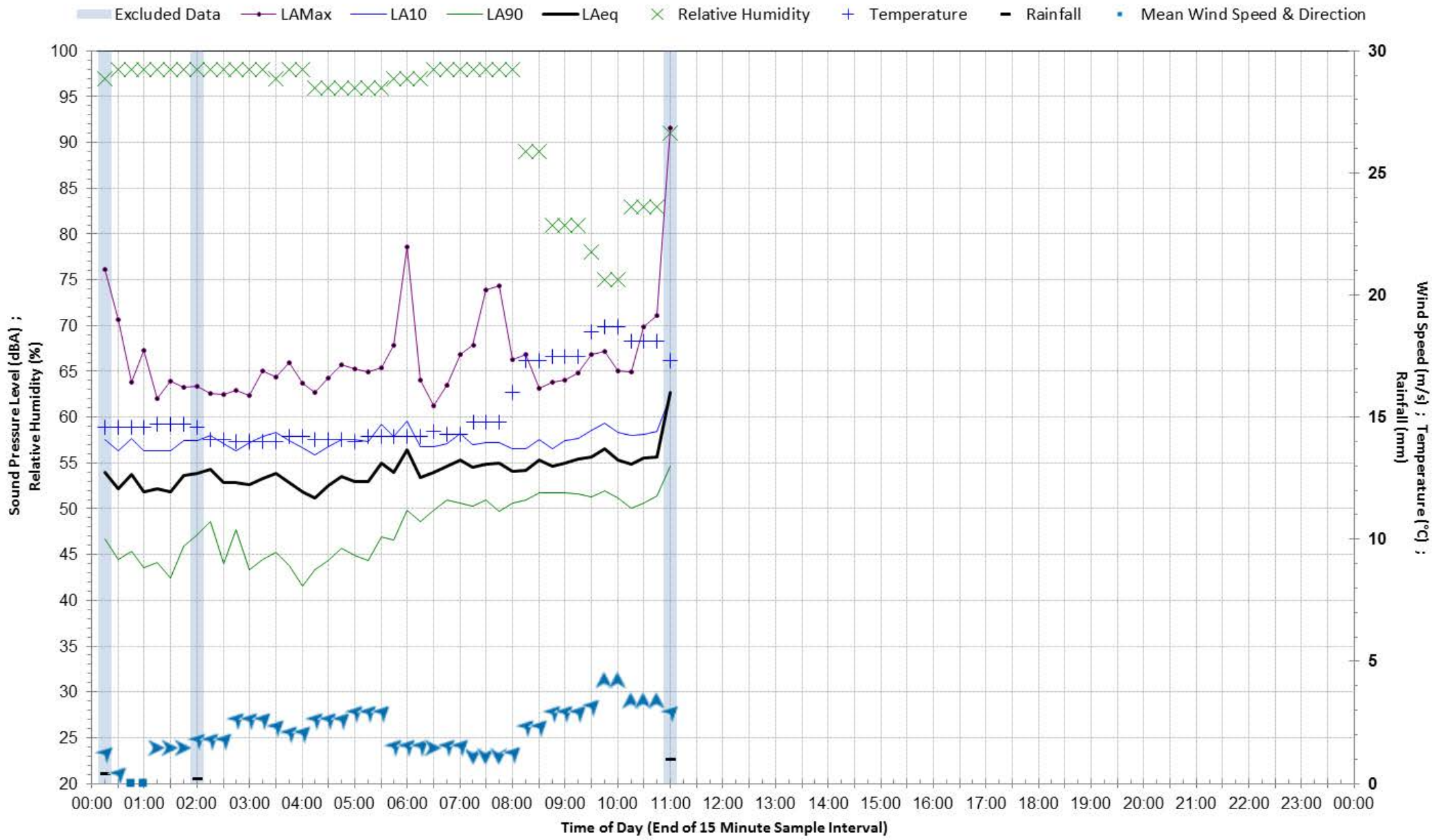
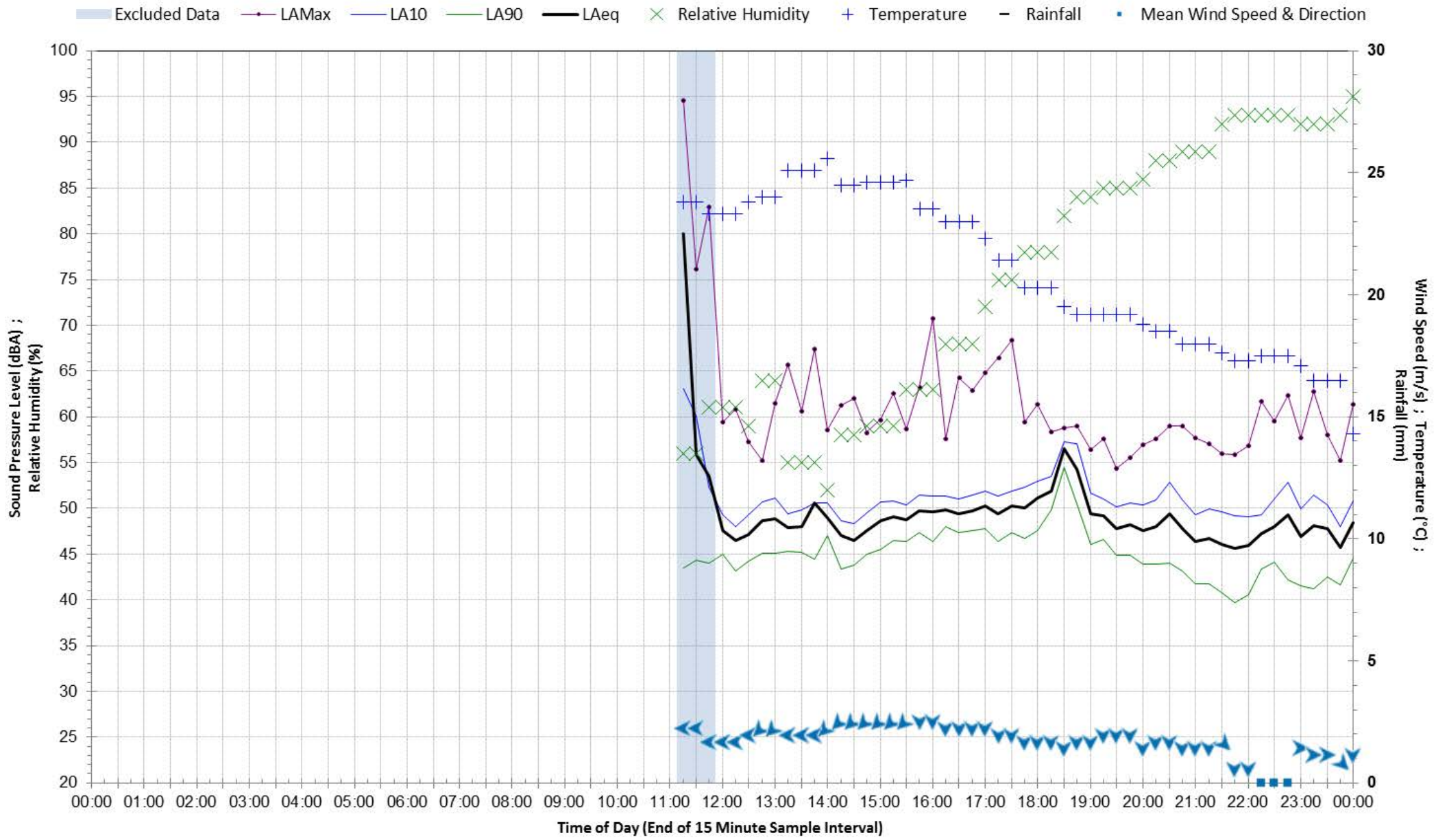


SN 131629 Statistical Ambient Noise Levels
Thursday 30 April 2015



SN 131632 Statistical Ambient Noise Levels
Friday 24 April 2015



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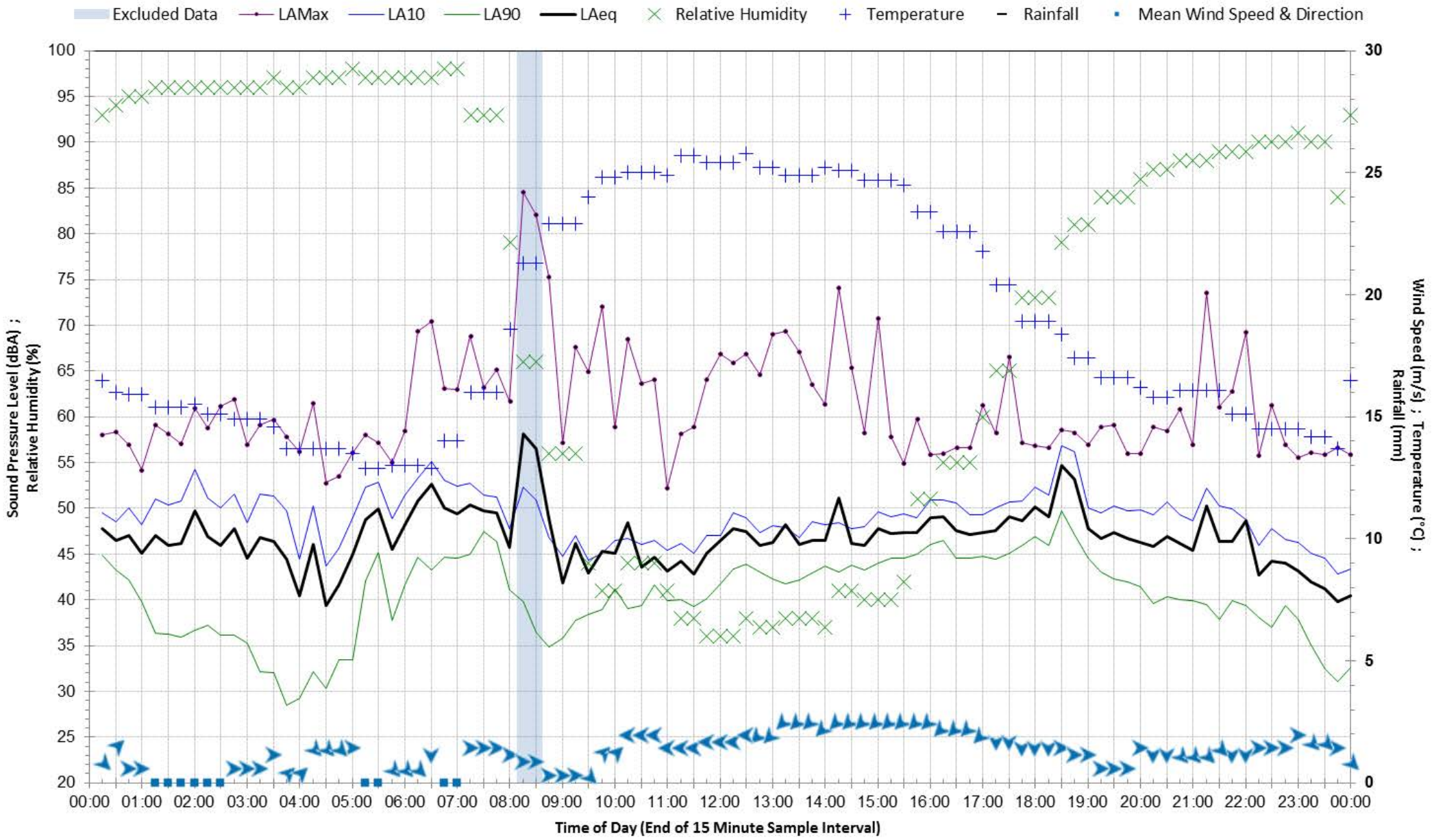

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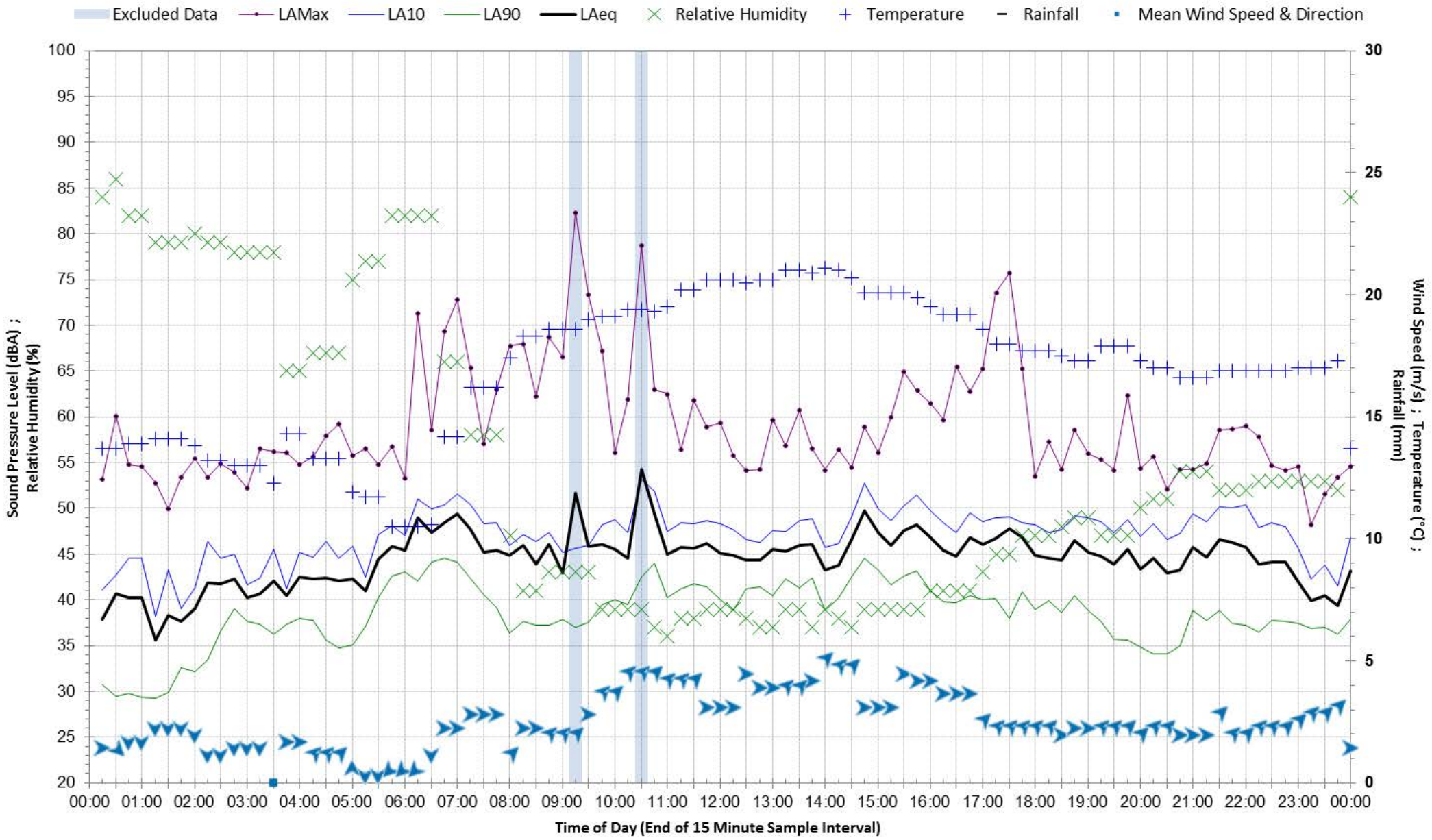

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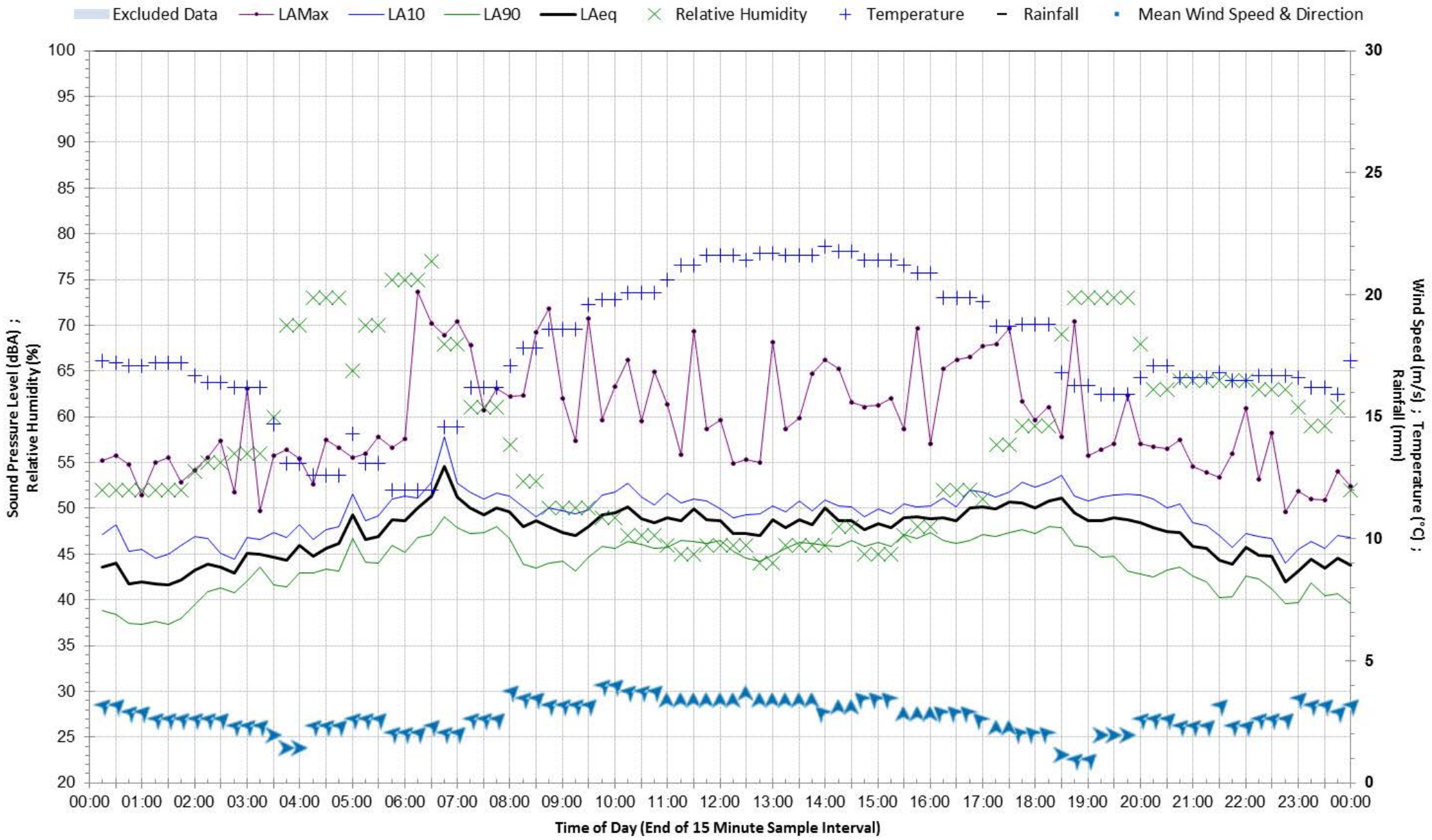

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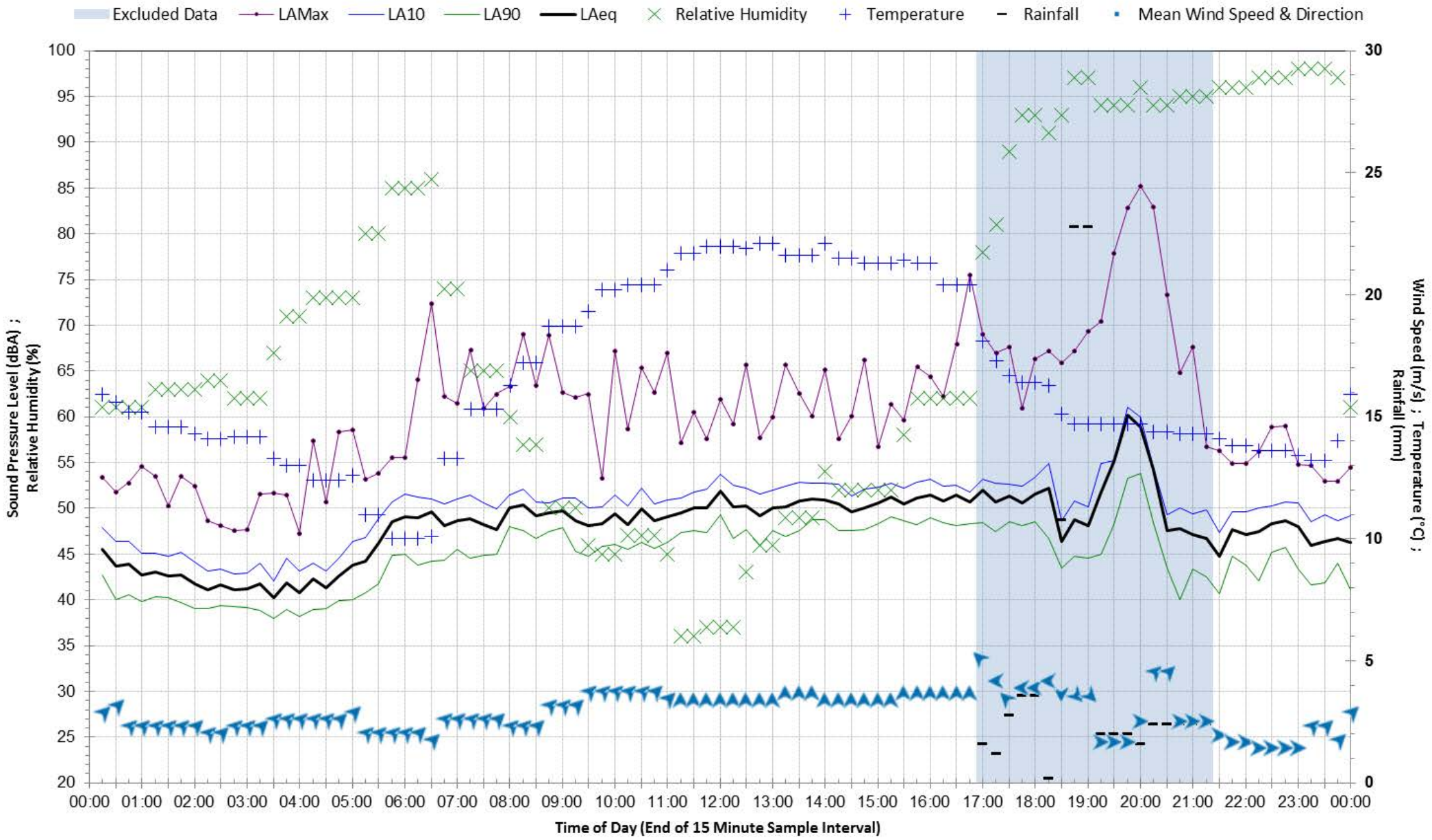

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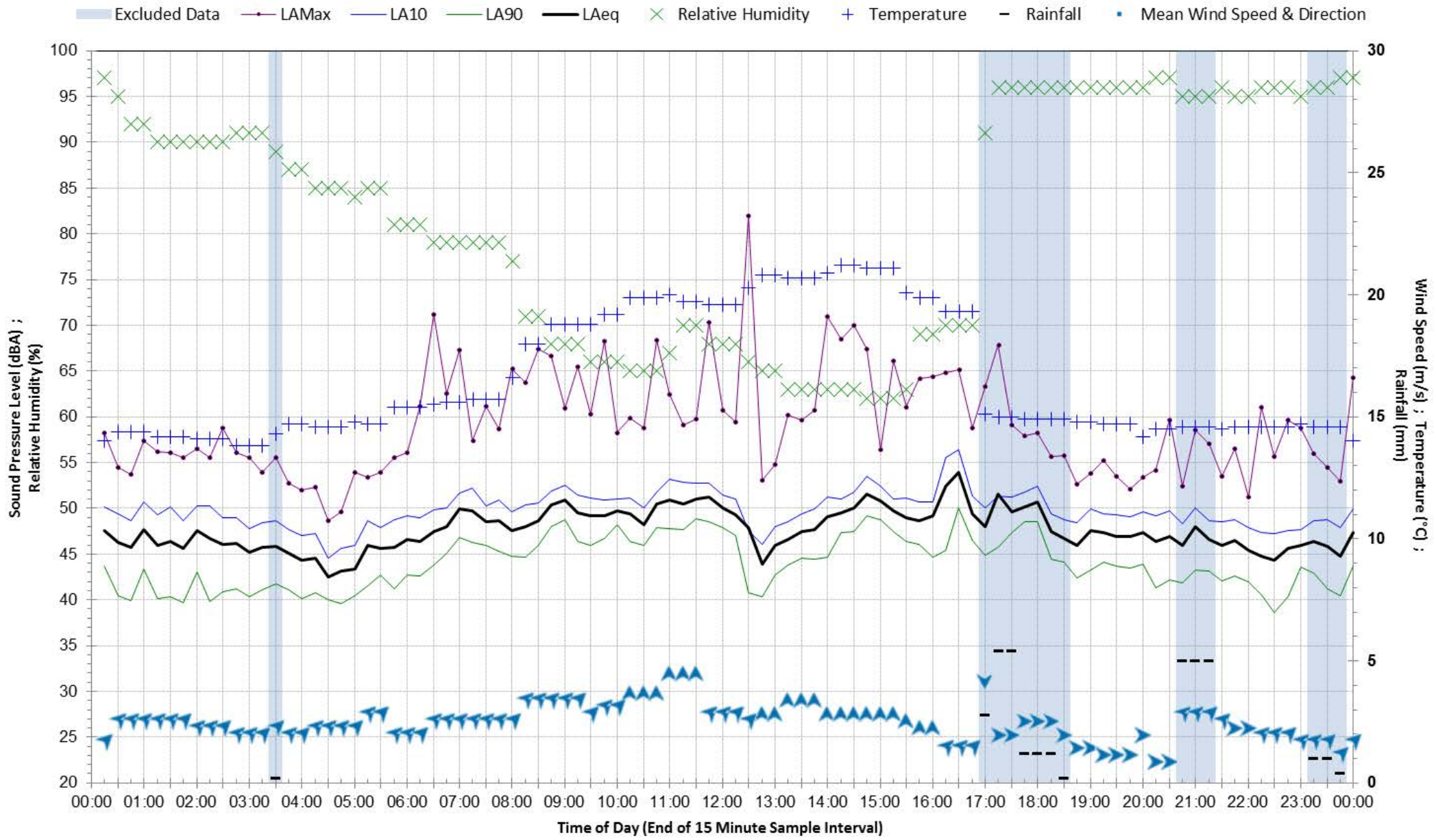
Wednesday 29 April 2015



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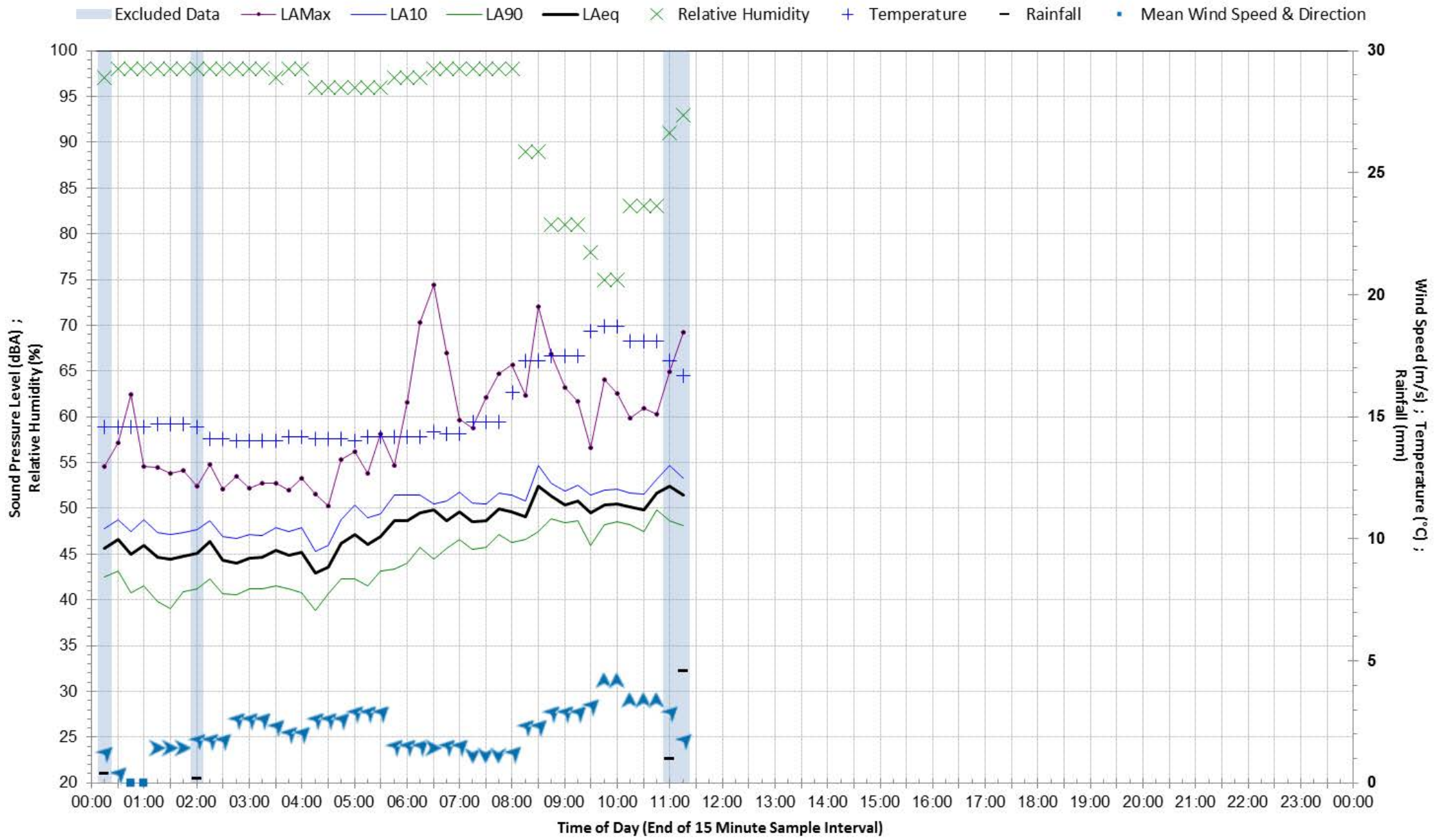

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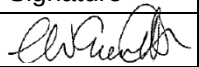
Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	A. Rees	C. Evenden		S. Lawer		13/5/2015

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PROPOSED SEWER PUMP STATION (SPS)

PROPOSED 950 m² BIORETENTION BASIN

PROPOSED PUBLIC RESERVE

PROPOSED ROW FOR ACCESS TO SPS

300
728 m²

299
22.16 ha

OCEANIC DRIVE

EXISTING BIORETENTION BASIN

PUBLIC RESERVE

ROAD 1

ROAD 2

ROAD 3

ROAD 4

ROAD 5

ZENITH AVENUE

APPROVED DEVELOPMENT

SOLITARY ISLANDS WAY

EXISTING DEVELOPMENT

PROPOSED PUBLIC RESERVE

APPROX. 180m² BUILDING ENVELOPE

APPROX. 200m² BUILDING ENVELOPE

APPROX. 200m² BUILDING ENVELOPE

ROAD RESERVE TAPERED FROM 20m WIDE TO 16m WIDE

PROPOSED THRESHOLD TREATMENT

601 686 m² | 602 480 m² | 603 480 m² | 604 480 m² | 605 480 m² | 606 480 m² | 607 480 m² | 608 480 m² | 609 480 m² | 610 480 m² | 611 480 m² | 612 480 m² | 613 480 m² | 614 480 m² | 615 562 m²

334 561 m² | 333 503 m² | 332 502 m² | 331 500 m² | 330 499 m² | 329 497 m² | 328 496 m² | 327 494 m² | 326 493 m² | 325 491 m² | 324 544 m²

335 561 m² | 336 503 m² | 337 502 m² | 338 500 m² | 339 499 m² | 340 497 m² | 341 496 m² | 342 495 m² | 343 493 m² | 344 492 m² | 345 544 m²

414 677 m² | 415 540 m² | 416 662 m²

413 470 m² | 412 470 m² | 411 468 m² | 410 467 m² | 409 466 m² | 408 465 m² | 407 463 m² | 406 460 m²

417 471 m² | 418 470 m² | 419 468 m² | 420 467 m² | 421 466 m² | 422 465 m² | 423 463 m² | 424 461 m²

405 620 m² | 404 571 m² | 403 636 m²

514 563 m² | 434 462 m² | 433 461 m² | 432 459 m² | 431 458 m² | 430 457 m² | 429 455 m² | 428 454 m² | 427 453 m² | 426 452 m²

513 559 m² | 512 461 m² | 511 461 m² | 510 459 m² | 509 458 m² | 508 457 m² | 507 455 m² | 506 454 m² | 505 453 m² | 504 452 m²

425 626 m² | 502 570 m² | 503 631 m²

616 566 m² | 515 574 m² | 516 577 m² | 517 584 m² | 518 592 m² | 519 592 m² | 520 592 m² | 521 592 m² | 522 592 m² | 523 593 m² | 524 593 m² | 525 593 m² | 526 593 m² | 527 593 m² | 528 928 m²

321 536m² | 320 431m² | 319 431 m² | 318 431 m² | 317 536 m²

322 593 m² | 316 591 m²

323 593 m² | 315 587 m²

311 684 m² | 312 608 m² | 313 591 m² | 314 637 m²

402 568 m² | 310 480 m² | 309 556 m²

401 589 m² | 308 520 m²

501 1132 m²

307 655 m²

306 866 m²

305 782 m²

304 794 m²

303 1102 m²

302 784 m² *

301 1345 m²

298 4905 m²

RESIDENTIAL BUILDING LOTS

STAGE 3	45 LOTS (301 - 345 PLUS LOTS 297 - 300)
STAGE 4	34 LOTS (401 - 434)
STAGE 5	28 LOTS (501 - 528)
STAGE 6	16 LOTS (601 - 616)
TOTAL	123 LOTS

LEGEND:

EXISTING CONTOUR (0.25m INTERVAL)

DUAL OCCUPANCY LOT *

PROPOSED STAGE BOUNDARIES

PROPOSED LOT LAYOUT PLAN

SCALE 1:750

PRELIMINARY

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
A	FOR INFORMATION		ICG			

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230 Harbour Drive Coffs Harbour
NSW 2450 Australia
T 61 2 6650 5600 F 61 2 6650 5601
E cfsmail@ghd.com W www.ghd.com

Drawn	I. GOULD	Designer	
Drafting Check		Design Check	
Approved (Project Director)			
Date			
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client: AV JENNINGS PTY LTD
Project: SANDY BEACH SUBDIVISION STAGE 3
Title: ASSET PROTECTION ZONES

Original Size: A1
Drawing No: 22-17122-SK112
Rev: A

Plot Date: 29 May 2015 - 12:34 PM
Plotted by: Ian Gould
Cad File No: G:\22\17122\CADD\Drawings\22-17122-SK112.dwg