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Dear Tina,

Operational noise from Water Treatment Plan GDC10

Gore District Council has asked Styles Group to provide an opinion relating to the operational noise from the East Gore Water Treatment Plant and Pump Station¹ (the **WTP**).

We have been asked to consider whether the Proposed District Plan (**PDP**) should introduce noise limits to control the level of operational noise from the WTP and received at the residential properties surrounding the WTP site. We have been specifically asked to consider whether noise effects from the WTP should be subject to the noise limits for the underlying Residential zone.

We have reviewed the following information:

- The acoustic assessment commissioned by Gore District Council prepared by Marshall Day Acoustics (the **MDA Report**) dated 26 March 2024.
- Submission S134 from McMillan and Harpur (the Submission) of 36 Talbot Street
- The Notice of Requirement for the WTP prepared by WSP
- The PDP Noise Chapter
- Evidence of Brendon Shanks (Marshall Day Acoustics) for Gore District Council 3 Waters Department dated 10 September 2004,

Styles Group have provided noise and vibration advice to Gore District Plan to inform the development of the PDP Noise Chapter. Our prior involvement has not included any review of the WTP, its noise limits or the establishment of the proposed "Water Supply Treatment Facility Buffer Area".

We understand that the WTP was constructed circa 1981 and was upgraded in 2021-2022 to include a 362.5m² treatment building, and ancillary operational infrastructure including oxidation tank, chemical tanks, external transformer and generator.

¹ Designation GDC-10

1.0 The WTP's noise limits under the ODP and PDP

1.1 The ODP noise limits

The WTP and the surrounding sites are zoned Residential A Zone according to the Operative District Plan (ODP).

We understand that there are no conditions attached to Designation GDC-10 relating to noise limits, and the *General Standards for all utilities* in Rule 7.9 of the ODP has controlled the noise levels that are permitted to be generated from the WTP.

Rule 7.9(2)(b) requires:

Except as provided for in Rules 7.9(2)(e) and 7.9(7)(d), all utilities located within Rural and Residential Zones shall be operated in a manner that complies with the following noise limits:

On any day:

7.00 a.m. to 10.00 p.m.	55 dBA L_{eq}
10.00 p.m. to 7.00 a.m.	40 dBA L_{eq}
10.00 p.m. to 7.00 a.m. 7	75 dBA L_{max}

Measured: Within Rural Zones, at any point within the notional boundary of any noise sensitive activity. Within Residential Zones, at any point within any other site.

The WTP has therefore been required to comply with a noise level of 55 dB L_{Aeq} during the daytime, and a noise limit of 40 dB L_{Aeq} and 75 dB L_{AFmax} during the nighttime. The noise levels must be complied with when measured and assessed at any point within any other site that is zoned Residential.

We note that the noise limits contained in Rule 7.9(2)(b) mirror the relevant residential noise limits contained in Rule 4.5.1(1) *Noise limits in rural and residential areas*.

1.2 The PDP noise limits

The PDP proposes to zone the WTP and the directly adjoining sites in the General Residential Zone (GRZ), with the land to the south-west zoned Medium Density Residential Zone.

Proposed standard NOISE-S1 controls the level of noise that can be generated and received between sites in the GRZ. The rule requires that the noise (rating) level and maximum noise level arising from any activity shall not exceed:

- a) 7am to 10pm – 50 dB L_{Aeq}
- b) 10pm to 7am - 40 dB L_{Aeq} and 70 dBA L_{max}

The noise levels must be complied with when measured and assessed at any point within any other site in the GRZ.

When compared to the noise limits in ODP Ruled 7.9(2)(b) and Rule 4.5.1(1):

- The PDP daytime noise limit is 5 dB lower than the ODP daytime noise limit

- The PDP night time noise limit is the same as ODP night time noise limit, except that the L_{AFmax} limit (the descriptor that protects against sleep disturbance effects) is 5 dB lower in the PDP.

The PDP noise limits are slightly more restrictive in the daytime and will deliver a greater level of amenity to noise sensitive activities during the day.

There is no appreciable change in noise effects at night between the ODP and PDP.

We note that the PDP does not include a noise limit that is specifically designed for network utilities that are located in or close to residential activity. This is appropriate given that most or all network utilities would require either a resource consent or designation to operate. Either of these processes should include an assessment of noise effects to ensure that their noise effects are compatible with the receivers around them.

The zone noise standards in NOISE-S1 are designed to control the noise effects that could reasonably be expected from the permitted activities in each zone and are not designed to manage noise from network utilities and other land use activities that the PDP does not permit.



Figure 1 PDP Proposed Zoning Arrangements

1.3 The Water Supply Treatment Facility Buffer Area

The PDP proposes to introduce a “Water Supply Treatment Facility Buffer Area” (the **Buffer**) under GRZ-R14. The proposed Buffer rule introduces a discretionary activity status for any sensitive activity constructed within 50m of the WTP Site.

In order to be useful as a noise buffer, the Buffer provisions would also need to shift the assessment point from the boundary of the Residential zone (50m inside the Buffer) to the outer edge of the Buffer.

It is our experience that noise buffer zones around major infrastructure are typically required where the noise effects are unable to be internalised or managed at source. In our experience, they are only generally authorised where the noise-generator can demonstrate that internalising their noise effects is impracticable. Reasons may include prohibitive cost, lack of available space or other impediments that cannot be overcome.

Buffer zones often come at the expense of the amenity and development potential of the land they cover. In this case, the proposed Buffer would be likely to impact the amenity and development potential of all of the land around it.

We consider that the Buffer should only be authorised if the operator of the WTP can demonstrate that it would be impracticable to reduce noise levels to be compliant with the PDP standards at the boundary of its' site.

2.0 The Submission

We have reviewed Submission 134 from the owner of 36 Talbot Street. This property is located on the southern boundary of the WTP and is the closest receiver of noise from the WTP.

Submission 134 raises concerns relating to the noise effects from the WTP and the implications of the proposed buffer across their property at 36 Talbot Street. The Submission discusses the ongoing noise issues from the WTP:

“Following the upgrade the submitter and surrounding neighbours have consistently encountered disturbances due to the operation of the WTP facility, including sleep disturbance. The prolonged adverse noise and vibration effects, of which the submitter reports are particularly observable during evening hours, have been raised by the submitter with Council staff over the past twelve months.”

Submission 134 refers to an MDA Report dated 9 December 2022. The 2022 MDA Report found that the WTP aeration tower required significant noise mitigation in order to comply with a night time noise limit of 40 dB L_{Aeq} . The 2022 MDA Report recorded noise measurements² of 62 dB L_{Aeq} with fans running at 100% and 54 dB L_{Aeq} with fans running at 60%. These reported noise levels were between 14 and 22 dB L_{Aeq} above the permitted night time noise limit.

The 2022 MDA Report recommended Gore District Council implement noise mitigation to address the level of noise from the WTP. We understand that the noise mitigation measures were completed in January 2024. The efficacy of the noise mitigation measures are discussed in the MDA Report and evidence of Mr Shanks.

3.0 The MDA Report and evidence of Brendon Shanks

The MDA Report and evidence of Mr Shanks discuss the effectiveness of the noise mitigation measures undertaken in January 2024. We understand that the measures included:

² At the position representative of the site boundary with 63 Talbot Street.

- The construction of a 1.8m high noise barrier around the base of the tower and fan
- The construction of an enclosure around the fan, including attenuators on the air intakes
- The installation of an attenuator in the duct between the fan and the tower
- Erection of screening around the south facing air outlets at the top of the tower.

The MDA Report and evidence of Mr Shanks finds that:

- The WTP is able to comply with the noise limits when measured and assessed at the boundary of 36 Talbot Street when operating at 60% load.
- In the event that the aeration tower is required to operate at 100% load, extending the shielding of the side of the air outlets will enable the WTP to comply with the night time noise limits when measured and assessed at the closest assessment location on the boundary of 36 Talbot Street.

Mr Shanks evidence finds that:

"I consider that the night-time noise limit of 40 dB L_{Aeq} at the site boundary provides adequate protection against adverse noise effects. Particularly when considering that based on the distance to the dwelling at 36 Talbot Street, noise from the aeration tower will be less than 30 dB L_{Aeq} at the façade.

This would result in internal noise levels below 20 dB L_{Aeq} with partially open windows. This is well below the noise level of 30 dB L_{Aeq} recommended by the World Health Organization (WHO) in bedrooms for good quality sleep."

Based on the information that is available, we agree with Mr Shanks.

Given that it is practicable to meet the ODP and PDP noise limits at the boundary of the Site, we see no noise-related reason for the Buffer.

4.0 Recommendation for noise limits

We have been asked to comment on whether the noise limits in NOISE-S1 are appropriate to control noise levels from the WTP. Compliance with the noise limits in NOISE-S1 would require the WTP noise levels to not exceed:

- a) 7am to 10pm – 50 dB L_{Aeq}
- b) 10pm to 7am – 40 dB L_{Aeq} and 70 dB L_{Amax}

The noise levels must be complied with when measured and assessed at any point within any other site in the GRZ.

We note that the noise limits in NOISE-S1 are designed to control the noise sources that are anticipated and provided for in the GRZ and are not specifically designed to control noise from mechanical plant that operate on a 24/7 basis.

We consider that there are several general options for noise limits to control noise from mechanical plant that is 'always on'. These are:

Option 1 – Noise limits of 55dB L_{Aeq} during the day and 45dB L_{Aeq} at night

These noise limits are the highest acceptable noise limits for rural / residential receivers. For WTP noise - the amenity level would be '**low**' or '**poor**' and the noise of the WTP would likely be dominant, intrusive and incessant day and night. These limits are 5dB higher than the PDP provisions.

Option 2 – 50dB L_{Aeq} during the day and 40dB L_{Aeq} at night

These noise limits are typical for rural / residential receivers for the (predominantly transient or seasonal) noise sources that are expected in those zones. For WTP noise - the amenity level could be described as '**moderate**'. The noise of the WTP would likely be a clear and often prominent feature in the noise environment and masking many other sounds. The incessant nature of the WTP noise would remove any sense of peacefulness that may otherwise exist, particularly in the mornings and evenings. These limits are the same as the PDP provisions.

Option 3 – 50dB L_{Aeq} during the day and 35dB L_{Aeq} at night

In this option, the daytime noise limit is the same as the PDP provisions but the night time noise limit is 5dB lower. The daytime limit is typical for rural / residential receivers for the (predominantly transient or seasonal) noise sources that are expected in those zones. The night time limit is 5dB lower than what is commonly applied for activities expected in the zone, but provides additional benefit for noise sources that are constant. For WTP noise - the amenity level could be described as '**good**' or '**very good**'. The noise of the WTP would likely be noticeable at times in the noise environment but at a low level. The low level of the WTP noise could affect the peacefulness that may otherwise exist, particularly in the mornings and evenings, but the noise would be low and 'in the background'.

We recommend that noise limits consistent with options 2 or 3 are applied in this case. Option 2 is consistent with applying the PDP provisions without modification (including the proposed 70 dB L_{Amax} limit at night). Applying the PDP limits at the WTP boundary (as the PDP would apply without modification) would deliver a 'moderate' level of amenity across neighbouring land.

We see no need for the Buffer given that the evidence of Mr Shanks is that complying with the PDP noise limits at the boundary of the WTP site appears to be practicable.

Please contact me if you require any further information.

Yours sincerely,



Jon Styles, MASNZ
Director and Principal