Concord Hospital Redevelopment - Response to EPA Queries

1 INTRODUCTION

This letter has been prepared in response to the NSW EPA's comments on the acoustic report prepared for the Concord Repatriation General Hospital Redevelopment - 1 Hospital Road, Concord. Report reference is revision 6 Acoustic Report for SSD 9036 (dated 10/07/2018).

In addition, based on the discussion below, an amended report has been prepared titled Acoustic Report for SSD 9036, Revision 8, dated 13th December 2018.

Letter reference received from the NSW EPA is reference DOC18/663871-03, dated 9th October 2018.

Our responses are presented below.
2 NSW EPA QUERIES

2.1 CONSTRUCTION NOISE – SECTION 2.2 OF EPA LETTER

NSW EPA Comments

2.2 noise and vibration

The EPA anticipates that demolition, site preparation (including tree clearing), bulk earthworks, construction and construction-related activities are likely to have significant noise and vibration impacts on surrounding residences, especially residences adjoining the hospital campus.

2.2.1 general construction hours

The EPA emphasises that demolition, site preparation, bulk earthworks, construction and construction-related activities should be undertaken during the recommended standard construction hours.

Recommendation

The proponent be required to ensure that as far as practicable all demolition, site preparation, bulk earthworks, construction and construction-related activities likely to be audible at any noise sensitive receivers such as surrounding residences are only undertaken during the standard construction hours, being -

(a) 7.00 am to 6.00 pm Monday to Friday,
(b) 8.00 am to 1.00 pm Saturday, and
(c) no work on Sundays or gazetted public holidays.

2.2.2 intra-day respite periods

The EPA anticipates that those demolition, site preparation, bulk earthworks, construction and construction-related activities generating noise with particularly annoying or intrusive characteristics (such as those identified as particularly annoying in section 4.5 of the Interim Construction Noise Guideline) would be subject to a regime of intra-day respite periods where –

(a) they are only undertaken after 8.00 am,
(b) they are only undertaken over continuous periods not exceeding 3 hours with at least a 1 hour respite every three hours, and.
(c) ‘continuous’ means any period during which there is less than an uninterrupted 60 minute respite between temporarily halting and recommencing any of the intrusive and annoying work referred to in Interim Construction Noise Guideline section 4.5

The EPA emphasises that intra-day respite periods are not proposed to apply to those demolition, site preparation, bulk earthworks, construction and construction-related activities that do not generate noise with particularly annoying or intrusive characteristics.

Recommendation

The proponent be required to schedule intra-day ‘respite periods’ for construction activities identified in section 4.5 of the Interim Construction Noise Guideline as being particularly annoying to noise sensitive receivers, including surrounding residents.

2.2.3 idling and queuing construction vehicles

The EPA is aware from previous major infrastructure projects that community concerns are likely to arise from noise impacts associated with the early arrival and idling of construction vehicles (including concrete agitator trucks) at the development site and in the residential precincts surrounding that site.

Recommendation

The proponent be required to ensure construction vehicles (including concrete agitator trucks) involved in demolition, site preparation, bulk earthworks, construction and construction-related activities do not arrive at the project site or in surrounding residential precincts outside approved construction hours.
2.2.4 reversing and movement alarms

The EPA has identified the noise from ‘beeper’ type plant movement alarms to be particularly intrusive and is aware of feasible and reasonable alternatives. Transport for NSW, Barangaroo Delivery Authority/Lend Lease and Leighton Contractors (M2 Upgrade project) have undertaken safety risk assessments of alternatives to the traditional ‘beeper’ alarms. Each determined that adoption of ‘quacker’ type movement/reversing alarms instead of traditional beepers on all plant and vehicles would not only maintain a safe workplace but also deliver improved outcomes of reduced noise impacts on surrounding residents.

Interim Construction Noise Guideline Appendix C provides additional background material on this issue.

Recommendation

The proponent be required to consider undertaking a safety risk assessment of site preparation, bulk earth works, construction and construction-related activities to determine whether it is practicable to use audible movement alarms of a type that would minimise the noise impact on surrounding noise sensitive receivers, without compromising safety.

Acoustic Logic Response

- Construction Hours:
  
  o We note that construction works are proposed to occur on Monday to Friday 7am to 6pm, Saturday 8am to 1pm and no works on Sunday or Public Holidays. These construction hours are in the “recommended standard hours” in accordance with the NSW EPA Interim Construction Noise Guidelines (ICNG) 2009.

- Respite periods:
  
  o Respite periods are recommended in the EPA Interim Construction Noise Guidelines when the Highly Noise Affected trigger level of 75dB(A) is reached during the “Recommended standard hours”.

  o Respite periods should only be adopted for activities that are expected to reach the Highly Noise Affected trigger level. There should be no blanket adoption of respite periods based on the equipment used, it should be based on the noise level.

  o It is not anticipated that noise levels exceeding 75dB(A) will be achieved at residences outside of the hospital precinct. As such respite periods are unlikely to be warranted.

  o Any condition of consent addressing construction noise and respite periods should require respite periods for activities exceeding the 75dB(A) Highly Noise Affected trigger level. To do otherwise is contrary to the Interim Construction Noise Guidelines and will result in unnecessary delay to the project.

- With regard to idling and queuing construction vehicles, a management control has been included in the recommendations section of the report which states; “Construction vehicles which are stationary onsite during queuing, should have their engines switched off to minimise impacts on residential receivers.”

- Similar to above regarding reversing and movement alarms, a management control has been included in the recommendations section of the revised report which states; “Construction equipment which require reversing or movement alarms should use a ‘quacker’ type alarm instead of traditional beepers”

2.2 BACKGROUND NOISE MEASUREMENTS – SECTION 3.1 OF EPA LETTER

NSW EPA Comments
3.1 Noise and vibration impacts

The EPA anticipates the proposed development may have significant operational noise impacts on nearby sensitive receivers, especially residences adjoinging the hospital campus.

background noise measurement

The EPA emphasises that properly establishing background noise levels in accordance with guidance material in the New South Wales Noise Policy for Industry (NPI) is fundamental to a consistent approach to the quantitative assessment of noise impacts of development. The EPA considers that background noise monitoring was not undertaken in accordance with the guidance material provided in NPI Fact Sheets A and B in respect of unattended monitoring locations and rain affected data.

Recommendation

The proponent be required to undertake and report background noise monitoring in accordance with the relevant guidance material provided in Noise Policy for Industry Fact Sheets A and B.

Acoustic Logic Response

In our opinion, the procedures recommended in Fact Sheets A and B of the policy were complied with. While it is unclear in the EPA letter what part of Fact Sheets A and B are not complied with (other than related to rain noise and monitoring location), we provide the following commentary:

Unattended Monitoring Locations

Table A1 of Fact Sheet A states:

- Table A1: Methods for determining background noise states in row 6, “Monitoring location: Reasonably most- or potentially most-affected residence(s)”[3]. Citation 3 from the table then goes on to state “Where it is impractical or not possible to monitor at the reasonably most- or potentially most-affected locations(s), the location selected should be fully justified as being representative of background noise levels”.

- In addition, the term “Reasonably most-affected residence(s)” is defined in Section A1.2 Definitions to support methodologies:

**Reasonably most-affected residence(s)** – locations that are reasonably most affected (or that will be most affected) by noise from the source under consideration. In determining these locations, the following need to be considered: existing background levels, noise source location(s), distance from source(s) (or proposed source[s]) to receiver, and any shielding (for example, a building or barrier) between source and receiver. Often several locations will be affected by noise from the development. In these cases, locations that can be considered representative of the various affected areas should be monitored. Where monitoring cannot be undertaken at a residence, the location selected as representative should be fully justified.

Acoustic Logic Response:

- Three unattended noise monitors were used in determining the background noise levels at the nearest receivers to the Hospital (One for Fremont Street (M1), one for Currawang Street (M3) and another for Nullawarra Avenue (M4)). With regards to each of the monitoring locations we note the following:
  - M1 - This location is the nearest residential location to the multi-stage carpark. Monitoring location M1 which was undertaken for the Fremont Street residences and was installed in Lovedale Park behind number 11 Fremont Street. The logger
location was approximately 10m from the neighbouring property boundary. As this is not directly on the property the monitoring location is justified as per the below:

- Based on the definition of *Reasonably most-affect residents* four items need to be considered:
  1. Existing background levels.
  2. Noise source location(s).
  3. Distance from source(s) (or proposed source[s]) to receiver.
  4. Shielding (for example a building or barrier) between source and receiver.

We note:

- Residential receivers to the north of the hospital are affected by mechanical plant from the hospital precinct, the logger location was selected as the location is least affected by the plant noise. Locations further north of the noise logging site, while further away from the hospital, are actually more impacted by plant and equipment noise because of the noise shielding provided by the hospital building shell is reduced.

- Noise sources which can be heard in the rear of Fremont Street residences/Lovedale Place is distant traffic noise from Concord Road, Hospital Road and pre-existing hospital plant.
  1. Comparing the distance between the logger location and the common boundary to the kerb of Concord Road, this distance is identical.
  2. Comparing the distance between the logger location and the common boundary to the kerb of Hospital Road, this distance is identical.
  3. Comparing the distance between the logger location and the common boundary to the existing rooftop mechanical plant which can be heard from the Hospital, this distance is identical.

- In short, the logging location adopted was ideal in that;
  1. It is in the area which is least affected by plant noise.
  2. It was the same distance from all local noise sources.
  3. 10m separation between residential property boundary and the logger location is negligible given this distance is less than typical length of the residential property frontage in the area and in some situations less than the distance from rear property boundary to the dwelling.

- Therefore, the logger location as selected is in accordance with the procedures as outlined in Fact Sheet A and B of the policy.
M3 - This location is the nearest residential location to the Stage 1 building. Monitoring location M3 which was undertaken for the Currawang Street residences. Logger was installed along the boundary between the nearest receiver (1 Currawang Street) and the Hospital Grounds. Therefore, satisfying the above requirement.

While locations M1 and M3 were selected due to being the nearest residential receivers, an additional location (M4) had been selected to provide an additional background noise data point as well as providing information regarding pre-existing traffic noise on Nullawarra Avenue, in the event the proposed redevelopment was to significantly increase existing traffic flows. The requirement that background noise monitoring be conducted at the nearest residencies as required by Fact Sheet A and Bis already met by loggers M1 and M3.

Rain affected data

NSW EPA NPfI requirements for rain affected data:

- Section B1.1, Paragraph 6, Monitoring should not be conducted (or monitoring data are to be excluded) when average wind speeds are greater than 5 metres per second at microphone height, or during rain. Exceptions to this rule are allowed, provided the proponent is able to show that the wind-induced noise on the microphone and sound levels due to rain are at least 10 dB(A) below the background noise levels under investigation. For sites where high wind speeds are a feature of the area, monitoring may be permitted during higher wind speeds provided that the proponent is able to show that these wind speeds are a site feature and that the wind-induced noise on the microphone is at least 10 dB(A) below the noise levels under investigation.

Acoustic Logic Response:

- In the revised report (Revision 8), weather data has been corrected in the graphs presented in appendix 1 to 4, to show the correct data for the weather station at Sydney Olympic Park Archery Centre (approximately 2km to the furthest unattended noise monitor). The periods of weather affected are highlighted in red on the graphs.

- For the calculation of the rating background noise levels, interval periods (15-minute) which are affected by weather conditions, being rain fall and or wind speed greater than 5m per second are excluded from the period.

  - In the event excluded weather affected data exceeds 18% of any period (i.e. during any day period), said period is excluded from the calculation.

  - In the event excluded weather affected data exceeds 13% of any period (i.e. during any evening period), said period is excluded from the calculation.

  - In the event excluded weather affected data exceeds 13% of any period (i.e. during any evening period), said period is excluded from the calculation.

- In addition, as a graphical representation of the data which was excluded, Appendix A to D of this letter presents the tabulated and graphed data with the weather affected interval removed.
2.3 CONSTRUCTION VIBRATION – SECTION 3.1 OF EPA LETTER

**NSW EPA Comments**

3.1 Noise and vibration impacts

The EPA anticipates the proposed development may have significant operational noise impacts on nearby sensitive receivers, especially residences adjoining the hospital campus.

**Acoustic Logic Response**

There is a typographical error in the report which nominated the vibration monitoring location, which has been corrected in the revised report (Revision 8).

2.4 MECHANICAL PLANT – SECTION 3.1 OF EPA LETTER

**NSW EPA Comments**

3.1 Noise and vibration impacts

The EPA anticipates the proposed development may have significant operational noise impacts on nearby sensitive receivers, especially residences adjoining the hospital campus.

**Acoustic Logic Response**

When the SSD acoustic report was prepared, detailed information regarding the locations and selections of mechanical plant were not known. The level of detail which was provided is consistent with information provided at SSD stage. However, since the report has been submitted, the project has proceeded into detailed design phase and we now are in a position in which we can provide more detail regarding mechanical plant. See below.
2.4.1.1 General Comments

All equipment is to be installed on vibration isolated mounts.

2.4.1.2 Transfer Ducts.

Flexible transfer ducts are to be constructed using 1000mm long insulated flexible ducting.

If penetrating a slag to slab wall, the flex is to be drawn through a 600mm long sheet metal sleeve installed at the wall penetration. Flex must be snug within the sleeve.

2.4.1.3 Basement Plant Room East (B042)

It is recommended that a 600mm deep acoustic louvre is installed in the opening adjacent to the main entry, with the following insertion loss

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<th>Hz</th>
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<tbody>
<tr>
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<td>4</td>
<td>7</td>
<td>10</td>
<td>18</td>
<td>26</td>
<td>36</td>
<td>37</td>
<td>34</td>
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2.4.1.4 Chiller Plant Room

- All walls of plant room are to be solid, non-perforated.
- Concrete slab above plant room to be a minimum of 200mm.
- The chillers and pipework to be supported using 25mm static deflection springs with neoprene baseplate.
- Low load (screw/scroll) chiller – support screw chiller pipework from the floor slab, not from the ceiling.
- Chillers to sit on concrete plinths which are isolated from floor slab using 20mm rubber matting.
- Noise absorptive lining to underside of slab (50mm thick foil faced insulation) to chiller plant room is likely to be required (to address noise to occupied areas above).

2.4.1.5 Basement and Level 6 Plant Room - Generally

- Provided that there are return air fans and AHUs in this plant room only, the external louvres are not required to be acoustic louvres (Level 6 plant room only).
- If there are pumps, suction plant located in this plant room, these plant items are to be separated from the external louvre using a partition.
- Any area of north facing louvre that does not need to be open for airflow purposes should be blanked off using 6mm fc sheeting (Level 6 plant room only).

2.4.1.5.1 Basement and Level 6 Air Handling Unit’s (AHU)
• Supply ducting:
  o 1500mm long 40% open area attenuator recommended. Minimum insertion loss as follows:

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<th>Hz</th>
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<th>125</th>
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<td>Loss</td>
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<td>16</td>
<td>23</td>
<td>31</td>
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<td>33</td>
<td>20</td>
<td>16</td>
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</table>

• Outside air ducting to have 75mm internal melinex faced lining or 600mm long 50% open area attenuator.

• Relief air should be approximately 1m of 50mm internally lined ducting (we assume melinex not needed)

• Need to ensure that the switching frequency on the VSD adjusted to eliminate high pitched whine.

2.4.1.5.2 Basement and Level 6 Return Air Fans (RAF)

• Intake ducting:
  o 1800mm long 40% open area attenuator recommended. Minimum insertion loss as follows:

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<thead>
<tr>
<th>Hz</th>
<th>63</th>
<th>125</th>
<th>250</th>
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</thead>
<tbody>
<tr>
<td>Loss</td>
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<td>18</td>
<td>27</td>
<td>36</td>
<td>43</td>
<td>37</td>
<td>23</td>
<td>18</td>
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• Need to ensure that the switching frequency on the VSD adjusted to eliminate high pitched whine.

• Fan casing of the return air fans to be externally wrapped with 5kg/m2 foam backed loaded vinyl to prevent fan casing being an issue.

2.4.1.6 On Floor Plant Room Air Handling Unit’s (Air Handling Units)

• Supply ducting:
  o 1500mm long 40% open area attenuator recommended. Minimum insertion loss as follows:

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<th>Hz</th>
<th>63</th>
<th>125</th>
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<td>Loss</td>
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</table>
If located outside of the plant room, the attenuator and ducting on the upstream side of the attenuator is to be externally clad with 2x13mm plasterboard.

### 2.4.1.7 On Floor Plant Room Return Air Fans (RAF)

- Intake ducting:
  - 1800mm long 40% open area attenuator recommended. Minimum insertion loss as follows:

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<tr>
<th>Hz</th>
<th>63</th>
<th>125</th>
<th>250</th>
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<td>36</td>
<td>43</td>
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- Attenuator must be located within ductwork within the plant room.

### 2.4.1.8 Fan Coil Units (FCUs)

- Fan coil units located over meeting rooms, interview rooms, private offices are recommended to have 50mm thick insulated fan casing. Remaining units to have 25mm thick insulated casing.

- Fan coil units are not to be located over rooms with perforated/slotted ceilings. Fan coil unit located in L0105 Lounge should be relocated outside of this room, or the fan casing externally wrapped with 5kg/m² foam backed loaded vinyl.

- It is recommended that fan coil units use 25mm insulation on the supply side (first 2m from fan) and 50mm insulation on the return.

- Minimum of 1m of insulated flex for run out from rigid duct to supply and return air grilles.

### 2.4.1.9 Cooling Towers

- Night operation should be limited to 50% operation.

- Cooling towers are to be installed on triple layer of Super shearflex isolated pads.

### 2.4.1.10 Stair Pressurisation Fans

- One diameter long unpodded acoustic attenuators to be installed on the fan outlet. Minimum insertion loss as follows:

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<th>Hz</th>
<th>63</th>
<th>125</th>
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2.4.1.11 Smoke Exhaust Fans (up to 79dB(A) at 3m distance)

- Fan to operate at no more than 25Hz if run in relief mode.
- Discharge ducting – Line all discharge ducting (min one 90-degree bend) with 50mm thick internal lining.
- Intake ducting - 1500mm long 40% open area attenuator recommended. Minimum insertion loss as follows:

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<tr>
<th>Hz</th>
<th>63</th>
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3 CLOSURE

In our opinion, all queries raised by the EPA have been adequately responded to with a level of detail appropriate to this stage of the project. Appropriate noise emission goals have been proposed and the acoustic viability of the project has been demonstrated.

Please contact us should you have any further queries.

Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
Matthew Furlong
APPENDIX 1 – UNATTENDED NOISE MONITORING RESULTS
LOCATION M1 – FREEMONT STREET / LOVEDALE PLACE

(WEATHER DATA HAS BEEN COLLECTED FROM SYDNEY OLYMPIC PARK
ARCHERY CENTRE WEATHER TOWER)
## Appendix 1 – Freemont Street / Lovedale Place Tabulated Results

<table>
<thead>
<tr>
<th>Date</th>
<th>Day (7am – 6pm)</th>
<th>Evening (6pm-10pm)</th>
<th>Night (10pm-7am)</th>
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<tr>
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<td>Saturday, 17th February, 2018</td>
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<td>Sunday, 18th February, 2018</td>
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<td>Monday, 26th February, 2018</td>
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<tr>
<th>Day (7am – 6pm)</th>
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<tr>
<td>45</td>
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*Interval periods marked * have been excluded for due to weather conditions.*
APPENDIX 2 – UNATTENDED NOISE MONITORING RESULTS
LOCATION M2 – HOSPITAL ROAD

(WEATHER DATA HAS BEEN COLLECTED FROM SYDNEY OLYMPIC PARK
ARCHERY CENTRE WEATHER TOWER)
## Appendix 2 – Hospital Road Tabulated Results

<table>
<thead>
<tr>
<th>Date</th>
<th>Measured Background Noise Level dB(A)</th>
<th><strong>L_{90}(Period)</strong></th>
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<tbody>
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<td><strong>Median</strong></td>
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*Interval periods marked * have been excluded for due to weather conditions.
APPENDIX 3 – UNATTENDED NOISE MONITORING RESULTS
LOCATION M3 – CURRAWANG STREET

(WEATHER DATA HAS BEEN COLLECTED FROM SYDNEY OLYMPIC PARK
ARCHERY CENTRE WEATHER TOWER)
## Appendix 3 – Currawang Street Tabulated Results

<table>
<thead>
<tr>
<th>Date</th>
<th>Day (7am – 6pm)</th>
<th>Evening (6pm-10pm)</th>
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<tr>
<td>Sunday, 25th February, 2018</td>
<td>*</td>
<td>*</td>
<td>45</td>
</tr>
<tr>
<td>Monday, 26th February, 2018</td>
<td>*</td>
<td>47</td>
<td>*</td>
</tr>
<tr>
<td>Tuesday, 27th February, 2018</td>
<td>46</td>
<td>*</td>
<td>43</td>
</tr>
<tr>
<td><strong>Median</strong></td>
<td><strong>46</strong></td>
<td><strong>46</strong></td>
<td><strong>43</strong></td>
</tr>
</tbody>
</table>
APPENDIX 4 – UNATTENDED NOISE MONITORING RESULTS
LOCATION M4 – NULLAWRRA AVE

(WEATHER DATA HAS BEEN COLLECTED FROM SYDNEY OLYMPIC PARK
ARCHERY CENTRE WEATHER TOWER)
## Appendix 4 – Nullawarra Avenue

<table>
<thead>
<tr>
<th>Date</th>
<th>Measured Background Noise Level dBA Lₙ₀(Period)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day (7am – 6pm)</td>
</tr>
<tr>
<td>Tuesday, 27th February, 2018</td>
<td>*</td>
</tr>
<tr>
<td>Wednesday, 28th February, 2018</td>
<td>50</td>
</tr>
<tr>
<td>Thursday, 1st March, 2018</td>
<td>50</td>
</tr>
<tr>
<td>Friday, 2nd March, 2018</td>
<td>49</td>
</tr>
<tr>
<td>Saturday, 3rd March, 2018</td>
<td>46</td>
</tr>
<tr>
<td>Sunday, 4th March, 2018</td>
<td>*</td>
</tr>
<tr>
<td>Monday, 5th March, 2018</td>
<td>50</td>
</tr>
<tr>
<td>Tuesday, 6th March, 2018</td>
<td>*</td>
</tr>
<tr>
<td>Wednesday, 7 March, 2018</td>
<td>49</td>
</tr>
<tr>
<td>Median</td>
<td>49</td>
</tr>
</tbody>
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