8. **Noise emissions**

8.1 **Project description**

The Project will involve the development of an EfW Plant at the AP Pulp and Paper Mill complex in Maryvale, Victoria. The proposed Project comprises an EfW plant having a nominal output of 70 megawatts (MWe), with the combustion of waste via a moving-grate fired boiler. Key infrastructure for the EfW Plant include:

- Waste reception and storage hall
- Combustion and energy recovery units
- Flue gas treatment
- Energy utilisation and turbines
- Laydown and minor access roads on the existing AP Paper Mill site.

Noise-generating plant and equipment for the EfW Plant will mostly be located within buildings and enclosures. The initial plant layout is shown in Figure 8.1 below.
Figure 8.1: EfW Plant layout

Plan Scale 1:500

Legend:
1. Stack
2. Flue Gas Treatment Area
3. Boiler House
4. Feed Chute
5. Waste Burner
6. Tipping Hall
7. Turbine & Generator
8. Cooling Towers
9. Offices & Workshop
10. Fire Water Tank
11. Sewer Water Tank
12. Fly Ash Silos
13. Additive Silos
14. Residue Silos
15. Potential Visitors Centre
16. Emergency Diesel Generator & Storage
17. Walkway to Site Office from Carpark

Notes:
1. All dimensions are in millimeters unless otherwise noted.
2. Site appearance to match existing Australian Paper Plant galvanised steel sheeting not shown & the preference, however, has not yet been finalised.
8.2 Project location

The Project will be located within the existing AP Maryvale Pulp and Paper Mill site boundaries, approximately 7 kilometres (7km) northeast of the township of Morwell and approximately 7km west of the township of Traralgon. The Mill is situated in the centre of the Latrobe Valley, adjacent to the Morwell River.

The broader area surrounding the EfW Plant contains large industrial premises including several open cut brown coal mines and associated power stations, water treatment plants, quarries, a dairy processing facility and numerous light industrial premises. The Mill site is located within a planning zone designated for industrial activities (Industrial 2 Zone, IN2Z) and surrounded by farming zones and special use zones (predominantly for coal mining and power generation activities). Figure 8.2 below shows the planning zones in the vicinity of the EfW Plant.
Figure 8.2: Planning zones in the vicinity of the proposed EfW Plant

Legend
- Population Centres
- Nearest Noise Sensitive Receivers
- ABS Urban Centre Locations with Vic. Population > 7000
- Major Urban Areas
- Maryvale Mill Complex
- Project Area

DATA SOURCES

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Despite the industrial and farming nature of a lot of the land use surrounding the proposed EfW Plant site, there are a few Noise Sensitive Areas (NSAs) surrounding the site, as shown in Figure 8.3 below (marked as locations ‘North’, ‘East’, ‘South’, ‘West’). The planning zone of each of the nearest noise sensitive receivers is also provided:

- **North** – Northern noise sensitive area – Sawyers Lane – at the extreme southern end of Sawyers Lane. [FZ – Farm Zone]

- **East** – Eastern noise sensitive area – Scrubby Lane – 270 metres south of the Scrubby Lane / Traralgon West Road intersection [RLZ3 – Rural Living Zone 3]

- **South** – Southern noise sensitive area – Morwell, Maryvale Road – 285 metres west of the Morwell Maryvale Road and Traralgon West Road intersection [SUZ – Special Use Zone]

- **West** – Western noise sensitive area – Derhams Lane – 190 metres north of the Derhams Lane / Tanjil East Road intersection [SUZ – Special Use Zone].

The nearest NSA is Location ‘South’ (Morwell, Maryvale Road), located approximately 2 kilometres south of the proposed EfW.
Figure 8.3: Nearest noise sensitive areas (NSAs) to the proposed EfW Plant
8.3 Purpose of assessment

The purpose of this noise impact assessment is to:

- Provide an assessment of noise emissions to determine compliance with EPA agreed noise limits
- Provide findings for input to a EPA Works Approval application and planning permit application with the Latrobe City Council
- Provide recommendations where further noise mitigation works are deemed to be required or useful to mitigate potential noise impacts.

It is important to note that the Project is currently in the feasibility phase and there are a number of design parameters that have yet to be fully developed. The next phase of the Project involves the appointment of an EPC contractor to progress the detailed design and subsequent final design and construction of the Project (should the project proceed).

It is during the detailed design phase where acoustic design is conducted and noise mitigation measures are incorporated into the design. This process is iterative and will involve risk and hazard identification (e.g. risk and HAZOP/HAZID workshops) to quantify and manage risks, such as adherence to statutory noise limits for equipment. AP will ensure that the design includes adequate mitigations for key noise sources. Experience has shown that typical noise mitigation measures can reduce the noise contribution of a plant by up to 10 dB(A) and can be incorporated in to the plant design. If the noise contribution of the subject plant is above 10 dB(A), more detailed engineering for noise mitigation is normally required to reduce noise impacts.

This assessment reports on the findings of EPA noise limit calculations and computational noise modelling which has been conducted to determine the potential noise impacts of the EfW Project. As the Project progresses through subsequent design phases, re-modelling of the EfW Plant design will be conducted to confirm the potential noise impacts at the NSAs and that the Plant’s design complies with NIRV requirements. AP will commit to conducting noise monitoring to verify the results of the detailed design process and the noise modelling during the commissioning phase.

8.3.1 Relevant regulations and guidelines

Noise emitted from all commercial, industrial and trade premises within Metropolitan Melbourne must comply with the State Environment Protection Policy (Control of Noise from Commerce Industry and Trade) No. N-1 (SEPP N-1) at NSAs. The proposed site of the EfW site is based in regional Victoria outside of SEPP N-1’s area of application, thus Noise from Industry in Regional Victoria (NIRV, Publication 1411, October 2011) is applicable. The purpose of both SEPP N-1 and NIRV is to protect people from commercial, industrial or trade noise that may affect NSAs, with consideration to existing land use.

The residences adjacent to the proposed site are outside Melbourne’s Urban Growth Boundary and the Urban Centre Boundary of an urban centre with a population greater than 7000. In such circumstances where either the noise emitter or the noise receiver are within a major urban area, NIRV adopts the procedures of SEPP N-1 for setting Recommended Maximum Noise Levels (RMNLs). For this situation where the EfW Plant (the ‘noise emitter’) and the NSA (‘noise receivers’) are outside of a major urban area, the procedures in NIRV apply. The NIRV RMNLs are determined by adopting the methodology in Part 3 of NIRV and are based on the following:

1) Determination of the ‘Zone Levels’ based upon the land-use zones for both the generating zone (where the noise emitter is located) and the receiving zone (Noise Sensitive Area). Refer to Table 1 in the NIRV publication

2) Determination of the ‘Distance-adjusted Levels’ based upon the distance between the zone where the noise emitter is located and the location of the noise receiver (the Noise Sensitive Area)

3) A ‘Base Noise Level Check’, comparing the ‘Distance-adjusted Levels’ with the following ‘Base Noise Levels’ for each period of the day (adopting the greater of each comparison):
- Day: 45 dB(A)
- Evening: 37 dB(A)
- Night: 32 dB(A).

4) A ‘Background Level Check’ (the results from a background noise survey) comparing the measured levels with the resultant noise levels from the ‘Base Noise Level Check’, adopting the following procedure for each period:
   - Day - the greater of:
     - the distance-adjusted level or base noise level
     - the day background level plus 8 dB.
   - Evening - the greater of:
     - the distance-adjusted level or base noise level
     - the evening background level plus 5 dB.
   - Night - the greater of:
     - the distance-adjusted level or base noise level
     - the night background level plus 5 dB.

5) An assessment of ‘High Traffic-Noise Areas’ (if applicable) and comparison of the levels determined from ‘Step 4’ with the following reference values:
   - Day: 55 dB(A)
   - Evening: 50 dB(A)
   - Night: 45 dB(A).

In NIRV, RMNLs are described for different periods of the day. The periods are defined as follows

- **Day Period:** 07:00 to 18:00 hours
- **Evening Period:** 18:00 to 22:00 hours
- **Night Period:** 22:00 to 07:00 hours

(Note that 13:00 hours to 22:00 hours on Saturday and 07:00 hours to 22:00 hours on Sundays and public holidays are defined as the Evening Period)

### 8.4 Methodology

The methodology adopted for the noise assessment is described below. The methodology was discussed, reviewed and approved by EPA, at a meeting held on 22 November 2017 between the EPA and the EfW Project Team (comprising AP and Jacobs specialists).

#### 8.4.1 Applicable guidelines

The proposed site for the EfW and the NSAs are located outside of the SEPP N-1 area of application. In this situation, the applicable guideline for the determination of noise limits is NIRV.

#### 8.4.2 Background noise levels and recommended maximum noise levels

Various noise studies have been conducted on behalf of AP over recent years. This has included studies performed as part of a EPA Works Approval Application for a De-Inking Plant (DIP) in 2015 as well as studies commissioned by AP for monitoring of various onsite activities. The DIP was granted a Works Approval for construction and the plant’s operation was subsequently incorporated in to Mill’s EPA Licence (#46547). The
NSAs used for the DIP noise study in 2015 have not changed and there has not been any further residential development in areas closer to the proposed EfW Plant compared to those NSAs. Thus the NSAs used for the DIP noise study have been deemed appropriate for this assessment.

Recommended Maximum Noise Levels (RMNLs) at the NSAs were determined following the procedures of NIRV. These were assigned based on the zones in the planning scheme and the background noise measurements.

Through subsequent discussions with the EPA, Effective Recommended Maximum Noise Levels (ERMNLs) have been established based on modified RMNLs, in order to reduce the effect of background noise level ‘creep’ due to industrial noise emissions from existing multiple industrial sites in the local environment. The ERMNLs for the NSAs are provided in Section 8.4.3.

### 8.4.3 Noise sources associated with the EfW

The main noise sources associated with the proposed EfW site have been identified as the following plant items:

- Water cooled condensers (WCC)
- Induced draft fans
- Ash extraction fans
- Lime pack blowers
- Stack
- Compressor
- High pressure steam line
- Transformer
- Truck movements
- EfW Plant buildings including:
  - Tipping Hall
  - Waste Bunker
  - Bag House
  - Turbine Hall.

The source noise levels were based on publicly available information related to the Ferrybridge EfW site in the UK (the reference design for AP’s proposed plant), published material on similar EfW plants and industry recognised data sources. The source noise levels are provided in Section 8.6.1.

The Mill site also incorporates a railway which facilitates product export (paper and packaging products from the Mill) from the site once a day via freight train. The addition of the EfW Plant is not expected to lead to an additional number of trains delivering waste to the Mill site, pending further investigations of the logistics and waste origins during the detailed design phase. The standard prescriptors for rail traffic noise L_{eq. 16hr} and L_{eq. 8hr} (the noise level over a 16-hour day-time period and 8-hour night-time period), typically increase due to increased number of trains or marked changes in infrastructure – neither of which are anticipated at this stage of the Project. Noise from freight train deliveries have not been considered within this assessment as the relevant government policy is not applicable in this circumstance\(^{21}\).

\(^{21}\) The relevant policy for railway noise is the Victorian Passenger Rail Infrastructure Noise Policy April 2013 (PRINP) which provides ‘Investigation Thresholds’ to guide transport bodies when assessing the impacts of rail noise on nearby communities. However, this only applies to freight-rail operations in circumstances where freight-rail activity is operated along a passenger-rail corridor and therefore is not applicable.
Trucks, their movements and numbers, on-site have been considered within this assessment based on information supplied by AP.

### 8.4.4 Acoustic model for EfW

An acoustic model has been developed for the EfW using the acoustic software SoundPLAN (version 7.4). This is an environmental noise modelling software package which has implemented the CONCAWE noise propagation model\(^{22}\). The CONCAWE methodology considers noise attenuation by:

- Geometrical spreading
- Atmospheric absorption
- Ground effects
- Meteorological conditions
- Barriers.

The model inputs for SoundPLAN include:

- Topography
- Building structures
- Noise sources associated with proposed plant
- Receivers
- Ground absorption
- Air absorption.

The noise levels have been predicted at the NSAs for day, evening and night periods for the following meteorological conditions, details in Section 8.6.2:

- Neutral
- Predominant.

#### 8.5 Recommended maximum noise level

Recommended Maximum Noise Levels (RMNLs) for the four designated NSAs surrounding the EfW Plant have been derived from the procedures in NIRV and are shown in Table 8.1. As the NSAs have not changed since 2015 and there has not been any further residential development in areas closer to the proposed EfW Plant compared to those NSAs, the selection of these NSAs is deemed appropriate for the assessment.

<table>
<thead>
<tr>
<th>Noise sensitive areas</th>
<th>Recommended maximum noise levels (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>North – Sawyers Lane</td>
<td>45  39  34</td>
</tr>
<tr>
<td>East – Scrubby Lane</td>
<td>45  37  32</td>
</tr>
<tr>
<td>South – Maryvale Rd</td>
<td>54  49  44</td>
</tr>
<tr>
<td>West – Derhams Lane</td>
<td>47  42  37</td>
</tr>
</tbody>
</table>

The Effective Recommended Maximum Noise Levels for the four NSAs surrounding the EfW Plant are shown in Table 8.2. This is based on discussions with the EPA in which a 3 dB decrease across all RMNLs was agreed

\(^{22}\) CONCAWE, The Propagation of Noise from Petrochemical Complexes to Neighbouring Communities, CJ Manning 1981.
to account for the effect of potential background noise level ‘creep’ due to industrial noise emissions from multiple industrial sites in the local environment.

Table 8.2: Effective recommended maximum noise levels

<table>
<thead>
<tr>
<th>Noise sensitive areas</th>
<th>Effective recommended maximum noise levels (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day</td>
</tr>
<tr>
<td>North – Sawyers Lane</td>
<td>42</td>
</tr>
<tr>
<td>East – Scrubby Lane</td>
<td>42</td>
</tr>
<tr>
<td>South – Maryvale Rd</td>
<td>51</td>
</tr>
<tr>
<td>West – Derhams Lane</td>
<td>44</td>
</tr>
</tbody>
</table>

To put these ERMNLs into an everyday context, it is useful to compare against some common noise sources and their typical sound (power) levels. Figure 8.4 below shows the sound power levels of typical machines and situations.

Figure 8.4: Some common noise sources and their typical sound levels, sourced from WorkSafe Victoria Guide for assessing and fixing noise problems at work.
Details of the locations of the NSAs surrounding the site for which ERMMNLs have been applied to are provided below and presented earlier in Figure 8.4.

- **North** – Northern noise sensitive area – **Sawyers Lane** – at the extreme southern end of Sawyers Lane
- **East** – Eastern noise sensitive area – **Scrubby Lane** – 270 metres south of the Scrubby Lane / Traralgon West Road intersection
- **South** – Southern noise sensitive area – **Morwell, Maryvale Road** – 285 metres West of the Morwell Maryvale Road and Traralgon West Road intersection
- **West** – Western noise sensitive area – **Derhams Lane** – 190 metres north of the Derhams Lane / Tanjil East Road intersection.

The approximate distances from the site boundary of the EfW plant to each of the noise sensitive areas are presented in Table 8.3 below.

<table>
<thead>
<tr>
<th>Noise sensitive areas</th>
<th>Distance from EfW site (approx. metres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>North – Sawyers Lane</td>
<td>3,100</td>
</tr>
<tr>
<td>East – Scrubby Lane</td>
<td>3,200</td>
</tr>
<tr>
<td>South – Maryvale Rd</td>
<td>1,700</td>
</tr>
<tr>
<td>West – Derhams Lane</td>
<td>2,600</td>
</tr>
</tbody>
</table>

### 8.6 Acoustic modelling inputs

An acoustic model for the EfW site was developed from source noise levels (i.e. from a noise database of common plant and equipment) and design details sourced from published material on similar EfW plants in the UK (Ferrybridge\(^{23}\)) and Australia (Eastern Creek\(^{24}\)) as well as industry recognised data sources. Specific modelling details are provided below.

A schematic layout of the modelled EfW site, showing the arrangement of all noise sources, is presented in Figure 8.5 below.

\(^{23}\) Ferrybridge, Multi-fuel 2 Preliminary Environmental Information Report by URS (October 2013, Ref: Pa-D1)

\(^{24}\) Energy from Waste Facility, Eastern Creek (SSD 6236) – Noise Impact Assessment by Pacific Environment (31st October 2016, Job ID. 21292C)
Equipment active in each operational scenario has been based upon information supplied by AP on the likely hours of operation of each item of plant. Equipment and quantities for the EfW facility have also been based on information supplied by AP, based on the equipment in the reference design. This information may change as the design is progressed during the detailed design phase.

Table 8.4: Operational details for EfW site

<table>
<thead>
<tr>
<th>No.</th>
<th>Equipment</th>
<th>Height (m)</th>
<th>Operation</th>
<th>Operational assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Quantity</td>
<td>Day</td>
</tr>
<tr>
<td>1</td>
<td>Stack</td>
<td>100</td>
<td>2</td>
<td>✔</td>
</tr>
<tr>
<td>2</td>
<td>WCC</td>
<td>13</td>
<td>4</td>
<td>✔</td>
</tr>
<tr>
<td>3</td>
<td>ID Fan</td>
<td>3</td>
<td>2</td>
<td>✔</td>
</tr>
<tr>
<td>4</td>
<td>Ash Extraction Fan</td>
<td>3</td>
<td>2</td>
<td>✔</td>
</tr>
<tr>
<td>5</td>
<td>Lime Pack Blower</td>
<td>3</td>
<td>2</td>
<td>✔</td>
</tr>
<tr>
<td>6</td>
<td>Compressor</td>
<td>0.5</td>
<td>1</td>
<td>✔</td>
</tr>
<tr>
<td>7</td>
<td>High Pressure Steam Line</td>
<td>15</td>
<td>1</td>
<td>✔</td>
</tr>
<tr>
<td>8</td>
<td>Truck (total numbers)</td>
<td>1.5</td>
<td>60 (daily total)</td>
<td>✔ (3) *</td>
</tr>
<tr>
<td>9</td>
<td>Transformer</td>
<td>3</td>
<td>1</td>
<td>✔</td>
</tr>
</tbody>
</table>

* Truck delivery numbers for Day, Evening and Night Scenarios included in the acoustic model for the facility have been based on a conservation-assumption supplied by AP.

- For Day operations, three trucks were modelled as active in the scenario, representing the various modes of operation of the trucks when on-site and consistent with the number of trucks expected concurrently onsite. The activities of each truck included in Day Scenario are listed below:
  - One unloading truck is active in the Tipping Hall building;
  - Two additional trucks are active outside of the buildings; one in transit (off weighbridge) halfway along the access driveway and one waiting stationary adjacent to the Tipping Hall.

- For Evening operations, two trucks were modelled as active in the scenario, consistent with the number of trucks expected concurrently onsite. The activities of each truck included in Evening Scenario are listed below:
  - Two trucks are active outside of the Tipping Hall; one in transit (off weighbridge) halfway along the access driveway and one waiting stationary adjacent to the Tipping Hall.

- For Night operations, one truck was modelled as active in the scenario, consistent with the number of trucks expected concurrently onsite. The activities of each truck included in Night Scenario are listed below:
  - One truck is active outside of the Tipping Hall.

8.6.1 Modelling details

The octave band sound power levels for significant sources at the EfW site used in the acoustic model are provided in Table 8.5.
Table 8.5: Sound power levels of EfW noise sources

<table>
<thead>
<tr>
<th>No.</th>
<th>Equipment</th>
<th>Sound power level, dB(A)</th>
<th>Overall sound power level, dB(A)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Octave band frequency (Hz)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>63</td>
<td>125</td>
</tr>
<tr>
<td>1</td>
<td>Stack²⁵</td>
<td>85</td>
<td>87</td>
</tr>
<tr>
<td>2</td>
<td>WCC²⁶ (per unit)</td>
<td>40</td>
<td>65</td>
</tr>
<tr>
<td>3</td>
<td>ID Fan²</td>
<td>68</td>
<td>76</td>
</tr>
<tr>
<td>4</td>
<td>Ash Extraction Fan²</td>
<td>58</td>
<td>79</td>
</tr>
<tr>
<td>5</td>
<td>Lime Pack Blower²</td>
<td>57</td>
<td>78</td>
</tr>
<tr>
<td>6</td>
<td>Compressor²</td>
<td>87</td>
<td>86</td>
</tr>
<tr>
<td>7</td>
<td>High Pressure Steam Line²</td>
<td>56</td>
<td>70</td>
</tr>
<tr>
<td>8</td>
<td>Truck²</td>
<td>86</td>
<td>94</td>
</tr>
<tr>
<td>9</td>
<td>Transformer²</td>
<td>79</td>
<td>91</td>
</tr>
</tbody>
</table>

The octave band internal sound pressure levels for EfW facility buildings used in the acoustic model are provided in Table 8.6.

Table 8.6: Internal sound pressure levels for EfW facility buildings

<table>
<thead>
<tr>
<th>Building</th>
<th>Sound pressure level, dB(A)</th>
<th>Overall sound pressure level, dB(A)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Octave band frequency (Hz)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>63</td>
<td>125</td>
</tr>
<tr>
<td>Tipping Hall²⁶</td>
<td>64</td>
<td>71</td>
</tr>
<tr>
<td>Waste Bunker²⁶</td>
<td>58</td>
<td>68</td>
</tr>
<tr>
<td>Boiler House²⁶</td>
<td>69</td>
<td>74</td>
</tr>
<tr>
<td>Turbine Hall²⁶</td>
<td>69</td>
<td>75</td>
</tr>
</tbody>
</table>

Assumptions with regard to modelling of the EfW Plant are:

- The Tipping Hall, Bag House, Waste Bunker, Boiler House and Turbine Hall are assumed to be constructed with a sandwich panel consisting of 0.6mm outer steel sheet, insulation core and 0.4mm inner steel sheet. It is also assumed the Tipping Hall is an enclosed space - while there are roller doors these are to be quick action and will only be open momentarily and close automatically.

- The sound power levels applied to truck activities are based on Jacobs noise measurements taken at a similar facility and, as a conservative assumption, based on the noisiest truck-type measured for each activity, 20kL tanker, front-loader or hook-lift truck.

- The sound power level applied to the water cooling tower is indicative of a typical tower for a site of this kind, sourced from a recognised industry technical standard. This is based on a water cooling tower unit with a ventilator, water volume flow of 3000 m³/h and ventilator blade tip speed 40 to 70m/s. The sound power level is considered reasonable for a site of this kind.

- Water cooling tower units are assumed to be point sources as receivers are greater than 1 kilometre away.

- Building breakout calculations have been performed assuming those internal sound pressure levels for Tipping Hall, Waste Bunker, Boiler House and Turbine Hall provided in Table 8.5 and internal levels calculated for the Bag House and Mechanical Workshop assuming the Bag House includes items 3, 4, 5 of Table 8.5 and the Mechanical Workshop item 6 of Table 8.5.

²⁵ The acoustic model did not incorporate directivity losses due to the stack.
²⁶ VDI 3734-2:1990 Characteristic Noise Emission Values of Technical Sound Sources; Cooling Towers, Verlag des Vereins Deutscher Ingenieure
• Noise sources contained within the Tipping Hall, Waste Bunker, Boiler House and Turbine Hall were not considered individually within the acoustic model and instead were incorporated in the model through the internal sound pressure levels for each building and its associated breakout calculation.
• All equipment is assumed to operate continuously and simultaneously for Day, Evening and Night scenarios.

8.6.2 Meteorological conditions

Noise levels from the operation of the EfW Plant have been predicted at the Noise Sensitive Areas, during day, evening and night periods. The predictions were made for two sets of meteorological conditions:
• Scenario 1: Neutral meteorological conditions
• Scenario 2: Predominant meteorological conditions.

The details of the meteorological conditions are provided in Table 8.7.

Table 8.7: Meteorological conditions

<table>
<thead>
<tr>
<th>Meteorological condition</th>
<th>Wind speed* (m/s)</th>
<th>Temperature (°C)</th>
<th>Humidity (%)</th>
<th>Pasquil stability category (from CONCAWE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutral</td>
<td>0</td>
<td>20</td>
<td>70</td>
<td>Neutral (D)</td>
</tr>
<tr>
<td>Predominant</td>
<td>3</td>
<td>15</td>
<td>50</td>
<td>Worst Case (F)</td>
</tr>
</tbody>
</table>

*The predominant wind direction in the area surrounding the Mill site (a westerly wind) was used in determining the impact at Noise Sensitive Areas.

An analysis of the predominant winds for the Project was conducted. Figure 8.6 below shows the wind roses of meteorological data from the Bureau of Meteorology’s Latrobe Valley Airport weather station. The wind roses show that the predominant wind direction is from the west and southwest and accounts for over 50% of the winds.
BoM LVA summer (Jan. 3PM) wind rose 1984-2017
1037 observations; 1% calms

BoM LVA winter (July 3PM) wind rose 1984-2017
1029 observations; 4% calms

Figure 8.6: Summer and winter wind roses for the period 1984-2017 from the Bureau of Meteorology’s Latrobe Valley Airport weather station

8.7 Acoustic modelling results

The modelling inputs and scenarios were run with the SoundPLAN model and the predicted noise levels due to the EfW are provided in Figure 8.8. It is important to note that the figures in the table represent the EfW’s contribution to the overall noise level experienced at the representative NSA. In other words, the levels in the table represent the EfW Plant’s influence at the particular NSA at the particular time of day, over and above the existing industrial noise sources in the area.

Table 8.8: Predicted noise levels for the proposed EfW Plant

<table>
<thead>
<tr>
<th>Locations</th>
<th>Predicted sound pressure level (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day 7am – 6pm</td>
</tr>
<tr>
<td>Neutral</td>
<td></td>
</tr>
<tr>
<td>North</td>
<td>23</td>
</tr>
<tr>
<td>East</td>
<td>19</td>
</tr>
<tr>
<td>South</td>
<td>32</td>
</tr>
<tr>
<td>West</td>
<td>25</td>
</tr>
</tbody>
</table>
The results of the acoustic modelling can also be represented as contour plots over an aerial map image. The contours represent the modelled predicted sound pressure levels attributable to the EfW Plant. The following series of contour plots shows the modelled predictions for each of the day, evening and night periods for neutral and predominant weather conditions.

<table>
<thead>
<tr>
<th>Locations</th>
<th>Day 7am – 6pm</th>
<th>Evening 6pm – 10pm</th>
<th>Night 10pm – 7am</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predominant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North</td>
<td>28</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>East</td>
<td>24</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>South</td>
<td>31</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>West</td>
<td>24</td>
<td>23</td>
<td>23</td>
</tr>
</tbody>
</table>
Figure 8.7: Noise Contour Plot: Evening - Neutral Meteorological Conditions (South)

Legend
- Nearest Noise Sensitive Receivers
- Noise Contour, L_{Aeq}, dB(A)
  - 20 - 25 dB(A) contour
  - 25 - 30 dB(A) contour
  - 30 - 35 dB(A) contour
  - 35 - 40 dB(A) contour
  - 40 - 50 dB(A) contour
  - 50 - 60 dB(A) contour
  - 60 - 70 dB(A) contour
  - > 70 dB(A) contour
- Maryvale Mill Complex
- Project Area
Figure 8.9: Noise Contour Plot: Night - Neutral Meteorological Conditions (South)

Legend
- Nearest Noise Sensitive Receivers
- Noise Contour, LAeq, dB(A)
  - 20 - 25 dB(A) contour
  - 25 - 30 dB(A) contour
  - 30 - 35 dB(A) contour
  - 35 - 40 dB(A) contour
  - 40 - 50 dB(A) contour
  - 50 - 60 dB(A) contour
  - 60 - 70 dB(A) contour
  - > 70 dB(A) contour
- Maryvale Mill Complex
- Project Area

Nearest Noise Sensitive Receivers

Noise Contour, LAeq, dB(A)

- 20 - 25 dB(A) contour
- 25 - 30 dB(A) contour
- 30 - 35 dB(A) contour
- 35 - 40 dB(A) contour
- 40 - 50 dB(A) contour
- 50 - 60 dB(A) contour
- 60 - 70 dB(A) contour
- > 70 dB(A) contour

Maryvale Mill Complex

Project Area

DATA SOURCES
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Figure 8.11: Noise Contour Plot: Evening - Adverse Meteorological Conditions (East)
Figure 8.12: Noise Contour Plot: Night- Adverse Meteorological Conditions (East)

Australian Paper Energy from Waste Feasibility Study

Legend
- Nearest Noise Sensitive Receivers
- Noise Contour, Lₐₑₐₜ, dB(A)
  - 20 - 25 dB(A) contour
  - 25 - 30 dB(A) contour
  - 30 - 35 dB(A) contour
  - 35 - 40 dB(A) contour
  - 40 - 50 dB(A) contour
  - 50 - 60 dB(A) contour
  - 60 - 70 dB(A) contour
  - > 70 dB(A) contour
- Maryvale Mill Complex
- Project Area

DATA SOURCES
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8.8 Assessment impacts

The modelling results have been tabulated and compared to the RMNLs for all periods and under both neutral and predominant meteorological conditions. The predicted noise levels and their compliance with RMNLs are provided in Table 8.9.

Table 8.9: Predicted noise levels compliance with RMNLs

<table>
<thead>
<tr>
<th>Locations</th>
<th>Predicted sound pressure level (dB)</th>
<th>RMNLs</th>
<th>Compliance with RMNLs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day</td>
<td>Evening</td>
<td>Night</td>
</tr>
<tr>
<td>Neutral</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North</td>
<td>23</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>East</td>
<td>19</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>South</td>
<td>32</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>West</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Predominant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North</td>
<td>28</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>East</td>
<td>24</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>South</td>
<td>31</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>West</td>
<td>24</td>
<td>23</td>
<td>23</td>
</tr>
</tbody>
</table>

The results presented in Table 9 show that the predicted noise levels due to the operation of the EFW, experienced at the NSAs, meet the RMNLs for all time periods and meteorological conditions.

To account for the effect of background noise level ‘creep’ due to industrial noise emissions from multiple industrial sites into the local residential environment, a 3 dB decrease across all RMNLs was agreed to through discussions with the EPA. The Effective Recommended Maximum Noise Levels (ERMNLs) for the four NSAs surrounding the EFW Plant are shown in Table 8.2 (displayed in Section 8.5 and repeated below).

Table 8.10: Effective Recommended Maximum Noise Levels

<table>
<thead>
<tr>
<th>Noise Sensitive Areas</th>
<th>Effective recommended maximum noise levels (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day</td>
</tr>
<tr>
<td>North – Sawyers Lane</td>
<td>42</td>
</tr>
<tr>
<td>East – Scrubby Lane</td>
<td>42</td>
</tr>
<tr>
<td>South – Maryvale Rd</td>
<td>51</td>
</tr>
<tr>
<td>West – Derhams Lane</td>
<td>44</td>
</tr>
</tbody>
</table>

An acoustic principle is that an increase or decrease in sound level of approximately 10 dB corresponds to a subjective doubling or halving in loudness. A sound 10 dB or more below another sound is unlikely to be perceived and will not contribute to the overall noise level dominated by the other sound. In the circumstances of the EFW Project, the EFW Plant will be located adjacent to the existing Maryvale Mill. Given that the Mill would be the dominant noise source, the EFW Plant would be unlikely to be perceived if the EFW Plant’s noise levels can be shown to be 10 dB below the ERMNLs at the respective NSAs.

Accordingly, Design Noise Targets have been calculated to represent the maximum noise level contribution of the EFW Plant at the particular NSA at the particular time period. In other words, for the EFW Plant to have no net contribution to the overall noise level experienced at each NSA, the predicted noise levels due to the EFW will have to meet the Design Noise Targets presented in Table 8.11. The Design Noise Targets represent a
difference of 10 dB or more below the ERMNLs. AP will commit to ensuring the EfW Plant noise contribution does not have adverse impacts at the NSAs.

Table 8.11 : Predicted noise levels and design noise targets

<table>
<thead>
<tr>
<th>Locations</th>
<th>Predicted sound pressure level (dB)</th>
<th>Design Noise Targets (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day</td>
<td>Evening</td>
</tr>
<tr>
<td>Neutral</td>
<td></td>
<td></td>
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<tr>
<td>North</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>East</td>
<td>19</td>
<td>18</td>
</tr>
<tr>
<td>South</td>
<td>32</td>
<td>31</td>
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<tr>
<td>West</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Adverse</td>
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<tr>
<td>North</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>East</td>
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<td>23</td>
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<tr>
<td>South</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>West</td>
<td>24</td>
<td>23</td>
</tr>
</tbody>
</table>

8.9 Conclusions and recommendations

This assessment reports on the findings of EPA noise limit calculations and computational noise modelling which has been conducted to determine the potential noise impacts of the EfW Project. Calculations of Recommended Maximum Noise Levels and Effective Recommended Maximum Noise Levels have been conducted in accordance with NIRV.

Predicted noise levels due to the EfW at representative NSAs have been modelled using SoundPLAN for all time periods and for both neutral and predominant meteorological conditions. The noise experienced at each property for each of these time periods has been compared against the Recommended Maximum Noise Levels and Effective Recommended Maximum Noise Levels. Design Noise Targets were also determined for the Project to represent the maximum noise level contribution of the EfW Plant at a particular NSA for a particular time period.

It was found that the EfW Plant will meet the RMNLs at each of the NSAs and for each of the time periods. AP will also commit to meeting the Design Noise Targets so that the EfW Plant noise contribution will not have adverse impacts at the NSAs.

It is important to note that the Project is currently in the feasibility phase and there are a number of design parameters that have yet to be fully developed. The next phase of the Project involves the appointment of an EPC contractor to progress the detailed design and subsequent final design and construction of the Project (should the project proceed).

As the Project progresses through subsequent design phases, re-modelling of the EfW Plant design will be conducted to reassess potential noise impacts at the NSAs and to confirm that the Plant’s design will continue to comply with NIRV requirements. During the commissioning phase, AP will also commit to conducting noise monitoring for the EfW facility to verify the results of the detailed design process and the noise modelling.

If required, further mitigation measures can be implemented to further minimise noise impacts during the detailed design phase. This could consider further mitigation on dominant noise sources, including:
- Noise from the Boiler House
- Water cooled condensers (WCC)
- Truck Noise.
Typical mitigation strategies that may be applied to reduce noise levels include:

c) Selection of quiet plant and equipment (low noise / non-tonal options)
d) ‘Line of sight’ with noise sensitive areas reduced as far as practicably possible
e) Application of acoustic attenuation in the form of noise ‘barrier’ walls or enclosure. The ‘barrier’ is to have a mass per unit area in the order of 15 kg/m² and be contiguous without any gaps
f) Application of acoustic insulating constructions for building door and walls
g) The use of attenuators on extract systems.

It is during the detailed design phase where acoustic design is conducted and noise mitigation measures are incorporated into the design. This process is iterative and will involve risk and hazard identification (e.g. risk and HAZOP/HAZID workshops) to quantify and manage risks, such as adherence to statutory noise limits for equipment. Experience has shown that typical noise mitigation measures can reduce the noise contribution of a plant by up to 10 dB(A) and can be incorporated in to the plant design. If the noise contribution of the subject plant is above 10 dB(A), more detailed engineering for noise mitigation is normally required to reduce noise impacts.