Appendix H

Odour Assessment

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REVIEW OF ODOUR EFFECTS RELATING TO HOLMES AND SKELLERUP BLOCKS - ROLLESTON WEST PLAN CHANGE

Dear Jeremy,

This letter report[1] provides a review of the potential odour effects due to the odour generating activities in the vicinity of the "Holmes" and "Skellerup" blocks (the blocks) located to the west of Rolleston if these blocks are changed to a residential land use. It is understood that Rolleston West Residential Ltd (RWRL) intend to submit on the Selwyn District Council (SDC) Plan change with the aim of achieving the rezoning the blocks from rural-residential to conventional residential (12 households/hectare density). These blocks currently have areas where housing density is restricted due to potential reverse sensitivity effects upon existing nearby waste management activities which discharge odour. The areas are referred to as Odour Control Setback Area in the operative Selwyn District Plan (the Plan) and are shown in Appendix 39 and 40 of the Plan for the Holmes and Skellerup blocks respectively. The location of the Holmes and Skellerup blocks are shown in Figure 1 and Figure 2.

The Odour Control Setback Areas are understood to be based on reviews of consented and existing activities in the vicinity of the blocks during the SDC plan change 8 and plan change 9 hearings (PC8 and PC9). These were private plan changes by the Selwyn Plantation Board Limited (SPBL) during 2010-2011 to change the zoning of these blocks to be rural-residential. Golder Associates (NZ) Ltd (Golder 2008) provided advice to the SPBL in support of these plan changes.

The scope of this review is an assessment on the requirements to avoid significant reverse sensitivity to odour effects due to the proposed rezoning of the Holmes and Skellerup blocks. This review utilises previous work by Golder (2008) for the SPBL in the regards to the Reverse sensitivity effects associated with PC8 and PC9. The review also accounts for changes in land use since 2008 including consideration of any new consented activities, cessation of activities and known consented changes in operation of odour generating activities. Any changes in published buffer distances referred to by Golder (2008) will also be considered. Where necessary, Golder has used its professional judgement in combination with available buffer guidance to assess a suitable buffer for each of the activities to ensure only minor or less reverse sensitivity effects from the proposed land use changes. This review relies on information publicly available at the time.

[1] This letter is subject to the limitations provided in Attachment 1.

A brief description of the odour generating activities and any changes to these is provided in Section 1.0. This is followed by a review of buffer distance criteria for each activity and any other mitigating factors that may be applied - Section 2.0. Finally, overall recommendations on limitations on the locations of residential dwellings is provided Section 3.0.

1.0 ODOUR GENERATING ACTIVITIES

1.1 Overview

Activities identified in the previous Golder (2008) assessment include the following three potentially odorous activities:

- The Rolleston Wastewater Treatment Plant and disposal site (herein referred to as the "Pines WWTP");
- Rolleston Resource Recovery Park (herein referred to as Pines Resource Recovery Park "PRRP"); and
- Tegel Foods Limited's intensive poultry farming sheds (herein referred to as "Tegel's poultry operation").

Our review of existing consents in the vicinity of the Holmes and Skellerup blocks finds that the Pines WWTP and the PRRP hold active air discharge consents with the Canterbury Regional Council (CRC). Tegel's poultry operation does not – and it is understood that one is not required. We have also identified dairy effluent irrigation consents on the north side of State Highway 1, however due to the buffer distance to these activities and restrictions within the associated air disharge consents for these activities, these activities are not expected to result in significant odour effects on the Holmes or Skellerup blocks. These activities have not been considered further.

A description of the operation of the above activities is provided in Golder (2008) and a summary of the operation and changes to the consented operation since the Golder (2008) report are provided in the sections below.

1.2 Pines WWTP

Golder (2008) concluded that potential odour nuisance from the Pines WWTP would be associated with:

- Biosolids handling, storage and disposal;
- Secondary treated effluent irrigation; and, to a lesser degree;
- The primary effluent treatment process.

Based on our current understanding of the activity, these are still the main sources of potential odour nuisance for the blocks, if developed to residential areas.

Based on a review of the consents associated with the Pines WWTP, it appears that no changes have been made to the primary effluent treatment processes.

There have been changes[2] to the consent for biosolids application to land (current consent is CRC210644). It is noted that the current consent clarifies that the method of further processing biosolids is solar drying in

[2] These are for reduced bore monitoring following upgrades to reticulated water supply for the potentially affected parties, and increases to the limits of zinc and copper contained in the biosolids.

glasshouses. This method of processing is expected to have a lower odour potential compared to biosolids processing via composting.

There are no changes to the classification (i.e., Class Aa) required by this consent for the biosolids that can be applied to land, which would alter the odour potential from this activity.

There have been several changes to the conditions of the Pines WWTP consent (current consent number CRC153952) which impact the extent of the potential odour effects due to irrigation of the treated effluent. The consent now defines different restrictions for treated effluent irrigation for various areas, including that adjacent to the western boundary of the Holmes Block. There are specific additional conditions in CRC153952 (Conditions 35 to 42) that were contingent on the then proposed Plan Change 8 to the Selwyn District Council resulting in the Holmes block being rezoned rural residential. As the proposed plan change was successful, it is assumed that Conditions 35 to 42 apply.

Under these consent conditions, the irrigation of treated effluent is allowed to occur up to 25 m from the common boundary (Condition 40c), subject to meeting criteria related to the irrigated water quality, method of irrigation and boundary planting. The distance to the boundary is increased if:

- The water quality limits are not achieved. This would mean that during wind conditions that would put the Holmes block downwind, irrigation cannot occur within 200 m from the common boundary (Condition 39a).
- The method of the irrigation does not meet Condition 43, irrigation cannot occur within 150 m of the common boundary. Condition 43 sets irrigation nozzle parameters to maximise droplet size,
- The shelter belt planting does not meet the requirements of Condition 40. In this case irrigation cannot occur within 150 m of the common boundary.
- The irrigator has been turned off for 24 hours there can be no irrigation with 200m of the boundary. This is to prevent treated effluent that is potentially anaerobic being irrigated close to this boundary.

From a review of recent aerial photographs, it appears that irrigation is undertaken up to 150 m from the boundary, and this appears to be due to the incomplete shelterbelt planting.

All of the above consent provisions reduce the risk of odour, pathogens and aerosols causing significant air quality impacts within the Holmes block. Given the water quality parameters required of the irrigated effluent (e.g., mean suspended Solids of 20 g/m^3, mean biological oxygen demand of 15 g/m^3), it is considered to be of a tertiary treated standard, and therefore the potential for adverse odour effects is expected to be low. However, there is a risk of pathogens (pathogens can include bacteria, parasites and viruses that are contained in human waste) being discharged and impacting the Holmes block if pathogens in the treated effluent significantly exceed the consent limit of 500 CFU/100 ml (median).

In terms of land that may be used in the future for treated effluent irrigation, there does not appear to be any additional blocks of land that are in the immediate vicinity of the Skellerup or Holmes blocks that appear to be obvious candidates for treated effluent irrigation.

1.3 Pines Resource Recovery Park - PRRP

The operations at the PRRP includes a composting facility and a refuse transfer operation. Changes to the operation of these are discussed below.

1.3.1 Composting

At the time of the Golder (2008) report, composting of green waste and putrescible waste (excluding biosolids) was consented (CRC041489) to be undertaken at the PRRP using an in-vessel process. An indicative maximum of 2,000 tonnes per annum of organic material was consented to be processed at the site. A HotRot system had been proposed to be used for the initial stages of composting with static piles used for the final maturation.

In 2019 (CRC190492) consent was granted for the removal of the in-vessel based system and for composting to be undertaken using an open windrow-based system. Also included in the application was explicit reference to the types of organic waste composted. These include kerbside organics (considered to be mostly garden waste and food scraps) and green waste.

A Golder review[3] of the application for Environment Canterbury prior to it being granted, concluded that the site was likely to produce more odour than it had in the past. However, due to the distance to the nearest sensitive receptors, it was unlikely to increase odour effects. The review noted that the scale of the operation is not explicitly constrained via consent condition (either in the previous consent or in the application for CRC190492), but the assessment of effects was on the basis of the current throughput of 4,200 Tonnes per year. The Golder review also recommended regular oxygen monitoring to confirm that compost was maintained in an aerobic state.

The use of an open air windrow-based composting system is considered to have increased risk of odour compared to the originally consented in-vessel system.

1.3.2 Refuse transfer operations

There have been no documented or consented changes associated with the refuse handling.

1.4 Tegel's Poultry Operation

Tegel operates seven breeder (egg laying) sheds between Dunns Crossing Road and Edwards Road. The Tegel operation is directly adjacent and to the north of the Skellerup block. Based on discussion with RWRL, Golder understands there have been no changes to the Dunns Crossing Road farm and there are no increases in operation planned.

2.0 RECOMMENDED BUFFER DISTANCES

2.1 Pines WWTP

2.1.1 Wastewater Treatment plant

Both the South Australia (SA) EPA and Victoria (Vic) EPA (EPA Victoria, 2012, South Australia Environment Protection Authority 2019) recommend buffer distances for wastewater treatment plants. These guidance documents have been updated since Golder, 2008. The SA EPA and the Vic EPA guidance reports buffer

[3] Letter M McCauley to Matthew Harrison (Environment Canterbury) dated 20 August 2018. Golder Ref 1791554-7403-007-LR-Rev0

distances are based on the installation treatment capacity (population equivalent - PE) and the type of treatment process. Golder (2008) discussed that the Pines WWTP had a future design capacity for a PE greater than 80,000, and this has been assumed.

The SA EPA reports the same buffer criteria of 300 m for a mechanical/biological treatment plant with PE <15,000. No buffer guidance is available for a treatment capacity PE greater than this.

Vic EPA provides an equation to calculate the buffer distance and based on this, a 430 m buffer is calculated for the 80,000 PE.

Previously Golder (2008) recommended a buffer distance of 500 m from the WWTP based on experience with similar operations in New Zealand, and this is retained in this assessment.

2.1.2 Biosolids handling, storage and disposal

For biosolids, the method of further processing the biosolids has been refined to be solar drying in glasshouse. ACT EPA recommend a distance of 400 m for this activity. No other relevant buffer criteria could be identified. This is a reduction on the 1,000 m recommended by Golder (2008) and which was based on potential composting of biosolids – composting is considered to be a potentially more odorous activity than solar drying.

With regard to land spreading of biosolids, Golder (2008) recommended a 500 m buffer to residential areas and as there have been no changes to the classification of the biosolids that could have impacted on the potential for odour effects. The recommendation of a 500 m buffer between land spreading of Class Aa biosolids and residential areas is retained.

2.1.3 Spray irrigation

While it is considered that the mitigation in place (See Section 1.2) will minimise the risk of odour. There is still a residual health risk due to pathogens associated with the consented irrigation of treated wastewater, and this is heightened with any discharge that does not comply with the consent limit of 500 CFU/100 ml.

It is considered that aerosol's generated from an irrigator nozzle, can travel up to approximately 200 m prior to desiccation. The planting required by the Pines WWTP is likely to provide a reasonably effective mitigation to aerosol carryover, as the ability for trees to act as a physical barrier to aerosols is considered effective[4]. RWRL have indicated that bunding and planting will be installed on the western boundary of the Holmes site. It is considered dense planting – similar to that required by the Pines WWTP would further reduce the potential for irrigation generates aerosols and associated pathogen risk, impacting beyond the shelter belts.

While the risk of pathogens being dispersed is generally associated with the risk of aerosol carryover, virus' are understood to potentially be more resilient and not reliant on droplets and we cannot comment on the ability to virus' to survive after desiccation. Although, as with aerosols, the shelter belts are expected to be effective at removing viruses, including those that have become desiccated.

Given the planting (both on the Pines WWTP side and the Holmes block side) and other consent conditions relating to the effluent quality, it is considered that no internal setback within the Holmes block is required to adequately mitigate odour effects.

[4] Evidence R Chilton for the Selwyn Plantation Board in the matter of applications CRC 101109, CRC1011111 and CRC 040100.1 related to the expansion of the Pines WWTP.

With regard to pathogen risk, it is considered likely that a 200 m setback would usually be sufficient to protect against pathogen risk associated spray irrigation of tertiary treated municipal effluent, assuming no shelter belts.

This buffer can be significantly reduced (given the proposed shelter belts on both the Pines WWTP property and a similar shelter belt on the adjacent Holmes block boundary. We recommend a setback of 100 m (between irrigated areas and nearest residential notional boundary) is maintained between the at this stage. To achieve this, with the Pines WWTP current consented operation, a setback of 75 m within the Holmes Block is required. However, a further detailed assessment at the time of any subdivision consent application may confirm that a lesser standard of mitigation/separation distance is appropriate'

Alternatively to the above, a setback could be maintained within the Pines WWTP irrigation area to mitigate against pathogen risk, rather than relying on a buffer/mitigation within the Holmes block.

2.2 Pines Resource Recovery Park

2.2.1 Waste transfer operations

The waste transfer operations have not changed since Golder (2008) and there are no changes to the reported buffer distances in the South Australia, Victoria and Western Australian EPA guidance. Therefore, Golder's previous recommendation of a 300 m buffer is retained.

2.2.2 Composting

As discussed in 1.3.1, the current consent allows for an uncovered windrow system and while there are no limits in the conditions, the application for the current active consent was based on a throughput of 4,200 T/year.

South Australia EPA, Victoria EPA, Western Australia EPA all provide recommended buffer distances for composting operations, these are discussed further below.

South Australia EPA: The SA EPA buffer guidance (South Australia Environment Protection Authority, 2019) provides an evaluation distance of 1,000 m for composting operations greater than 200 tonnes/year.

Victoria EPA: Vic EPA have provided specific guidance on composting (EPA Victoria, 2017). This provides examples of appropriate buffer criteria depending on the through-put of the operation, type of material being processed, and the type of composting process being used. It is notable that open air composting system for processing mixed source separated kerbside (Garden waste/food waste – FOGO[5]) is not recommended and no buffer criteria are provided. For an open air, with only green waste operation with a throughput of to 1,200 tonnes per year, a buffer distance of greater than 600 m is recommended and for up to 14,000 tonnes per annum >1,100 m is recommended.

Western Australia EPA: For an open air composting operation with manure, mixed food, putrescible and vegetative waste, WA EPA recommends a buffer distance of 1,000 m.

In summary on the basis that the throughput is maintained close to the current throughput, i.e., limited to 4,200 tonnes/annum and there is a high degree of control in the manufacture of the compost, the leachate management (particularly maintaining both of these in an aerobic state), and given the location of the

[5] Food Organics and Garden Organics

proposed residential area, a buffer distance of 600 m is considered to be reasonable. This is consistent with the distance to the existing dwelling to the north east of the compost operation.

2.3 Tegel's Poultry Operation

Based on that there having been no changes to the Tegel operation, Golder's 2008 recommended buffer distances of 150 m is retained as a recommendation.

3.0 SUMMARY

Table 1 provides a summary of the recommended buffer distances to mitigate odour effects. With respect to pathogen risk from irrigation of treated effluent, an upper estimate of an additional setback distance required given the proposed trees and shelter belt, this setback may be able to be reduced with following a further detailed assessment. Figure 1 and Figure 2 show the recommended buffer distances to mitigate against odour reverse sensitivity for the Holmes and Skellerup blocks respectively.

Table 1: Summary of distances expected to avoid reverse sensitivity due to odour.

Facility	Recommended buffer distance for odour mitigation	Comments
Pines WWTP – treatment	500 m from facility	
Pines WWTP – biosolids production	400 m from drying facility	
Pines WWTP- Irrigation	100 m from land used for treated Wastewater irrigation.	This distance is based on pathogen risk, and may be able to be reduced following a detailed assessment.
Pines WWTP biosolids land spreading	500 m from land disposal area	
PRRP – waste transfer operations	300 m from facility	
PRRP – composting	600 m from compost area	Based on throughput of 4,200 tonnes per annum and good control on leachate and compost.
Tegel Poultry Operation	150 m from sheds	

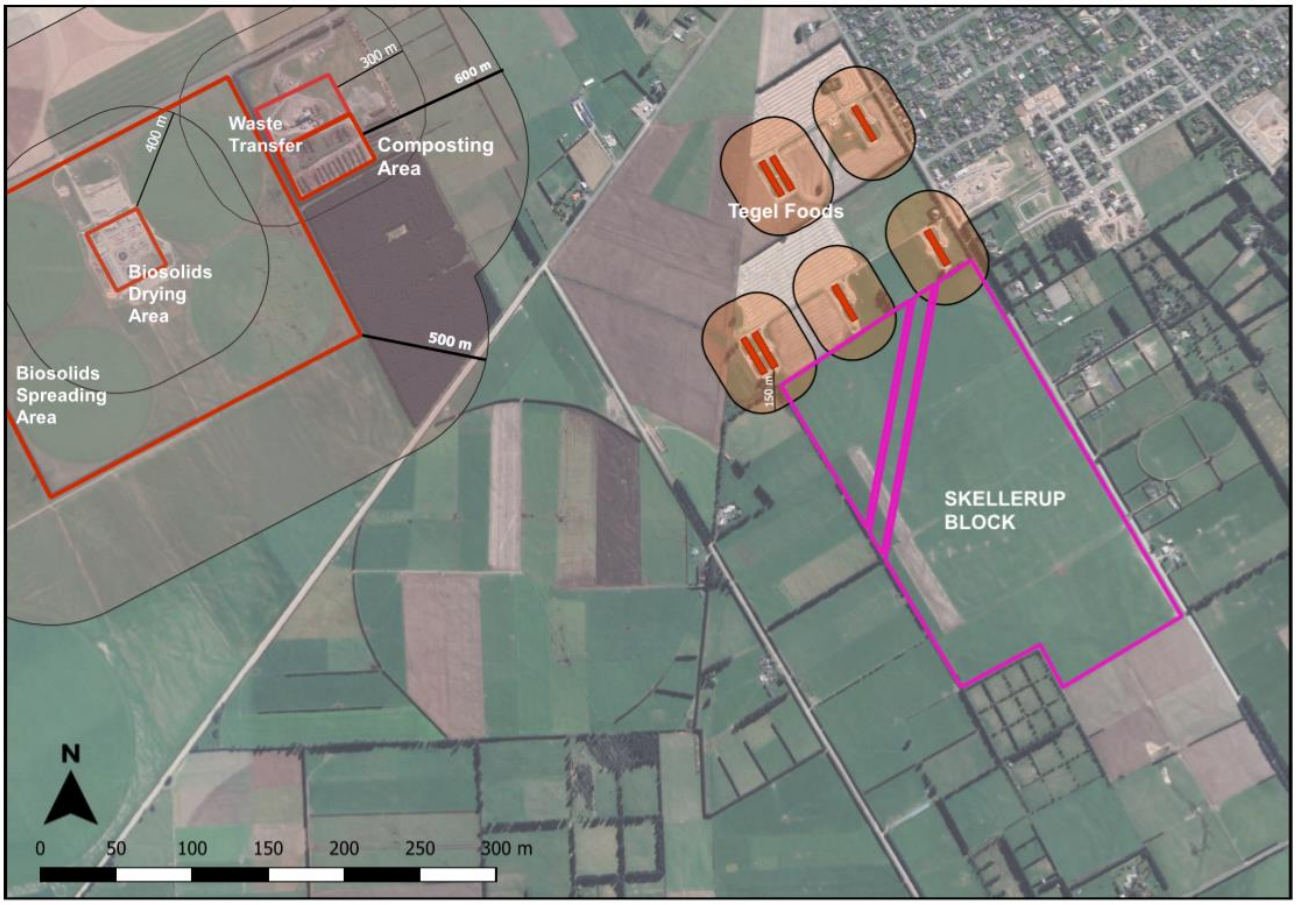


Figure 1: Recommended buffer distance for Skellerup block.

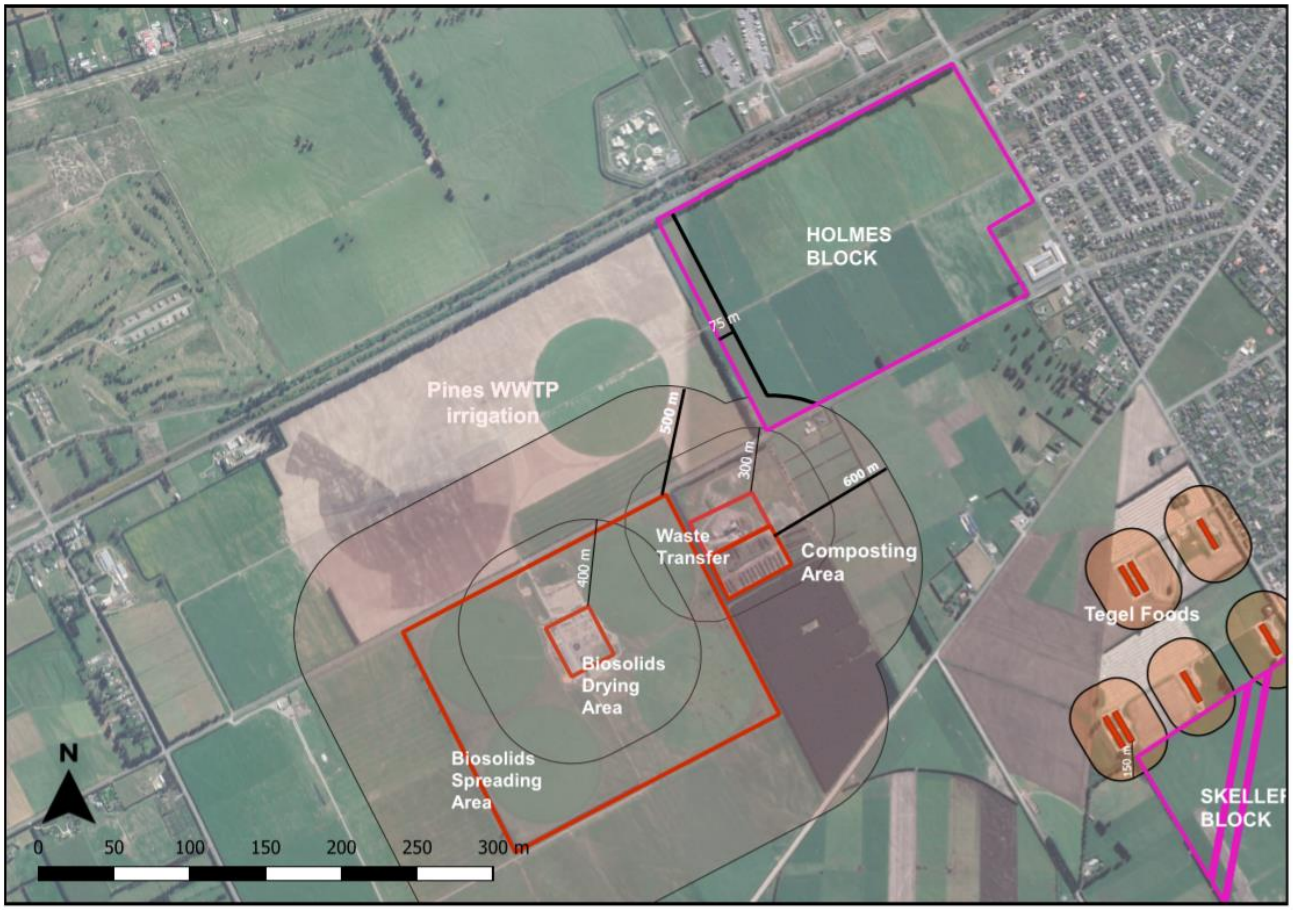


Figure 2: Recommended buffer distance for Holmes block.

4.0 CONCLUSION

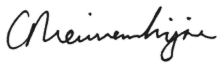
Based on our assessment above and subject to the recommended mitigation measures/buffers shown in Section 3.0, we consider that rezoning from rural-residential to residential would not result in reverse sensitivity to odour effects.

5.0 CLOSING

We trust the above information will assist RWRL in understanding the potential odour impacts on the Holmes and Skellerup blocks if developed into residential areas. If you have any queries regarding this letter, please contact the undersigned by email at cnieuwenhuijsen@golder.co.nz or by phone at (03) 903 2450.

Yours sincerely,

Golder Associates (NZ) Limited



Cathy Nieuwenhuijsen
Senior Air Quality Consultant

CN/RC/MU/mt

Attachment: Report Limitations.

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6.0 REFERENCES

Golder, 2008. Rolleston Odour Assessment prepared by Golder Associates (NZ) for Selwyn Plantation Board Limited. Golder report reference number: SELPL-CHC-004

Environmental Protection Authority Victoria, 2012. Draft guidelines for separation distances for composting facilities, EPA Victoria Publication 1445, 2012.

Environmental Protection Authority Victoria, 2017. Designing, Constructing and Operating Composting Facilities: Guideline. Publication 1588.1, June 2017.

Environmental Protection Authority South Australia, 2019, Evaluation Distances for Effective Air Quality and Noise Management. Issued August 2016, Updated March 2019.

Australian Capital Territory, 2018. Separation Distance Guidelines for Air Emissions. November 2018.

ATTACHMENT 1

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