December 2008

SELWYN PLANTATION BOARD LIMITED

Rolleston Odour Assessment

Submitted to:
Selwyn Plantation Board Limited

REPORT

Report Number: SELPL-CHC-004

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ABBREVIATIONS AND UNITS

Golder	Golder Associates (NZ) Limited
SPBL	Selwyn Plantation Board Limited
SDC	Selwyn District Council
ECan	Environment Canterbury
AEE	Assessment of environmental effects
MfE	Ministry for the Environment
RMA	Resource Management Act, 1991
RRRP	Rolleston Resource Recovery Park
WWTP	Wastewater treatment Plant
PE	Population equivalent

REPORT LIMITATIONS

This report is provided subject to the limitations in Appendix A.

1.0 INTRODUCTION

The Selwyn Plantation Board Limited (SPBL) is proposing to apply for a private plan change to the Selwyn District Plan (SDP). The plan change relates to land SPBL owns near the south-west of Rolleston; SPBL is seeking that it be rezoned from rural use to low density rural residential use.

This report provides an assessment of the degree to which the SPBL land could be constrained by existing potentially odorous activities. Three potentially odorous activities have been identified as follows:

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

The odour assessment approach has generally been a qualitative assessment of odours associated with each activity in order to identify any areas of SPBL land that may be constrained for residential development.

The SPBL land that is the subject of the plan change is illustrated in Figure 1. The SPBL land is referred to as the "Holmes" block and is situated off Dunns Crossing Road adjacent to the Main South Road.

2.0 ASSESSMENT APPROACH

An assessment of the risk of odour impacts on the Holmes block from activities listed in Section 1.0 has been carried out. This comprised a detailed examination of each activity to assess its odour potential and to determine a minimum buffer to residential dwellings.

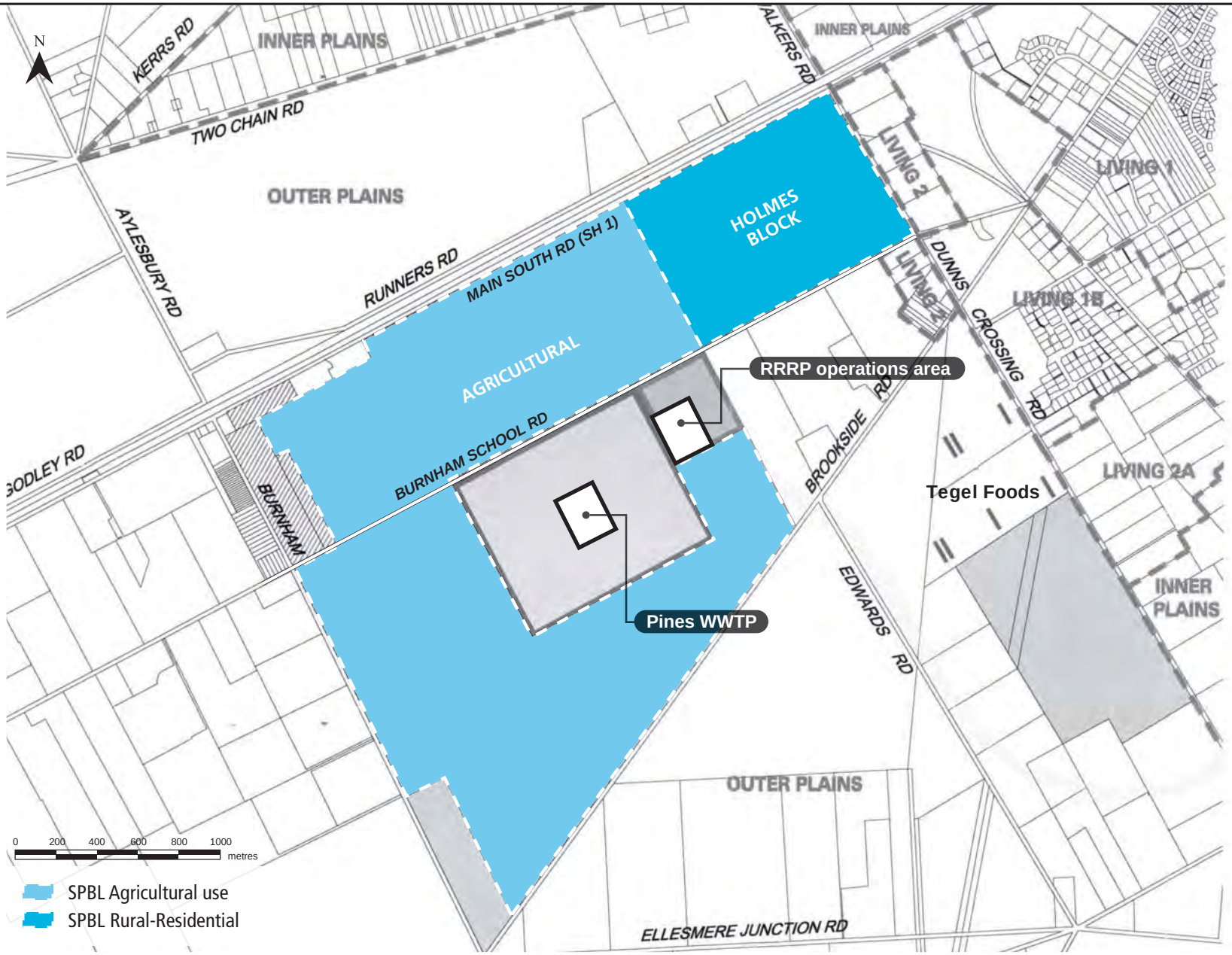
This assessment has considered the odour potential for each activity afresh. Consideration has also been given to the following information where relevant:

- Consent or designation process requirements;
- Assessment of effects on the environmental where available;
- Process control and best practice;
- Potential for future site expansion; and
- Odour complaint history.

Where necessary, Golder has used its professional judgement in combination with available buffer guidance to determine a suitable buffer for each of the activities.

In addition to the two identified sources of odour in Section 1.0, Golder has confirmed with the Environment Canterbury (ECan) that there are no new activities consented to discharge odorous contaminants into air surrounding the Holmes block.

Golder has generally assessed potential odour effects from the different sources as not being additive where the odour character of each source is distinctly different.



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TITLE | SPBL LAND (HOLMES BLOCK) AND POTENTIAL ODOUR SOURCES

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3.0 TEGEL POULTRY OPERATION

Tegel operates seven breeder (egg laying) sheds between Dunns Crossing Road and Edwards Road. From discussion with Tegel Foods (*pers coms* Wayne Millar, 7 August 2008), Golder understands there are no planned expansions of the Dunns Crossing Road farm at this time.

It is understood each of the seven sheds hold approximately 8,000 chickens at a density of 6 birds per square metre. The sheds have forced ventilation to control both temperature and humidity.

The main sources of odour associated with a breeder operation are the litter and the birds themselves; the odour emission is a function of temperature, humidity and bird density. As litter collects waste from the chickens it becomes more odorous, and is considered to be the main potential odour source associated with this poultry operation.

Breeder operations are considered to have a lower odour potential than the likes of broiler operations, which have much higher bird densities and litter management requirements.

ECan has advised Golder it has not received any complaints relating to odour from the Tegel Foods Limited farm along Dunns Crossing Roads (*pers coms* Jackie Jones, Environment Canterbury, 20 August 2008 – Appendix D).

Suppliers to Tegel are required to operate chicken sheds according to a code of best practice for the management of litter from their operations and to maintain appropriate shed environmental conditions (i.e., temperature and humidity). However, even with the use of best practice, odour can at best only be minimised. The use of odour control, such as biofiltration, is generally not considered practicable for the poultry industry at this time. Because of this, an appropriate buffer distance is required between chicken sheds and sensitive neighbours to allow dissipation of odours and ensure nuisance effects do not occur. However, in this instance the Holmes block is situated approximately 900 m northwest of the Tegel foods site. This distance is much greater than typical odour buffers for this type of activity (in the order of 300 m) and is therefore highly unlikely to experience adverse odour effects from this operation. For this reason, no further consideration is given to the Tegel Poultry operation in this report

4.0 ROLLESTON RESOURCE RECOVERY PARK

The RRRP consists of two main activities that have potential to generate odours, namely: (1) refuse transfer operations; and (2) composting of greenwaste and putrescible wastes. Both activities are located close to the southern corner of the site that abuts the Pines WWTP site.

The RRRP was commissioned in March 2006 and it is understood that no odour complaints have been received by ECan regarding the operation to date.

4.1 Refuse Transfer Operations

The refuse transfer operations at the RRRP consist of an open air receipt building where refuse is off-loaded by the public and commercial operators. This material is then pushed by a front-end-loader into a receipt hopper where it is compacted into sealed containers. The containers are then collected and taken to the Kate Valley Landfill. This approach is typical of most refuse transfer operations in New Zealand.

The main odour associated with such an operation is from the refuse itself, particularly during off-loading by collection vehicles and when it is pushed into the compactor because of the refuse being disturbed.

It is generally not considered practicable to fully enclose refuse transfer operations and provide odour control; therefore such operations are typically located away from sensitive activities, such as residential dwellings. Accordingly, an appropriate buffer is needed to ensure odour nuisance does not occur. This is discussed further in Section 6.1.

4.2 Composting

Composting of greenwaste and putrescible waste (excluding biosolids) is consented to be carried out at the RRRP using an in-vessel process. Several different in-vessel systems were considered as part of the resource consent application process. However, the HotRot system was selected in the final tendering process. The HotRot system consists of a horizontal in-vessel unit and uses mechanical turning and forced aeration to maintain aerobic conditions. Air from the HotRot units is extracted to a biofilter to control potential odours from the units.

Greenwaste is received on-site where it is then shredded. Putrescible waste is received in an enclosed structure where it is macerated before being mixed with greenwaste and fed into the HotRot units.

At present the RRRP operates two HotRot units, although it appears the site has been designed to allow expansion as Rolleston expands. The resource consent application indicated that a maximum of 2,000 tonnes per annum of organic material would be processed at the site.

Composted material is to be stored on-site in the form of a static pile for up to six-months to allow maturation of the compost prior to sale to the public. It is not evident where this would occur on site. However, Golder envisages it could be located on the hardstand area adjacent to the HotRot in-vessel units.

The composting of greenwaste and putrescibles is a process that can result in significant odour nuisance. The use of an in-vessel method as used at the RRRP greatly reduces the odour potential of the initial stage of composting; this is often seen as the greatest source of odour associated with traditional open-air windrow composting operations. However, the receipt of materials to be composted and the handling and storage of compost from the in-vessel system for maturation are also significant sources of odour.

Odours from the receipt of putrescible wastes are minimised at the RRRP through consent and designation controls on waste acceptance and process requirements. The controls on waste acceptance exclude biosolids and malodorous wastes from being received on site. They also require the putrescible waste to be processed into the in-vessel units within 24-hours of receipt to ensure the material does not degrade and become highly odorous. Despite these controls, some degree of odour is expected from the initial receipt and handling of materials to be composted.

With regard to the storage of composted material for maturation, the RRRP intends to static-pile the material in the open for up to six months. This can be a significant potential source of odour for the following reasons:

i) Compost has an earthy, slightly sweet smell when composted under ‘normal’ operating conditions. The open air storage of this material for maturation will therefore have such an odour associated with it.

ii) Material from the in-vessel units can be particularly odorous if the materials fed into the units are not appropriately managed to ensure a good balance between putrescible and woody greenwaste. Balancing the putrescible and woody greenwaste mix is required to ensure a moisture content of less than 60%. Golder has recommended this upper moisture content limit to various clients and understands that Christchurch City Council also operates to this limit for its Bromley plant. Where the moisture content is higher than this, anaerobic conditions can occur, resulting in a highly odorous material from the in-vessel units, which can then cause an odour nuisance when stored in the open. From Golder’s experience, this is not an uncommon occurrence as the blending of putrescible and greenwaste relies heavily on the judgement of the process operator to ensure moisture levels are not too high.

iii) The material that exits the in-vessel units has a greatly reduced biological activity level. If there is insufficient oxygen available within the pile due to its large size, anaerobic conditions may occur, which can result in odorous conditions when the static pile is disturbed.

Because of the potential for odours from both the receipt and handling of material to be composted and the material that exits the in-vessel units, an appropriate buffer is required for the RRRP composting process. This is discussed further in 6.1.

5.0 ROLLESTON WASTEWATER TREATMENT PLANT

The Pines WWTP has been consented to allow for the projected growth of Rolleston township to a population equivalent (PE) of approximately 22,000 and a maximum flow loading of approximately 7,500 m^3/day. The ultimate capacity of the Pines WWTP is defined by the resource consent conditions for the treatment and disposal of wastewater. The consents allow for a term of 35 years (expiring on 15 December 2038).

Stage one of the Pines WWTP was commissioned in 2007 and provides for a PE of 6,000 and treats wastewater from Rolleston and the surrounding area in conjunction with the Helpet WWTP (situated between Lincoln and Springston Roads). The Pines WWTP is of a modular design, which allows it to expand over time to meet the expected population growth of Rolleston and its surroundings. It is also expected to eventually replace the older Helpet WWTP.

According to the AEE report provided with the Pines WWTP consent application (prepared by MWH NZ Ltd, June 2003) the new WWTP will consist of a mechanical activated sludge process. This type of process is typical of most new municipal wastewater treatment plants in New Zealand. This type of system has numerous advantages over the traditional oxidation pond systems, notably the control and reduction of biological nitrogen in the discharged effluent and a greatly reduced odour potential.

The main treatment plant is located in the centre of the site, with the land surrounding it being used for the disposal of effluent and, potentially, biosolids. The process is described further below.

In 2007, the SDC commissioned an assessment of future options for the east Selwyn sewerage scheme (MWH, 2007). Two wastewater disposal options were identified, which included land disposal of wastewater from Lincoln, Prebbleton and Springston at the Pines WWTP site and the provision of biological nitrogen removal treatment. Should this option be adopted and any necessary consents or designations obtained, this would increase the amount of wastewater being treated and disposed of at the Pines WWTP to a projected PE of approximately 47,000 by 2041. To accommodate this it is expected additional land would be required for the irrigation of wastewater. It is understood this could include SPBL immediately to the northwest of the existing Pines WWTP site.

Subsequent discussions with SDC have highlighted further potential expansion and it seems likely at some time in the future the plant would be expanded to accommodate a PE upwards of 80,000, taking in further suburbs in the surrounding areas and possibly in the south of Christchurch. The PE capacity would likely be limited by nitrogen loading rates which are currently set at a maximum of 200 kg/hectare. It is Golder's understanding that SDC are actively investigating methods of nitrogen uptake and/or removal to resolve any limitations on future expansion capacity.

At the time of this report a decision had not been made to treat and dispose of wastewater from Lincoln, Prebbleton and Springston at the Pines WWTP site. However, it is considered prudent to assume that this is a likely possibility and to consider it within the scope of this assessment.

5.1 Screening

Screening of wastewater removes grits and other large solid objects. The current consents provide for screenings to be stored in sealed plastic bags for removal to landfill. In Golder's experience, there is usually little odour from screening operations at medium treatment facilities of the size of the new Rolleston plant, where the incoming sewage to the site is likely to be fresh. However, if the Pines WWTP is connected to satellite towns, the sewage from these towns may not be in a fresh state when it reaches the Pines WWTP. In these circumstances, it would be good practice to enclose the screening process and provide odour control.

5.2 Primary Effluent Treatment

Primary treatment of the screened wastewater at the new WWTP occurs in an open air activated sludge plug-flow process (aerobic treatment tank) with external clarifiers. From Golder's experience of this type of process at other wastewater treatment facilities, there is likely to be a low intensity musty odour from the

process during normal operation. Under normal operation this odour is unlikely to extend beyond the site boundary.

5.3 Secondary Effluent Treatment

The liquid component from the clarifiers is treated using ultra-violet radiation to minimise bacteria and pathogens in the final effluent. There is typically very little or no odour associated with this process due to the relatively low organic content of the effluent. Furthermore, UV treatment is typically carried out in an enclosed system further minimising any likelihood of odour emissions.

5.4 Sludge Digestion

In activated sludge plants, excess waste activated sludge (WAS) is removed from the aeration tank at a controlled rate to maintain an appropriate solids retention time. At the Pines WWTP, WAS is pumped to an aerobic digestion system where it is stabilised and thickened. The aerobic digester is an open top tank that has air pumped through the bottom of it and into the sludge at a rate that maintains a positive dissolved oxygen concentration. This should ensure aerobic conditions prevail and highly odorous sulfides associated with anaerobic conditions do not occur. Odours from this process are expected to be similar in character to that of the primary effluent stage.

5.5 Sludge Dewatering and Disposal

The digested sludge is mechanically dewatered to achieve a solids concentration of 18-20%. This is usually carried out using belt presses or centrifuges and is typically done in an enclosed building that helps to minimise odour emissions.

According to the resource consent application, it is anticipated the dewatered sludge (18-20% solids) will be removed from site for disposal at landfill. However, ultimately it is anticipated the sludge will be further treated, most likely using a composting process, to produce a Class Aa Biosolid (see Appendix E for definition) suitable for re-use. The consent application discussed the synergistic use of the adjacent RRRP composting plant for this purposes. However, it is worth noting the consents for the RRRP prohibit the composting of biosolids on site. It should also be noted that disposal of the biosolids to land at the site is permitted under the discharge to land consent once the biosolids have been treated to a Class Aa Biosolids standard.

In Golder's opinion, the treatment, handling and disposal of biosolids represents the most significant potential odour source from aerobic activated sludge wastewater treatment plants and significant buffers are usually required to avoid odour nuisance.

5.6 Irrigation of Treated Effluent

The final secondary treated effluent is spray irrigated onto 80 ha of land surrounding the treatment plant using centre-pivot irrigators. Ultimately, it is expected four centre-pivot irrigators will be in operation with K-Line irrigators used in areas not covered by the centre-pivots. The AEE states this is consistent with current best practice for spray irrigators, as centre pivot systems are supposedly capable of delivering a controlled spray that has large droplet sizes and results in minimal aerosol spray drift. This will act to minimise odours associated with spray irrigation when compared to older style travelling or gun style irrigator systems.

According to the AEE, the Pines WWTP discharge is not expected to result in significant solids carry over. Solids carry over has been an issue for the existing Rolleston WWTP and has been determined as a cause of odour nuisance associated with effluent irrigation at that plant. Golder considers effluent irrigation can result in a musty odour and that an appropriate buffer is the only practicable means to avoid odour nuisance from this activity.

Should the treatment capacity of the site be increased to provide for wastewater from Lincoln, Prebbleton and Springston, additional land would be required for the irrigation of the treated wastewater. This would be in the order of 115 ha and could include the SPBL land immediately to the northeast of the Pines WWTP site (MWH, 2007) and southwest of the Holmes block.

Further potential expansion as highlighted by SDC, to accommodate a PE upwards of 80,000 might require a total of 400 hectares of land to be available for irrigation based on current loading rates.

5.7 Summary

As highlighted above, Golder considers a buffer for the Pines WWTP will be required to avoid potential odour nuisance associated with:

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

Furthermore, the buffer required to mitigate sludge handling odours is likely to be largest and therefore the most restrictive in terms of how close residential development can be located to the plant.

6.0 BUFFER DISTANCES

6.1 Rolleston Resource Recovery Park

6.1.1 Waste transfer operations

South Australia, Victoria and Western Australian EPAs all report buffer distances for refuse transfer stations. SA EPA and Vic EPA recommend a buffer of 300 m, while WA recommends a buffer of 200 m. These buffer distances are generally measured from the closest edge of all plant, buildings or other structures and features from which residual air emissions may be anticipated. It is Golder's professional judgement that a 300 m buffer, as recommended by both SA EPA and Vic EPA, is appropriate for waste transfer station operations.

6.1.2 Composting

South Australia EPA

The SA EPA buffer guidance (South Australia Environment Protection Authority, 2000) recommends a buffer distance of 500 m for greenwaste composting. However, it states buffer criteria for operations that compost other organic waste (such as putrescible waste) would be considered on a case by case basis.

Victoria EPA

Vic EPA published specific guidance on composting in 1996 (EPA Victoria, 1996), which specifically lists appropriate buffer criteria depending on the through-put of the operation, type of material being processed and the type of composting process being used. This guidance supersedes the buffer values given in the earlier buffer guidelines (EPA Victoria, 1990).

Based on the understanding that the RRRP operates an in-vessel process, processing putrescible wastes, notably kitchen waste, with a throughput of approximately 2,000 tonnes per year, a buffer distance of 250 - 300 m is derived from the Vic EPA guidance.

Western Australia EPA

WA EPA recommends various buffer distances for a range of different composting facilities. For an in-vessel composting operation with odour control a buffer of 150 m is recommended. This is much less stringent than the buffers reported by the other Australian EPAs. However, WA EPA (Appendix 6) has confirmed its buffer

criteria are not intended to include the open air stock piling of material from in-vessel units for maturation or the receipt of material.

6.1.3 Summary

Buffer distance criteria for waste transfer operations are summarised in Table 1. Of these, it is Golder's recommendation that a buffer of 300 m is most appropriate for the RRRP.

Table 1: Buffer criteria – waste transfer operations.

Authority	Buffer criteria
Vic EPA	300 m
SA EPA	300 m
WA EPA	200 m

The various buffer distances for composting, as discussed above, are summarised in Table 2. Of these, Golder considers the Vic EPA buffer criteria best reflect the scale of operations, material being processed and composting method used at the RRRP. Based on this, Golder recommends a buffer distance of 300 m for composting activities at the RRRP.

Table 2: Buffer criteria – composting.

Authority	Buffer criteria
SA EPA	500 m
Vic EPA	250 – 300 m
WA EPA	150 m

A buffer distance of 300 m for the RRRP composting and waste transfer operations has been recommended by Golder. Both the composting and waste transfer operations are located adjacent to each other, forming a general operations area. The operational area is located to the southwest corner of the RRRP site and is set back approximately 200 m from the RRRP site boundary that abuts the SPBL land to the north. Accordingly, the recommended buffer of 300 m for the RRRP will only extend 100 m into the SPBL Homes block from its northern site corner.

The 300 m buffer for both waste transfer operations and composting operations is illustrated below in Figure 2.

6.2 Rolleston Wastewater Treatment Plant and Disposal Site

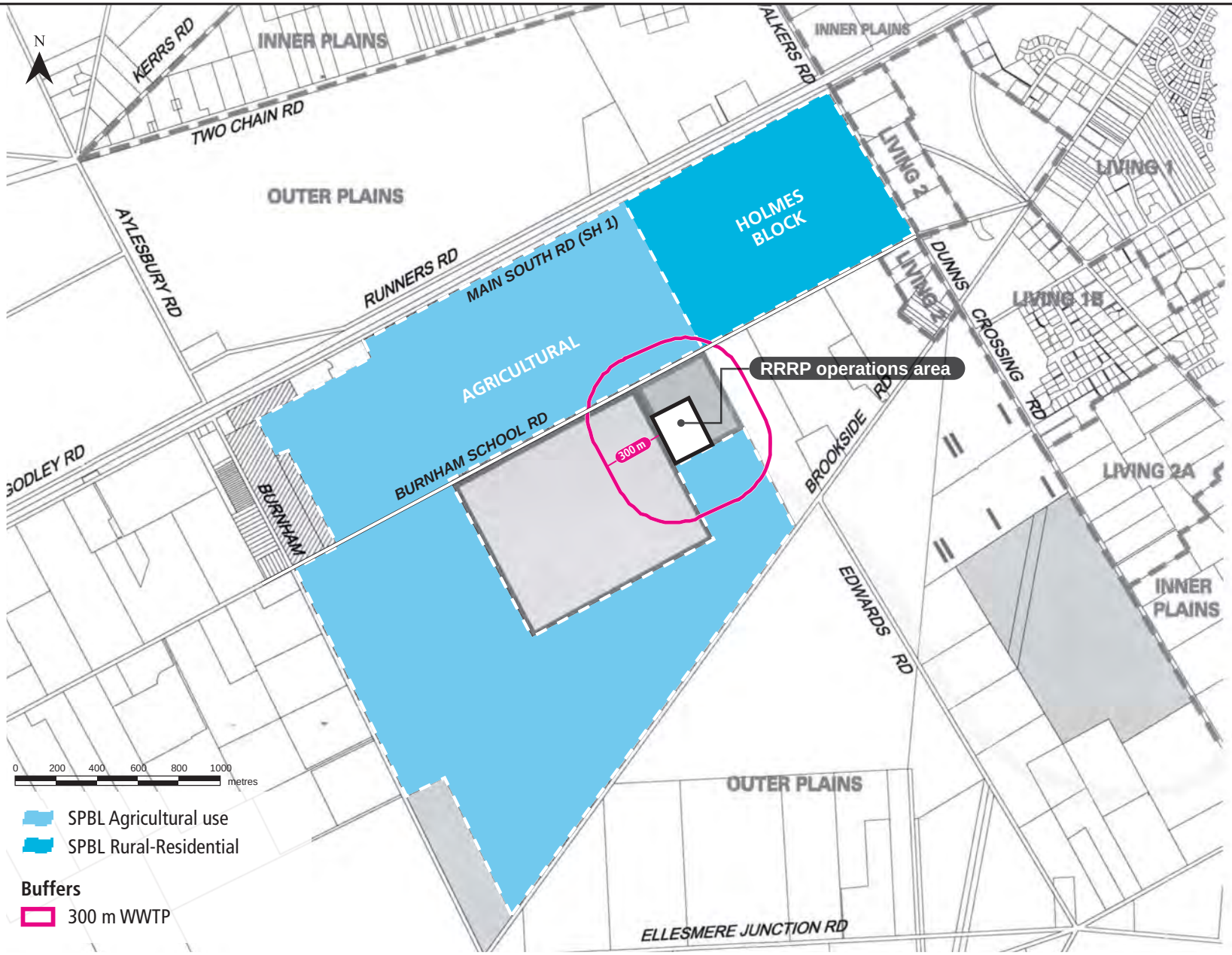
There is little available literature recommending suitable buffer distances for wastewater treatment plants. This is likely to be reflective of the variable nature of wastewater treatment plants, the methods of treatment and the odorous nature of some of the processes involved in treatment. However, there are regulatory guidelines as discussed below.

6.2.1 Treatment plant buffer guidelines

Both the SA EPA and Vic EPA (EPA Victoria, 1990, South Australia Environment Protection Authority 2000) recommend buffer distances for wastewater treatment plants. The Vic EPA guidance reports buffer distances based on the installation treatment capacity (population equivalent - PE) and the type of treatment process. For a mechanical/biological treatment plant, as proposed for the Pines WWTP, a buffer of 200 m is recommended for a PE of < 5,000 (approximate current population of Rolleston) and a buffer of 300 m for a

PE of less than < 20,000 (approximate design capacity of the Pines WWTP). It also recommends a buffer of 400 m for a PE of < 50,000 (approximate capacity that would allow for inclusion of Lincoln, Prebbleton and Springston). The SA EPA reports the same buffer criteria as Vic EPA.

No buffer guidance is available for a treatment capacity PE of approximately 80,000. For WWTP of this size, a more detailed and refined odour assessment would usually be carried out as part of the resource consent process, and would often necessitate odour dispersion modelling. Golder is not aware of any consent application or approval for expansion of the Pines WWTP accommodate a PE of approximately 80,000. Notwithstanding this, Golder has estimated a buffer distance of 500 m for the purpose of this assessment and is based on experience with similar operations in New Zealand.



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TITLE | RECOMMENDED BUFFERS ASSOCIATED WITH RRRP

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6.2.2 Treated effluent irrigation

The Vic EPA also reports buffer distances for the disposal of secondary treated effluent. A buffer of 200 m for spray irrigation is recommended irrespective of the treatment capacity of the plant.

6.2.3 Biosolids treatment and land disposal

Treatment of digested biosolids (i.e., treatment of the biosolids following the aerobic digestion process) has caused significant odour issues at a number of wastewater treatment plants in New Zealand. The existing resource consent for the site does not impose any specific restrictions on the type of treatment method, nor was this detailed in the AEE, other than identifying composting as a possible method and needing to achieve a Class Aa biosolid for subsequent re-use and/or disposal on site. Therefore, due to this uncertainty and the fact that the Pines WWTP is located downwind of the SPBL land during prevailing southwest winds, Golder recommends a buffer distance of 1,000 m from the site of the Pines WWTP site. This is on the basis that any biosolids treatment is likely to occur close to the main treatment plant and is located approximately within the centre of the site.

Because the Pines WWTP is consented for the disposal of Class Aa biosolids up to 10 m inside their site boundary it is appropriate to consider suitable odour buffer criteria for such an operation. The SA EPA (South Australia Environment Protection Authority 1996) recommends a 400 m buffer for biosolids disposal activities. However, based on Golder's experience a 500 m buffer is recommended for a medium activated sludge treatment plant in New Zealand.

6.2.4 Summary

The relevant buffer criteria for wastewater treatment and associated activities that are available from various guidance documents are summarised in Table 3.

Table 3: Buffer criteria – wastewater treatment.

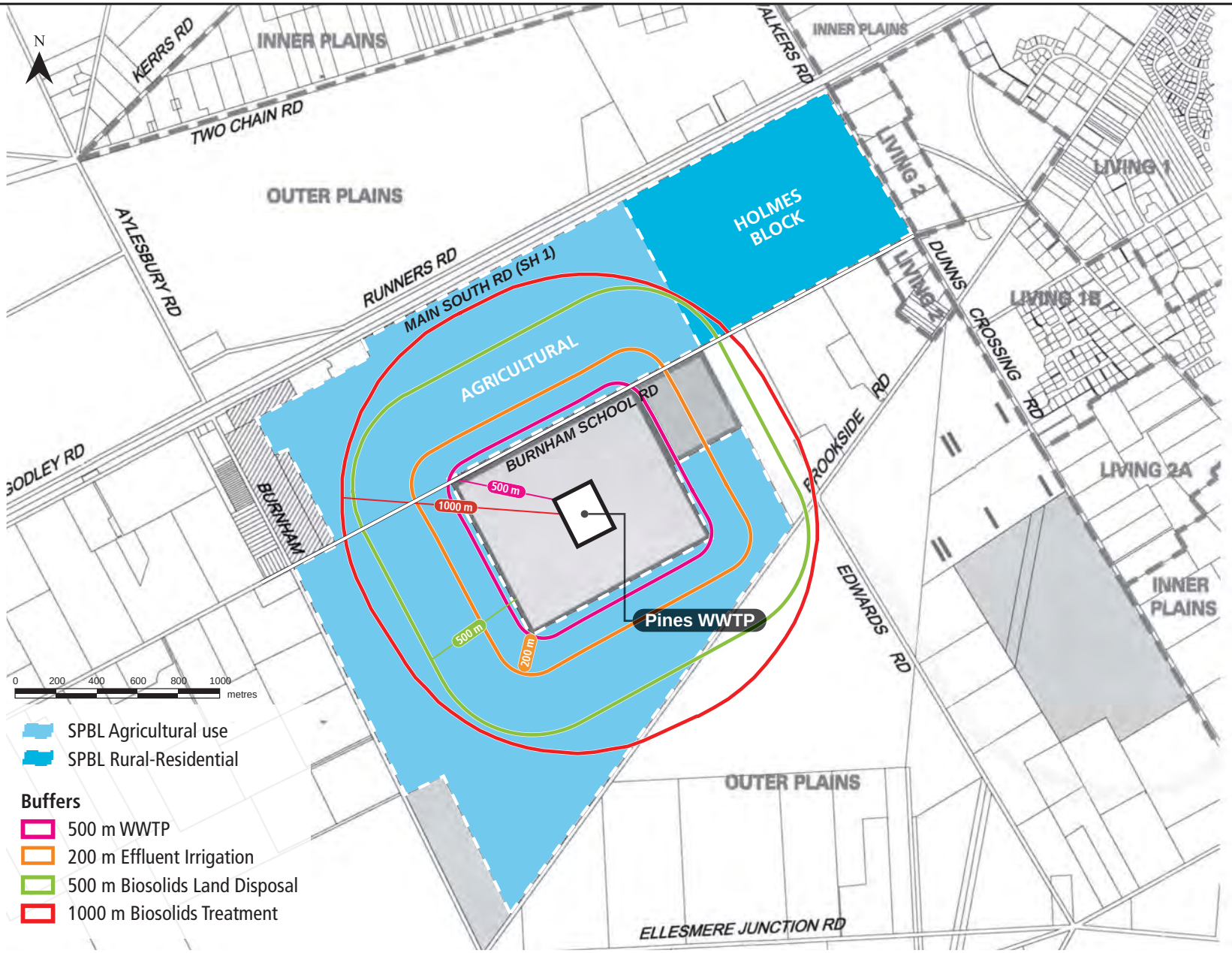
Authority		Buffer criteria
Vic EPA & SA EPA (Treatment plant)	PE ~ 20,000	300 m
	PE ~ 50,000	400 m
Vic EPA (Spray irrigation)		200 m
SA EPA (Biosolids disposal to land)		400 m

As discussed above, Golder considers the Vic EPA buffers of 500 m and 200 m to be appropriate for odours associated with the treatment plant and with effluent spray irrigation respectively. The 500 m buffer for the treatment plant is just outside the WWTP site boundary.

The 200 m buffer for the existing area consented for effluent irrigation extends up to 190 m beyond the Pines WWTP site boundary, but would not encroach on the Holmes Block.

Should the Pines WWTP be expanded to cater for wastewater from Lincoln, Prebbleton and Springston, then it is conceivable that irrigation might occur on the SPBL agricultural land to the south of Holmes block. Golder is not aware of any consent application or consent approval regarding wastewater irrigation onto this land. However, should SDC decide to proceed with spray irrigation on this land, then they would need to ensure that no adverse odour effects occur beyond their boundary. This could be achieved using a buffer/setback or various management practices that control the way irrigation is undertaken in order to minimise odour.

With regard to biosolids treatment and disposal to land, as discussed above Golder recommends a 500 m buffer. This is based on Golder's experience with biosolids management in NZ and that the prevailing wind, which is towards the SPBL land. Accordingly, buffers of 500 m for disposal to land and 1,000 m for the on-site processing of the digested biosolids are recommended. These are illustrated in Figure 3.



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TITLE | RECOMMENDED BUFFER DISTANCES ASSOCIATED WITH THE PINES WWTP

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7.0 DISCUSSION AND CONCLUSIONS

Golder has undertaken an assessment of likely constraints to residential development of the SPBL Holmes Block due to existing and anticipated future potential odour effects from surrounding activities. This land is the subject of a proposed application for a private plan change to the Selwyn District Plan to enable rural/residential landuse. The potential odour constraints from the following sources have been considered:

- The Rolleston Resource Recovery Park (refuse transfer and putrescible composting); and
- The Pines Wastewater Treatment Plant.
- Tegel Foods Limited's intensive poultry operation.

The assessment of potential odours from these operations was largely qualitative and considered best practice, consent and designation requirements, buffer criteria and Golder's own professional judgement.

The Tegel pultry operation is sufficiently far away from the Holmes block and is not expected to cause any odour constraint.

For the RRRP and the Pines WWTP, the qualitative assessment confirmed that buffers were required to minimise the likelihood of adverse odour effects beyond the site boundaries of each activity. Table 4 summarises the recommended buffer distances.

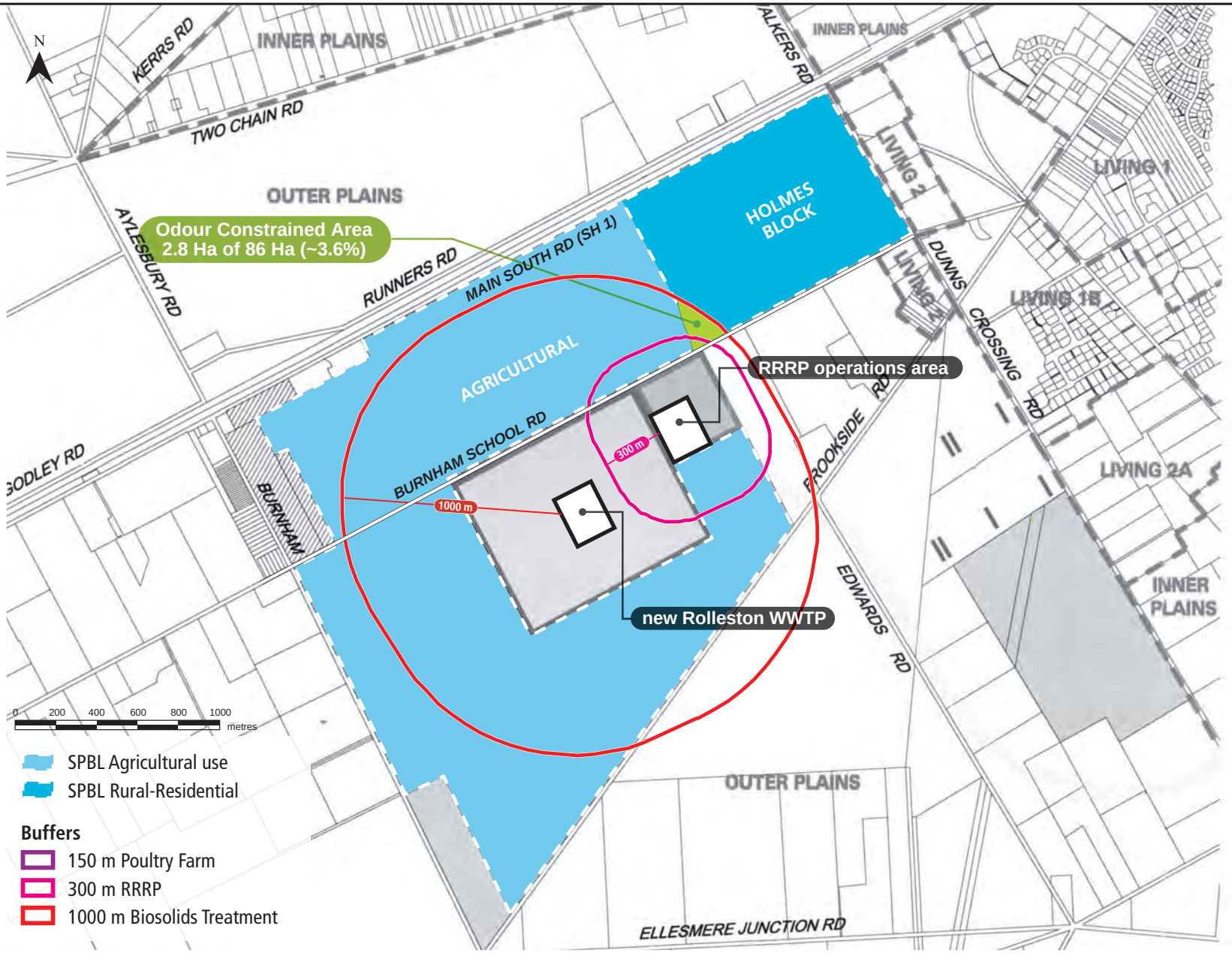
Table 4: Recommended buffer distances.

Site	Main Potential Odour Generating Activity	Recommended Buffer (m)
RRRP	Composting and waste transfer operations *(southern corner of site)*	300
Pines WWTP	Digested biosolids treatment *(operational area of WWTP)*	1,000
Potential irrigation of wastewater beyond the Pines WWTP site	Wastewater irrigation *(SPBL agricultural use land)*	200

Figure 4 shows the dominant buffer for each of the above processes, and indicates the areas of Holmes block that may be constrained due to potential odour effects.

The Pines WWTP as is currently consented would be the dominant constraining odour source for the Holmes block. The constrained area for this block is approximately 2.8 ha (approximately 3.6% of the Homes block).

The possible expansion option for the Pines WWTP to include the treatment of wastewater from Lincoln, Prebbleton and Springston and other areas to accommodate a PE > 80,000 is a relevant consideration. This would necessitate additional land for irrigation of the wastewater, which could include the SPBL agricultural use land to the south of the Holmes block. Golder is not aware of any consent application or consent approval regarding wastewater irrigation onto this land. However, should SDC decide to proceed with spray irrigation on this land, they would need to ensure that no adverse odour effects occur beyond its boundary.



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TITLE | CONSTRAINED AREAS OF SPBL LAND DUE TO POTENTIAL ODOUR FROM EXISTING ACTIVITES

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8.0 REFERENCES

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APPENDIX A

Report Limitations

REPORT LIMITATIONS

This Document has been provided by Golder Associates (NZ) Ltd ("Golder") subject to the following limitations:

(i). This Document has been prepared for the particular purpose outlined in Golder's proposal and no responsibility is accepted for the use of this Document, in whole or in part, in other contexts or for any other purpose.

(ii). The scope and the period of Golder's Services are as described in Golder's proposal, and are subject to restrictions and limitations. Golder did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Document. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Golder in regards to it.

(iii). Conditions may exist which were undetectable given the limited nature of the enquiry Golder was retained to undertake with respect to the site. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account in the Document. Accordingly, additional studies and actions may be required.

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(v). Any assessments made in this Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Document.

(vi). Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Golder for incomplete or inaccurate data supplied by others.

(vii). The Client acknowledges that Golder may have retained subconsultants affiliated with Golder to provide Services for the benefit of Golder. Golder will be fully responsible to the Client for the Services and work done by all of its subconsultants and subcontractors. The Client agrees that it will only assert claims against and seek to recover losses, damages or other liabilities from Golder and not Golder's affiliated companies. To the maximum extent allowed by law, the Client acknowledges and agrees it will not have any legal recourse, and waives any expense, loss, claim, demand, or cause of action, against Golder's affiliated companies, and their employees, officers and directors.

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APPENDIX B

Odour Complaints Confirmation from ECan

APPENDIX B
ECan Email

From: Jackie Jones [Jackie.Jones@ecan.govt.nz]

Sent: Wednesday, 20 August 2008 10:04 a.m.

To: Chilton, Richard

Cc: Paul Murney

Subject: RE: Check for odour complaints

Attachments: Rolleston Waste Treatment site - Richard Chilton.xls

Richard

I have no specific complaints registered against Tegel Food, Dunns Crossing Road or Rolleston Resource Recovery Park.

I do have complaints registered for Rolleston Waste Treatment which I have included.

As far as any non compliance for these sites you will have to go through customer services.

Jackie Jones

372-7253

Telephone file note: 20 August 2008

Conversation between: J Jones and R Chilton

R Chilton called J Jones about complaints data relating to the Rolleston Wastewater Treatment Plant. I was subsequently confirmed that the complaints registered related to the old WTP and not the new Pines WTP. This was evident by the receipt of complaints prior to the Pines WTP being commissioned.

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APPENDIX C

Guidelines for the Application of (Class Aa) Biosolids to Land

MFE, 2003: GUIDELINES FOR THE SAFE APPLICATION OF BIOSOLIDS TO LAND IN NZ - UNRESTRICTED USE BIOSOLIDS (CLASS AA) DEFINITION

Only biosolids that have achieved both an A grade for stabilisation and an 'a' contaminant grade are classified as unrestricted use biosolids. Biosolids that have demonstrably achieved these standards are considered to be of sufficiently high quality that they can be safely handled by the public and applied to land without risk of significant adverse effects. That is, control over their discharge to land can be exercised by way of a permitted activity rule in a regional resource management plan in much the same way that fertiliser application is currently regulated.

It is important to note that the term 'unrestricted use' is largely a misnomer, a shorthand way of indicating that no consent is required. Under a permitted activity rule of the type envisaged (section 5), the application of Aa biosolids to land would still be regulated. The discharge would be subject to meeting a number of conditions designed to minimise any risks to public health and environmental values.

From a public policy perspective there are two good reasons for having a permitted activity rule for high-quality biosolids:

- Sewerage authorities have an incentive to improve their trade-waste management practices and source controls to achieve an 'a' grade contaminant standard (consistent with waste minimisation and recycling objectives)
- The biosolids can be distributed or sold in retail outlets like other fertilisers or soil conditioners (individual users, or 'dischargers', do not need to obtain a resource consent, and the range of potentially beneficial uses is increased).

Stabilisation Grade

Biosolids are stabilised by treating them in a way that reduces or eliminates the potential for putrefaction and which, as a result, reduces pathogens, vector attraction and the potential for offensive odours. Further discussion on the rationale behind the stabilisation requirements is contained in section 6 of Volume 2: Technical Manual.

Vectors such as flies, mosquitoes, birds and rodents are potential carriers of disease. They can transmit pathogens to humans and other hosts physically through contact, or biologically by playing a specific role in the lifecycle of the pathogen. Reduction of the attractiveness of biosolids to vectors reduces their potential for transmitting diseases. This process is known as vector attraction reduction (VAR). VAR can be achieved by either:

- Subjecting the biosolids to specific physico-chemical processes or conditions, or
- Preventing access to the biosolids by vectors, usually by incorporating the biosolids into soil.

A high-quality biosolid 'A' is one in which pathogens and vector-attracting compounds, such as volatile solids, have been substantially reduced or removed. Some pathogen reduction processes are also effective at reducing vector attraction. To achieve stabilisation Grade A the biosolids must have an accredited quality assurance system and meet at least one of the accepted pathogen reduction processes, plus one of the

accepted vector attraction reduction methods and all of the pathogen standards. To achieve stabilisation Grade B, the biosolids need to meet a lesser degree of stabilisation plus one of the VAR requirements for Grade A; no pathogen reduction processes or product standards are applicable.

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APPENDIX D

Confirmation from VicEPA re Buffer criteria

APPENDIX D
EPA email

From: Martine.Yan@epa.vic.gov.au [mailto:Martine.Yan@epa.vic.gov.au]

Sent: Friday, 21 April 2006 6:51 p.m.

To: Richard Chilton

Cc: Piyaratne.Dewundege@epa.vic.gov.au

Subject: Fw: Query regarding AQ 2/86 Odour Buffers

Hi Richard,

Piya has forwarded your query to me in regards to the Recommended buffer distances for industrial residual air emissions(AQ 2/86).

The buffer distances listed in the guideline (AQ 2/86) are based on overseas and Australian experience on the assumption of best practice.

Their value is borne out by years of observations in EPA complaint investigations and experience.

Note that the guideline recommends distances between specified industry types and sensitive land uses to reduce the potential for amenity reducing non routine air emissions to impact on people in sensitive areas. The buffer is intended to protect people from emissions resulting from unusual or upset conditions (spills, accidents, plant upsets, equipment failure, abnormal atmospheric conditions), not normal day to day operations.

Buffer distances are not an alternative to source control of those routine, day to day emissions. However, despite the best use of technology, unintended or accidental emissions from equipment failure, accidents and abnormal weather conditions can lead to amenity reducing fugitive emissions affecting properties beyond the boundaries of the site. Provision of an adequate buffer distances allows the emissions to dissipate without adverse impacts on sensitive land uses.

Separation distances are intended to act as a trigger for risk assessment if the distance specified cannot be provided. A risk assessment should adequately identify and analyse the potential risks to the environment, formulating strategies and measures for avoiding, minimising and managing those risks. The relevant authority must then make a judgement as to whether the separation available will be adequate to prevent unacceptable impacts to nearby sensitive uses.

EPA Publication 508. As for the values for the Environmental Guidelines for composting and other organic recycling facilities, it is also based on EPA expertise and observations in complaint investigations.

I hope this helps.

Regards

Martine Yan

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