Before the Commissioner appointed by the Canterbury Regional Council

IN THE MATTER OF	The Resource Management Act 1991
AND	
IN THE MATTER OF	Application CRC194459 by Tegel Foods Limited, to discharge contaminants to air from poultry processing.

Section 42A Officer's Report

Report of Myles McCauley

Hearing commences 12 August 2020

1. My name is Myles Patrick McCauley. I am employed by Enviser Limited and have been engaged by Environment Canterbury to prepare this section 42A report.

2. I have worked in resource management since 1997, mostly in air quality both as a technical specialist and more generally on the interface with RMA processes. I have spent approximately half of that time as a private consultant, either in my current position or with Golder Associates (NZ) Limited (Golder) or its predecessor companies. Otherwise I have worked at Environment Canterbury as a Consents Investigating Officer, Air Quality Analyst and Principal Consents Planner. I have extensive expertise and experience in technical air quality assessments including combustion products and odour, as well as the processing of resource consent applications.

3. I was first involved with this proposal in 2018, when at Golder I was engaged by Environment Canterbury to make a technical review of the first application lodged by Tegel Foods Limited (Tegel), CRC185584 (discussed further later in this report). More recently I was engaged in my current role at Enviser to continue providing technical assistance. My engagement has since expanded to processing the application.

4. This report is prepared under the provisions of Section 42A of the Resource Management Act 1991 (RMA). This section allows a Council officer to provide a report to the decision-maker on resource consent applications made to the Council, and allows the decision-maker to consider the report at the hearing. Section 41(4) of the RMA allows the decision-maker to request and receive from any person who makes a report under Section 42A "any information or advice that is relevant and reasonably necessary to determine the application". This report will provide the decision-maker with information and advice related to:

   - the background to the applications
   - an outline of the relevant legal and planning provisions
   - comments on the assessment of environmental effects provided
   - details of Regional Council policies relevant to the applications
   - comments in relation to the matters specified in Part 2 of the RMA and
   - comments on the decision to be made by the decision-maker including comments on whether the applications can be granted or should be declined; if the applications

are to be granted what measures are required to avoid, remedy or mitigate any adverse effects; what monitoring should be undertaken and the duration of consent.

5. I have read the Code of Conduct for Expert Witnesses in giving evidence to the Environment Court. I agree to comply with that code when giving evidence to the hearing commissioner in this matter. All my evidence is within my expertise and I have considered and stated all material facts known to me which might alter or qualify the opinions I express.

INTRODUCTION

6. Tegel is applying for a resource consent to discharge contaminants to air from the operation of its poultry processing plant at 112 Carmen Road (legal description Section 27 SO 459717). The site has been operating since the 1950s and processes approximately 75,000 chickens and 5,000 turkeys per day. Solid and liquid fuel-fired boilers provide process heat. This application is for discharges from the plant continuing to process that number of birds, but with modifications and upgrades to the boiler plant and to its existing protein recovery plant (PRP).

7. The discharges from poultry processing are currently authorised by CRC971639.1 and those from the boilers by CRC054334.2. Both of these consents are continuing under section 124 of the Resource Management Act (RMA) while the current application is processed. CRC054334.2 and CRC971639.1 both have an expiry date of 28 August 2018.

8. Tegel originally applied for CRC185584 which entailed a substantial increase to the size of the plant in terms of bird numbers and hours of operation. CRC185584 has been superseded by this application (which does not seek any increases) but by agreement between Tegel and Environment Canterbury it remains in process to facilitate a s124 continuation and will be withdrawn once this application is decided. Two associated additional applications have been created for administrative purposes – CRC185732 and CRC185733 - and these will also be withdrawn when this process is concluded.

9. The application process has involved the lodging of several sets of documents. I will generally refer to these collectively in this report, but will also make frequent references to the technical air quality impact assessment (AQIA) report prepared by Tonkin and Taylor Limited dated April 2019 and included in the application as Appendix D.

10. I visited the site in June 2018. I was shown the site by Tegel staff, with particular regard to the smokehouse, the PRP, the biofilters and the area around the bird receipt building and the south boundary of the site. All site processes appeared to be operating at the time.

NOTIFICATION AND SUBMISSIONS

Notification

11. The application was publicly notified on Saturday 7 December 2019. Notification was on the Environment Canterbury website and in the Christchurch Press.

12. All properties within a radius of 500 metres were notified by letter and the following other affected parties were also notified.

- Te Ngāi Tūāhuriri Rūnanga Society Incorporated
- Te Rūnanga o Ngāi Tahu

- Te Runanga o Te Ngāi Tūāhuriri c/-Mahaanui Kurataiao Limited
- Community & Public Health, Public Health Unit and
- Christchurch City Council.

13. The notification wording was as follows.

Resource consent application – CRC194459: A discharge consent (s15) to discharge contaminants to air from a poultry processing plant.

Applicant: *Tegel Foods Limited*
Address for service: *Andrea Brabant,*
Tonkin & Taylor Ltd
PO Box 5271, Auckland 1141
Email: ABrabant@tonkintaylor.co.nz

The application is for a resource consent to discharge contaminants to air from a poultry processing plant at 112 Carmen Road, Christchurch, including:
- *Combustion products from the operation of six boilers with a combined heat output of 7 megawatts, and from the operation of a poultry smokehouse; and*
- *Odour from poultry processing, a protein recovery (rendering) plant and wastewater storage and conveyance.*

The application is to replace the existing consents for discharges to air from the plant.

The plant currently processes a maximum of approximately 75,000 chickens and 5,000 turkeys per day, and this application is to continue processing at those rates.

The applicant proposes to make upgrades and modifications to the plant, including the replacement of some of the site boilers with new appliances in a new boiler house, and modifications to the protein recovery plant and waste water holding tank that are intended to better manage and mitigate offsite odour effects.

A consent duration of 20 years is sought.

Submissions

14. Submissions closed on 27 January 2020. 24 submissions were received of which six are to be heard. Table 1 shows the numbers of submitters to be heard or not heard, and their general positions.

Table 1: Brief summary of submissions

Status	Position	Number
To be heard	Support	1
To be heard	Oppose	4
To be heard	Neutral	1
Not to be heard	*Support*	*7*
Not to be heard	*Oppose*	*8*
Not to be heard	*Neutral*	*3*

15. Six submitters wish to be heard.

16. Actus Transport (NZ) Limited supports the application. They provide transport services to Tegel and are concerned about potential business effects.

17. The four submissions in opposition all identify substantial odour issues associated with the plant. They are:

    a. Sandra Ainslie and Darrell Stuart who have lived for 30 years in the area and refer to substantial odour issues sometimes requiring that windows be closed, and fatty deposits on cars.

    b. Geeta Ratnam, who lived in the area for six years and notes a very bad smell with physical effects and requiring windows to be closed.

    c. The Ministry of Education, which notes substantial and frequent odours leading to effects on school pupils at the Hornby High School and Hornby Primary School. This submitter asked several technical questions of Tegel and their submission was accompanied by a technical document from Beca Limited.

    d. Brett Hargadon, who refers to foul and unpleasant odours from the site.

18. The neutral submission (Brian Curtis) wishes to keep effects at current levels or reduced.

19. Of the submissions that do not wish to be heard:

    a. Seven are in support. Two identify the odour as being acceptable, three do not comment, one supports for business reasons and one supports modifications that will reduce odours from the site.

    b. Eight are in opposition. Five of those identify regular odour effects from the site, one refers to odour occurring but is less definitive, one experienced odour during a visit to the area and one is worded neutrally but wishes to see odour effects reduce.

    c. Of the three neutral submissions, two identify regular or extensive odour from the site and one does not comment.

20. Overall, 12 of the submissions (half the total number) identify definite concerns regarding odour from the site. Of these, 11 are from people who are or have been located in the area (the remaining one was a visitor). The most distant submitter that identifies odour as an issue is the Ministry of Education with regard the Hornby Primary School, 600 m to the southwest of the site boundary, and the closest is immediately adjacent to the south boundary of the site.

CONSULTATION

21. No consultation is referred to in the application. I understand that Tegel has been in consultation with the Ministry of Education regarding its submission, but that was not concluded when I was writing this report.

DESCRIPTION OF THE ACTIVITY AND DISCHARGES

22. Approximately 75,000 chickens and a maximum of approximately 5,000 turkeys are processed per day with turkey demand being seasonal. Chicken and turkey processing occur in separate buildings. The site operates continuously for 6-7 days per week.

23. This section describes the site processes, and the key discharges from them. Attachment 1 to this report is the applicant's summary of potential odour discharges from the site.

Note regarding site upgrades

24. In this report, I will refer to proposed upgrades to a number of site processes and activities, particularly to the PRP and boilers. However, I have been advised by the applicant's consultant that the PRP and biofilter upgrades are actually now largely completed, and the replacement of the front boiler house and boilers is likely to occur before the end of 2020. The upgrades to the PRP and biofilter are described later in this report.

25. I will use the expression "proposed" in this report for the changes and upgrades, in order to highlight the differences between the previously-existing and upgraded activities and to keep the terminology consistent with that used in the application.

Bird receipt and storage

26. Chicken and turkey processing occur in separate buildings. Live birds are brought onto the site in open sided trucks, arriving via Halwyn Drive and an entry point at the north eastern corner of the site.

27. Chickens are brought to the bird receipt area on the southern side of the site. The bird receipt area is roofed but not fully enclosed. The birds are then placed in an enclosed storage area which is ventilated by ten wall-mounted fans that face north (into the site). This part of the process has substantial potential to generate odour.

28. The chicken receipt area gives off a characteristic odour which is essentially uncontrolled due to the open nature of the building. As with the PRP, this odour cannot be quantified and instead has been assessed as part of the overall odour assessment in the AQIA. Given the location of the receipt area immediately adjacent to off-site commercial properties, the odour it discharges can be a substantial issue.

Chicken primary processing

29. Chickens are then transferred to the primary processing line where they are stunned, slaughtered, scalded, plucked, eviscerated (offal, heads, necks and feet), cleaned and chilled.

30. The main discharge from this process is likely to be odour from scalding, which uses heat and water to remove feathers. Scalding generates a hot, moist odorous exhaust which discharges via two 18 m high stacks on the roof of the processing building. The AQIA does not quantify this discharge and given the nature of the process and the manner in which the discharge occurs, it is possibly not a substantial component of the overall site impact. The rest of the process has a low odour potential and the air from it is discharged via fans in the north wall of the building.

Chicken secondary processing

31. Chickens are prepared into portions, and packed (secondary processing). This is a cold process and has very little or no odour potential.

Turkey processing

32. Turkeys are receipted at the turkey plant toward the back of the site where they are slaughtered, scalded, eviscerated, dressed and deboned. Turkey processing is a smaller operation than chickens, typically one shift on each of three shifts per week but increasing to a shift per day for six days per week around Christmas.

Smoking and cooking

33. A proportion of the chicken and turkey product is then further processed in a cooking/smokehouse on the northern side of the site. The smokehouse includes five ovens, four of which are smokers and the fifth is a steaming oven. Smoking batches take approximately 3.5 hours with actual smoking occurring for about 45 minutes, while the non-smoking batches take approximately 1.5 hours. The smokehouse operates for a maximum of 16 hours per day, 5.5 days per week. The batches do not generally occur simultaneously.

34. The smoking ovens are heated using steam from the boilers, and they generate smoke either by dropping wood shavings onto a heated disc, which pyrolyses the wood shavings (pyrolysis is the heating and decomposition of materials at temperatures lower than those necessary for combustion), or by pushing logs against a rotating drum and producing smoke from the friction.

35. The principal discharges are likely to be smoke (particulate matter) from the four smoking ovens, and cooked/smoked chicken odour from the process. As with the other odour sources, the odour emission has not been quantified in the AQIA and instead is addressed via the overall assessment of effects.

36. The AQIA quantifies the potential discharges of particulate matter from the smokers but has not incorporated them into the assessment of effects as discussed later in this report. The discharges of PM_{10} from the smokehouse have been estimated using published United States EPA AP42 emission factors and are calculated to be:

- 608 grams per day overall (0.007 grams per second (g/s) averaged over 24 hours)
- 0.011 g/s averaged over the 16 hour operational day and
- 0.058 g/s maximum if all ovens operated simultaneously.

37. The discharges occur via five stacks. Their exact heights are unknown but four have their outlets approximately level with the roof ridgeline of the building that they emerge from, and one is substantially higher. The stacks are not capped.

Protein recovery plant

38. Processing by-products (soft offal, feathers and blood) are passed to a protein recovery plant (PRP) where they are rendered into protein and tallow. The site also receives by-products from another plant run by Brinks. Key steps in this process are:

a. By-products and blood from the Tegel site are pumped in separate pipes to a raw material bin.

b. By-products from Brinks are receipted in a separate hopper, which also receives feathers from the Tegel processing line.

c. From the bin, the by-products are screened in a rotating “contrashear” to separate liquids and solids. Liquids from the screen are pumped to a wastewater buffer tank at the east end of the site and disposed of to trade waste (sewer). Solids are conveyed to a “loading room” from which they are fed under gravity to cookers in the cooking room.

d. Cooking is in three cookers each with a capacity of three tonnes operating on a 4.5-hour cycle. The cookers are heated by steam. At the end of the cycle, each cooker is unloaded into a hopper and the material is conveyed to a press.

e. Liquids from the press pass to a centrifuge where the tallow is separated before being pumped to a tallow storage tank. Solids from the press and decanter centrifuge are conveyed to a hammer mill for size reduction to a meal product.

f. The meal is conveyed to a bagging machine and packed into two-tonne bags which are stored in a container before being taken off site.

39. The air from the key discharge points is collected and extracted to a bark biofilter at the east end of the site. It is likely that some "fugitive" odour emissions have been occurring via building openings, including when doors are open. In particular, the main access door is a large roller door and it is likely that this has created intermittent substantial odour when open.

40. The PRP extraction and biofilter system is to be upgraded by adding targeted extraction, extracting air from more sources to the biofilter and changing the biofilter configuration. This is likely to reduce the potential for fugitive discharges from the building and make the extraction more efficient. I will discuss the details later in this report.

41. The PRP is likely to be the main odour source at the site and will give rise to a distinctive cooked odour with other characteristics such as offal and rotting meat, depending on the circumstances. Instead of quantifying the rate of odour discharge, the application focusses on the overall effects of odour as discussed later in this report. The AQIA does include an assessment of the discharges from the PRP made using dispersion modelling, but it is based on arbitrary emission rates and is intended as a comparative exercise to assess the effect of the PRP upgrades, rather than an absolute indicator of potential odour concentrations. This is understandable given that it is difficult to quantify the odour discharges from a source of this type and any such calculation would have a high degree of associated uncertainty.

42. However, in the context of the PRP upgrade some of the assumptions made during the modelling assessment are worth summarising here.

a. It assumes that for the existing situation, 10% of the PRP discharge is fugitive and 90% is directed to the biofilter, which is capable of a reduction in odour of 95%.

b. For the then-proposed situation (i.e. before the current iteration of proposed changes to the PRP and biofilter), an 80% reduction in odour effects was assumed.

43. Most of these assumptions are difficult to verify and were used in an indicative manner.

Heating plant

44. Heat for the site processes is currently provided by six oil-fired boilers, each with a power output of 1.1 megawatts (MW). The boilers are currently consented to be fired on coal, light fuel oil, recycled waste oil (RWO), diesel or biodiesel. Two boilers are located in a "front" boiler house toward the west end of the site and the remaining four are in the "back" boiler house near the PRP. Tegel proposes to replace the front boiler house with a more central installation consisting of a single 2.3 MW boiler. The back boiler house will remain as is. Therefore, the heat output from the site under this consent application is a slight increase from 6.6 to 6.7 MW.

45. For this consent, the existing and new boilers will be fired on the liquid fuels itemised above, and coal will not be used. I understand that all of the boilers are likely to be largely fuelled on diesel in the future, but the other fuels may be used from time to time. When I refer to RWO in the proposed conditions attached to this report I will describe it as "reprocessed oil" as that terminology is consistent with the Environmental Protection Authority's Code of Practice document "The Management and Handling of Used Oil[1]".

[1] Environmental Protection Authority Te Mana Rauhī Taiao (2013) Management and Handling of Used Oil Approved Code of Practice. Publication number HSNOCOP 63.

46. Fuel combustion gives rise to a hot, moist exhaust that contains contaminants that are either residual from the fuel or created during combustion. The application assesses the effects of the following contaminants:

- inhalable particulate matter finer than ten microns in size (PM_{10})
- the sub-fraction of PM_{10} that is finer than 2.5 microns ($PM_{2.5}$)
- sulphur dioxide (SO_2)
- oxides of nitrogen (NO_x) and in particular, nitrogen dioxide (NO_2)
- benzo-a-pyrene (BaP) and
- chromium III.

47. Given the types of fuel burnt in the boilers, this is an appropriate selection of contaminant types. RWO in particular is likely to contain elevated concentrations of metals of which chromium is a key one. However, it is noteworthy that even in substantially larger cases, the discharges of contaminants other than particles, SO_2 and NO_2 from combustion sources are generally very small and create negligible effects.

48. The discharges from the upgraded boiler plant will occur via one stack from each boiler house. The new front boiler (2.3 MW) will discharge via a 15 m high stack with an exhaust gas (efflux) velocity of 16 metres per second (m/s) when operating at its maximum capacity (the existing two 1.1 MW boilers currently discharge through a 19 m high stack at the same efflux velocity).The existing rear boilers (four 1.1 MW appliances) will continue discharging from the existing combined 22 m high stack at a maximum efflux velocity of 19 m/s.

49. The emission rates and stack parameters assumed for the assessment are shown in Table 2 and Table 3 below.

Table 2: Boiler contaminant emission rates (Table 6-1 of the AQIA)

Contaminant	Front boiler stack		Rear boiler stack
	Existing	Proposed	
PM_{10}	0.2	0.2	0.4
$PM_{2.5}$	0.07	0.07	0.15
SO_2	0.6	0.6	1.2
NO_x	0.144	0.143	0.288
Benzo-a-pyrene (BaP)	2.2×10^{-6}	2.2×10^{-6}	4.5×10^{-6}
Chromium III*	1.5×10^{-4}	1.5×10^{-4}	3.0×10^{-4}

Table 3: Boiler discharge parameters (Table 6-2 of the AQIA)

Parameter	Front boiler stack		Rear boiler stack
	Existing	Proposed	
Stack discharge height	19 m	15 m	22 m
Stack inside diameter	0.35 m	0.35 m	0.45 m
Stack exhaust temperature	250°C	250°C	250°C
Stack exhaust velocity	16 m/s	16 m/s	19 m/s

50. I have reviewed these discharge assumptions and have some comments.

PM_{10}

51. The emission rate has been calculated for each boiler assuming that the in-stack concentration of PM_{10} is 250 milligrams per cubic metre when corrected to standard temperature and pressure (mg/Nm^3). This has then been multiplied by assumed exhaust flow rates to calculate the mass emission rate. This approach is commonly used but may be on the conservative side for general operation using liquid fuels.

$PM_{2.5}$

52. The AQIA assumes that the $PM_{2.5}$ content in the discharge is 37% of the PM_{10} fraction. This is based on an analysis of a United States EPA AP42 emission factor for the combustion of LFO, which I have reviewed.

53. Emissions data for $PM_{2.5}$ are not common, and a higher proportion is often assumed. In my experience, this can be as much as 80%, and assessments of combustion products occasionally assume that all PM_{10} is in the $PM_{2.5}$ fraction, in the absence of other information, although that is likely to be an unrealistically high assumption. There is a risk that the AQIA has under-estimated the $PM_{2.5}$ discharge from the boilers, but this cannot be confirmed without testing, and it is quite conceivable that the applicant's assumption is correct.

Sulphur dioxide

54. The SO_2 emission rates are based on the assumption that the maximum fuel sulphur content is 0.5 percent by weight (wt%), of which 5% is retained in ash after combustion (this ash retention reduces the amount discharged).

Nitrogen dioxide

55. The emission rate of total oxides of nitrogen has been calculated using the Australian National Pollutant Inventory (NPI) emission estimation factors from the worst case fuel type of RWO. The AQIA assumes that all of this is composed of NO_2 which is highly conservative; generally it can be assumed that approximately 10% of the initial discharge is NO_2, and more forms as a result of chemical transformation in the atmosphere as the plume disperses, but the total is unlikely to ever reach 100%.

Chromium III and benzo-a-pyrene

56. These emission rates have also been calculated using the NPI emission factors and are appropriate for the appliances.

Wastewater treatment

57. Processing wastewater (cleaning water, PRP wastewater, scalding water, etc) is discharged to the Christchurch City Council sewer as trade waste. The wastewater is piped to a flow balance tank at the east end of the site. The tank currently has an open top, but as part of this application, Tegel proposes to close it and extract the headspace air to the biofilter. Some odour is likely to occur from the wastewater system, particularly sumps and the balance tank, but the upgraded extraction is likely to reduce this compared with the previous situation.

Biofilter

58. Air extracted from the PRP passes to a bark biofilter at the north-eastern corner of the site. At present, the biofilter consists of 2 beds with a total area of 1,824 m^2.

However, Tegel proposes to reduce this to a single bed with an area of 1,395 m^2, and to increase the flow rate into the biofilter. I will discuss this later in this report.

59. A well maintained and appropriately loaded biofilter is unlikely to generate substantial odour.

PROPOSED PROTEIN RECOVERY PLANT AND BIOFILTER MODIFICATIONS

Protein recovery plant

60. Tegel proposes to make upgrades to the PRP to reduce odour impacts. The upgrades will consist of alterations to the extraction of air from various parts of the process. Attachments 2A and 2B to this report show the existing configuration, and the most recent proposed configuration respectively.

61. At present, air is extracted to the biofilter by a fan that can draw a maximum of 7.4 m^3/second of air, and this occurs as follows:

- air is extracted directly from each of the cookers - which are likely to be the main odour source – through a single condenser and to the biofilter
- building air from the loading room is extracted directly to the biofilter
- building air from the wider cooker/decanter/hammer mill and bagging space is extracted directly to the biofilter and
- building air from the screens is extracted directly to the biofilter.

62. It is proposed to increase the extraction rate to 12.6 m^3/s and increase the amount of direct source extraction. The upgrade can be summarised as:

- ducting and fan replacement as necessary to facilitate the flow increase and changed extraction configuration
- continuing to extract general building air from the three main areas described above
- direct targeted extraction from the cookers via a condenser as above and
- additional targeted source extraction from each of the press, decanter centrifuge, wastewater buffer tank and the PRP offal bin, direct to the biofilter.

63. The applicant anticipates that these modifications are likely to reduce the odour discharges from the site by a substantial amount (a figure of 80% is stated in the application, but the basis of this is uncertain). In part this is due to introducing additional targeted extraction which is generally accepted as being an effective way of managing highly odorous processes (when it is practicable). However, the applicant also states that the increased flow rate will enable better capture of general building air and a reduction in fugitive emissions, particularly when the main door of the PRP is open.

64. The proposed modifications have been reviewed by Mr Daryl Irvine of Pattle Delamore Partners Limited, and he has prepared a s42A report which forms Attachment 3 to this report. In general, Mr Irvine agrees with the proposed modifications and the reasons for them and considers that they are likely to result in a reduction of PRP odours. Mr Irvine will provide a comment to the panel in this regard and be available for questions.

Biofilter

65. As discussed above, the applicant proposes to reduce the area of the biofilter and reduce it to one bed. It is also proposed to replace the existing manifold distribution

with a perforated floor (plenum) to improve the distribution of air flow into the biofilter. The changes, in combination with the increased flow rate into the biofilter, will result in alterations to some key operating parameters of which the key ones are:

- the gas volume to bed area ratio will increase from 17.5 to 48.8 m^3/m^2/hour and
- the empty bed residence time will decrease from 146 to 111 seconds.

66. The changes mean that more air will be pushed through the biofilter faster. However the applicant states that all parameters will be within accepted guidelines and will not result in a decrease in biofilter performance.

67. Mr Irvine has reviewed this proposal and agrees that the proposed loading rate is acceptable, and has provided some recommendations regarding the fines content of the biofilter media, and the management of flow rates during the construction period. I understand that the modifications to the biofilter have already been made, so the construction period is not an issue. I am not aware of whether Tegel has acted on Mr Irvine's recommendation regarding the fines content of the biofilter media but I have included a recommended consent condition to that effect.

Timing and implementation of upgrades

68. As discussed above, the PRP and biofilter upgrades have largely been implemented, and the new front boiler house and boilers are likely to be installed before the end of 2020.

LEGAL AND PLANNING MATTERS

69. Section 15(1)(c) of the Resource Management Act applies. The discharges are not allowed by a national environmental standard or other regulations, or a rule in a regional plan (as discussed below). Therefore, a resource consent is required.

The Canterbury Air Regional Plan

70. The application assesses the overall activity status to be non-complying under the Canterbury Air Regional Plan (CARP) for the following reasons:

    a. The discharge of combustion products from the boilers is assessed by the applicant as a discretionary activity under rule 7.24. However, I consider that for the combustion of RWO and LFO (as assessed by the applicant), the application is more likely to be a restricted discretionary activity under rule 7.4. The applicable permitted activity (PA) rule is rule 7.20 and the application complies with the general conditions of that rule; however, rule 7.20 includes no fuel-specific conditions for the LFO and RWO fuels used by Tegel. Therefore, rule 7.24 does not apply and the application would default to rules 7.3 to 7.5 (and would likely fall under rule 7.4 (restricted discretionary activity)). The application takes the approach of applying under rule 7.24 "out of an abundance of caution". In practice this makes no difference to the outcome, given the matters for discretion under rule 7.4 and the overall non-complying status.

71. Having said that, in any case Tegel intends to also fuel the boilers using diesel and biodiesel but the application does not assess the rules related to these fuel types. In the case of biodiesel, the same pathway would apply as for LFO and RWO as discussed above. In the case of diesel, the sizes of the appliances – individually or collectively – exceeds the permitted activity threshold under rule 7.20, and the discharges would be discretionary under rule 7.24.

b. The discharge of contaminants from smoking or cooking is a discretionary activity under rule 7.63, as it is not managed by rules 7.47 to 7.62 (in particular, rule 7.59).

c. The discharge of odour from the PRP is a non-complying activity under rule 7.64 as it is not managed by rules 7.47 to 7.62, and does not comply with rule 7.63. The reason for this is that the applicant accepts that there have been offensive or objectionable odour effects in the past which means that the activity cannot be classed as discretionary under rule 7.63.

72. In the case of the PRP, the CARP does not connect rules 7.63 and 7.64, as rule 7.64 only applies to breaches of the "offensive or objectionable" threshold in the applicable permitted activity rules. In this case, the PA rule (rule 7.59) only applies for processing rates up to 10 tonnes per day, therefore it does not manage the PRP discharges. However, the general rules 7.3 to 7.5 would apply. Under these rules, the discharges from the PRP would be non-complying under rule 7.5.

73. I agree that it is appropriate to bundle the activities and that the overall activity status is non-complying.

The National Environmental Standards for Air Quality

74. The National Environmental Standards for Air Quality (NESAQ) include regulations applicable to the processing of resource consents. Of particular relevance is Regulation 17, which relates to the discharges of PM_{10}. In summary, regulation 17 states that a resource consent application to discharge PM_{10} into a "polluted airshed" must be declined if the discharge would be likely to increase the 24-hour average PM_{10} concentration by more than 2.5 micrograms per cubic metre ($\mu g/m^3$) beyond the subject site unless:

- the proposed consent is for the same activity as another consent held by the applicant when the application was made and
- the amount and rate of PM_{10} to be discharged will not increase and
- the discharges under the new consent only occur when those from the previous one no longer occurs.

75. If these conditions cannot be satisfied, the consent can only be granted if the applicant can offset all of the discharges, from other sources.

76. Christchurch is a polluted airshed under the NES, therefore regulation 17 applies. However, the applicant holds existing consent CRC054334.2 which authorises the discharge of PM_{10} (the activity) and the discharge is not expected to increase as a result of this application. CRC054334.2 has an expiry date of 28 August 2018 and is continuing under s124 of the RMA while this application is processed; therefore, it will cease once this application is decided and appeals are determined.

77. Regulations 20 and 21 of the NESAQ apply to resource consent applications for the discharges of carbon monoxide, oxides of nitrogen and sulphur dioxide. These regulations require that consent applications for the discharges of these contaminants be declined if the discharges are likely to cause the contaminants to breach the applicable ambient air quality standards, and if the discharges are the principal sources of those contaminants into the airshed. The application considers that these regulations are not triggered, and I agree with that assessment.

DESCRIPTION OF THE AFFECTED ENVIRONMENT

Location and character

78. The site is located in the built environment of western Christchurch. It is on the west end of a substantial area of industrial and commercial land which includes a wide variety of type and scale of activities. Residential land is situated immediately across Carmen Road to the west of the site and extends for a substantial distance in that direction. The site and surroundings are shown in Figure 1.

79. The site is located on a mixture of land zoned industrial heavy (the eastern part of the site) and industrial general (west end) in the Christchurch District Plan. Those zonings apply to most of the commercial land around the site (i.e. immediately east, north and south). The residential land across Carmen Road to the west, and that further afield to the north and north west is zoned for a mixture of residential, specific purpose and open space use.

80. The commercial activities around the site include a variety of uses, some of which have a higher sensitivity to air discharges than others (for example, a trampoline facility immediately to the south).

Figure 1: General site context (site outline in blue, north is toward the top of page).

81. Overall, the area around the site varies in sensitivity to the discharges. To the south west, west, north west and north, the residential land is highly sensitive. In the surrounding industrial areas, the sensitivity varies between high/moderate and low depending on the activity and individual site zoning.

Meteorology

82. Wind patterns are an important aspect of air quality assessments. The application includes a wind rose (graphical summary of wind speeds and directions) for the period 2008 – 2017 recorded at Kyle Street in Riccarton. That wind rose is likely to characterise the winds at the site and is shown in Figure 2.

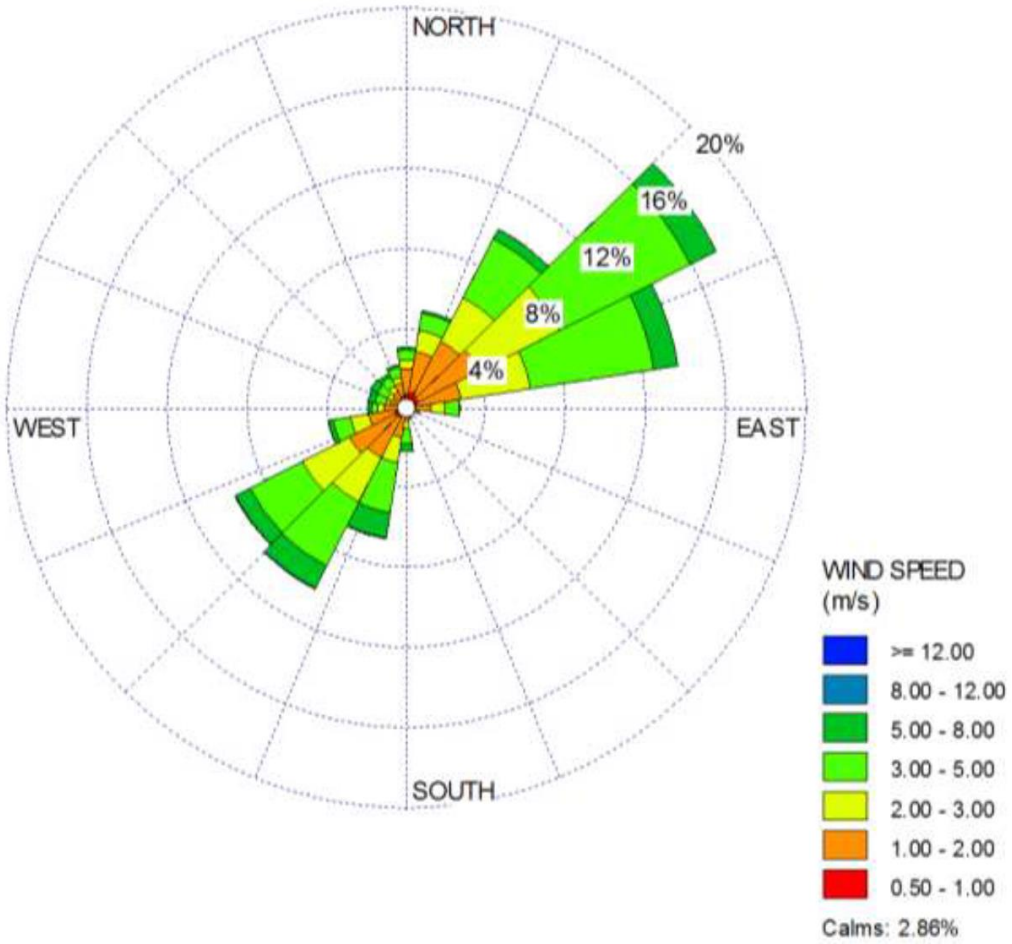


Figure 2: Wind rose, Kyle Street, 2008 - 2017 (Figure 5-2 of the AQIA)

Existing air quality

83. The site is located in the Christchurch Airshed, which is a "polluted airshed" under the NESAQ due to wintertime exceedances of the 24-hour average national environmental standard for PM_{10}, of 50 micrograms per cubic metre (µg/m^3). While the number and magnitude of these exceedances is steadily decreasing, several still occur every year. During 2019, four exceedances were recorded at Environment Canterbury's long-term St Albans monitoring site with a maximum concentration of 68 µg/m^3. So far this year, three exceedances have been recorded at the St Albans monitoring site.

84. Annual average PM_{10} is generally lower than the applicable guideline value of 20 µg/m^3. No exceedances have been recorded in the last 5 years (2015 – 2019), but in each year the concentration has been greater than 15 µg/m^3.

85. The concentrations of other contaminants, particularly NO_2 and SO_2 are typically very low in Christchurch. However, SO_2 is elevated in the Hornby area due to the presence of the Ravensdown fertiliser works approximately 700 m south of the Tegel site.

86. There are several other consented discharges of combustion products in the area around the site, particularly in the industrial/commercial areas to the east. Several other industries in the area discharge odour. None of these are likely to involve odours that are similar to those discharged from the Tegel site, but it is likely that a large bakery to the north will be producing cooking type odours, albeit of a different character.

Ngāi Tahu values

87. There are no identified applicable areas or sites of significance to Ngāi Tahu near to the site. The eastern boundary of the Te Waihora co-governance area is immediately to the west, but this is unlikely to be an issue with regard to the discharges to air from the site.

ASSESSMENT OF ACTUAL AND POTENTIAL EFFECTS

88. The application quantitatively assesses the effects of the discharges of combustion products from the boilers, and of odour from all site processes but focussing on the PRP. Some sources have not been directly assessed and I will discuss them after reviewing the quantitative assessments.

Boiler combustion products

89. The AQIA uses atmospheric dispersion modelling to assess the effects of boiler combustion products. Dispersion modelling is often used for assessments of this type and is an appropriate method in this case.

90. The AQIA uses the CALPUFF dispersion model and its associated CALMET meteorological pre-processor. I am familiar with this modelling system and have made or reviewed many assessments using it. I have reviewed the model setup configuration including the emission rates and discharge parameters discussed earlier in this report, and I generally agree with them. Some aspects are worth noting here:

    a. One year of meteorological data has been used (2012). This approach is often undertaken but it is becoming more common to use two or more years of data in order to account for variation between years.

    b. The existing situation and the proposed scenario have been modelled and the results compared.

    c. The modelling assumes that all boilers run at their maximum heat outputs at all times. This is likely to overstate the effects as the boilers are unlikely to operate in that manner.

    d. The modelling assumes that the discharge temperature is 250°C. It is not clear why this temperature has been used and it is possible that the discharge will not be that high at the stack outlet.

91. The AQIA presents modelling results in table form summarising maximum predicted ground level concentrations (GLCs) at selected locations. It also provides contour plots that overlay the model predictions onto an aerial photograph of the surrounding area. The contours are interpolated values between the GLCs predicted at each of the individual modelled receptor points; the predicted GLCs at each point generally

occur at different times and therefore the plots are not snapshots, but summaries of the maximum GLC at each receptor across the entire year modelled.

92. The predicted GLCs are compared with the assessment criteria shown in Table 4 below.

Table 4: Air quality assessment criteria (Table 6-3 from the AQIA)

Contaminant	Concentration (µg/m³)	Time average	Permissible annual exceedances	Source
PM_{10}	50 20	24 hour Annual	1 N/A	NESAQ MfE AAQG
$PM_{2.5}$	25 10	24 hour Annual	N/A N/A	WHO AQG WHO AQG
Sulphur dioxide (SO_2)	350 520 120	1 hour 1-hour 24-hour	9 Not to be exceeded N/A	NESAQ NESAQ MfE AAQG
Nitrogen dioxide (NO_2)	200 100	1 hour 24-hour	9 N/A	NESAQ MfE AAQG
Benzo-a-pyrene (BaP)	0.0003	3-month	N/A	MfE AAQG
Chromium III	0.11	Annual	N/A	MfE AAQG

93. In Table 4, "NESAQ" refers to contaminant standards set under the NESAQ, "MfE AAQG" refers to the Ministry for the Environment Ambient Air Quality guidelines, and "WHO AQG" refers to the World Health Organisation air quality guidelines. These criteria are generally used for assessments of this type.

94. With regard to $PM_{2.5}$, there is no current New Zealand guideline or national standard, hence the applicant's use of the WHO AQGs. However, proposed changes to the NESAQ (which are now past the consultation stage) aim to increase regulation of $PM_{2.5}$ including the addition of concentration standards which are the same as the WHO values. These are yet to be Gazetted and therefore are not relevant to this application.

95. I will now discuss the modelling predictions for each contaminant.

PM_{10}

96. The proposed discharges result in a maximum 24-hour average GLC of approximately 8 µg/m³ at the most-affected sensitive receptor (in the residential area west of the site). The overall maximum off-site concentration is not provided, but it appears from the contour plots that this value would be in the 10 to 12 µg/m³ range in the immediately adjacent industrial areas where people are not exposed for 24 hours at a time.

97. In comparison, the maximum values under the existing situation are 15 µg/m³ at the most-affected sensitive receptor, and possibly up to 20 µg/m³ at the immediately adjacent industrial locations. This indicates that the proposed reconfiguration is likely to produce a substantial decrease in adverse effects compared with the current layout. This is attributed by the applicant to the new location of the boiler house, which is some distance further from the higher buildings at the front of the site than the existing boiler house. This has the effect of reducing the effect of these buildings on the dispersion of the plume from the boilers (building downwash).

98. These predictions are compared with the 24-hour average NES of 50 µg/m³, which is currently exceeded in Christchurch several times every winter. On their own, the

GLCs do not exceed the NES, but they are occurring into an environment where background concentrations already periodically exceed it (primarily as a result of wintertime home heating, but with contributions from industry and motor vehicles). Given this, an addition of 8 µg/m^3 is not trivial. However, in my experience consent applications that anticipate this level of localised effect are granted in urban areas of the Canterbury region.

99. It is also noteworthy that the maximum GLCs are highly localised (less than 4 µg/m^3 over much of the modelling domain), are unlikely to be regular occurrences, and are based on a possibly-conservative operating assumption.

100. The predicted maximum annual average GLCs are 2 µg/m^3 under the existing situation, decreasing to 1 µg/m^3 under the proposed scenario. As discussed earlier in this report, exceedances of the annual average guideline value are uncommon and have not occurred in the last five years.

$PM_{2.5}$

101. As would be expected given that the emission rates are scaled from those of PM_{10}, the concentrations of $PM_{2.5}$ are proportionally lower and show a decrease between the existing and proposed situations. At the most-affected sensitive receptor the predicted maximum GLCs are 5.5 µg/m^3 (existing situation) and 2.9 µg/m3 (proposed).

102. The predicted maximum annual average GLCs are 0.7 µg/m^3 under the existing situation, decreasing to 0.4 µg/m^3 under the proposed scenario.

103. There is no current New Zealand guideline or national standard for $PM_{2.5}$ but the World Health Organisation 24-hour average guideline of 25 µg/m^3 and annual average value of 10 µg/m^3 are commonly used. As is the case with PM_{10} these guidelines are exceeded several times in Christchurch during the winter.

104. At face value, the AQIA predicts what I consider to be acceptable $PM_{2.5}$ concentrations, which are proportional to those for PM_{10} discussed above. However, as discussed above there is an element of uncertainty in the applicant's emission assumption.

105. It is again worth noting that the assessment indicates a decrease in maximum GLCs, which represents an improvement in local air quality.

Sulphur dioxide and nitrogen dioxide

106. The application predicts the following maximum GLCs.

107. For SO_2:

- SO_2 1-hour average – 78.9 µg/m^3 (existing) and 79.6 µg/m^3 (proposed) at any location beyond the site boundary and
- SO_2 24-hour average – 44.6 µg/m^3 (existing) and 23.7 µg/m^3 (proposed) at the most-affected sensitive receptor.

108. These GLCs are compared with the assessment criteria of 520 µg/m^3 (maximum 1-hour under any circumstances), 350 µg/m^3 (1-hour average with 9 exceedances allowable) and 120 µg/m^3 (24-hour average).

109. For NO_2:

- NO_2 1-hour average – 18.9 µg/m^3 (existing) and 19.1 µg/m^3 (proposed) at any location beyond the site boundary and

- NO_2 24-hour average – 10.7 µg/m^3 (existing) and 5.7 µg/m^3 (proposed) at the most-affected sensitive receptor.

110. These GLCs are compared with assessment criteria of 200 µg/m^3 (1-hour average with 9 exceedances allowable) and 100 µg/m^3 (24-hour average).

111. These values are well within the assessment criteria and after allowing for background concentrations I consider them acceptable. It is noteworthy that in the cases of 1-hour average GLCs, there is a slight increase between the existing and proposed situations that is not seen in longer-term averages. The application does not address this issue but it is possibly attributable to short-term meteorological changes (for example rapid alterations to atmospheric mixing at sunrise/sunset) causing brief peaks in concentrations that are reflected in the short term averages but smoothed out over the longer periods. The applicant may wish to discuss this further at the hearing.

112. It is also likely that while background SO_2 concentrations in most of Christchurch are very low, those at and near to the Tegel site would be higher due to the presence of the Ravensdown fertiliser works to the south of the site. No monitoring data are available for the area around Tegel, but I am aware that SO_2 concentrations close to the Ravensdown site have in the past neared and occasionally exceeded some SO_2 guidelines and standards. The application considers this and notes that given the location of Ravensdown to the south south-east of Tegel, and the lack of winds from that direction, SO_2 concentrations at the site are unlikely to be highly influenced by Ravensdown. I agree that this is likely to be the case.

Chromium III and Benzo-a-Pyrene

113. The application predicts the following maximum GLCs at the most-affected sensitive receptor:

- chromium III annual average – 0.0015 µg/m^3 (existing) and 0.00077 µg/m^3 (proposed) and
- BaP annual average – 0.000022 µg/m^3 (existing) and 0.000011 µg/m^3 (proposed).

114. These GLCs are compared with and are well within (by orders of magnitude) the assessment criteria of 0.11 and 0.0003 µg/m^3 respectively.

Odour

115. The application uses the following methods to assess the effect of odour discharges from the site, and also of the potential effects of the PRP upgrades:

- analysis of complaint records
- an odour observation survey and
- a comparative dispersion modelling study of the effects of discharges from the existing and proposed PRP configurations.

116. I will discuss these in turn.

Complaints

117. The AQIA summarises complaints to Environment Canterbury from 2009 to 2018, as summarised in Table 5. I have obtained an up to date complaint record and discuss this below.

118. The AQIA also notes, and I agree, that odour complaints are not conclusive indicators of effects but can provide a broad indication of odour nuisance. It can be very difficult to weigh up complaint records for many reasons including:

- complaint response times and the transience of many events, which vary and can mean that a real nuisance has ended before a compliance officer can arrive
- human sensitivity to odour which can affect who complains and why
- social factors such as community relationships and employment demographics
- behavioural factors such as reluctance to complain, or over-enthusiasm for it and
- confounding by other sources.

119. It is also sometimes the case that a well-run plant still receives one or two substantiated complaints per year because of unforeseen failures, breakdowns or losses of process control.

Table 5: Summary of complaints to Environment Canterbury 2009 to 2018 (Table 7-1 from the AQIA)

Year	Odour complaints received by ECan	Odour incidents substantiated by ECan	Compliance outcomes
2018	7	Nil	N/A
2017	1	Nil	N/A
2016	7	Nil	N/A
2015	11	2	Written warning provided to Tegel
2014	17	1	Odour noted
2013	4	Nil	N/A
2012	2	Nil	N/A
2011	19	4	Odour noted
2010	5	2	Odour noted
2009	26	5	Odour noted

120. The AQIA notes that many complaints have been received during the summer, and during working hours. The locations of the complaints are too general to enable meaningful spatial analysis, but many seem to be from the adjacent industrial land.

121. The substantiated complaints in 2014 and 2015 relate to plant upsets at the PRP, but no explanation is provided for those in 2009, 2010 and 2011.

122. I have obtained an up to date complaint record that indicates the following with regard to odour.

a. So far in 2020 there have been three complaints of which none were substantiated and one was assessed as “no environmental impact” presumably after a site visit although this is not stated.

b. In 2019, there were nine complaints, all not substantiated, of which five were assessed as “no environmental impact”.

c. Additional complaints were received in 2018, bringing the total to 13, all not substantiated.

123. Most of the complaints are quite definite about the nature and source of the odour.

124. The complaint record that I have reviewed is for the period between the start of 2016 and June 2020. No enforcement action occurred as a result of any of these complaints.

Odour observation survey

125. The AQIA includes a field-based odour observation survey undertaken based on standards developed by the Association of German Engineers (Verein Deutscher Ingenieure (the "VDI" standards)). I am familiar with these standards and have made several field surveys using them. They entail systematic and regular downwind odour observations and are a very useful tool if conducted appropriately. However, they are labour intensive and time consuming.

126. The applicant's odour assessment is comprehensive and has been undertaken appropriately. Observations (one per day) were made on 27 different days in January and February 2018 (the observation periods are generally 10 minutes long, with observations once every ten seconds). It uses a threshold of ten percent of observations returning a "recognisable" (also defined as "distinct") odour to define a nuisance effect and it concludes that that threshold was exceeded at three locations, all very close to the site boundary. Of these, one is in the 30 – 50% range during both south-westerly and north-easterly wind conditions, and two are in the 15 – 29% range (one during south-westerly winds, and the other during north-easterlies), with all adjacent to the eastern half of the site. This result indicates a substantial odour effect at those locations. At all other locations, including several residential areas, the frequencies are less than 10%.

127. The AQIA discusses the character of the odours and notes that:

- strong odours are not uncommon close to the plant
- rendering odour was noted in most observations at the three "exceedance" sites
- bird/feather odours (and other odour characters) were noted downwind of the bird receipt area
- other odours such as bakery and solvent type odours were noted and
- biofilter odour has a low intensity compared with that from the PRP.

128. In concluding, the AQIA states that the survey, in combination with the complaint record, indicates that routine plant operation is unlikely to cause odour nuisance in the nearby residential areas. However, it considers that odour nuisance is likely to be occurring in the nearby industrial and commercial areas. It further concludes that the presence of PRP odour indicates that fugitive discharges from that source are a substantial component of the site odour (if PRP emissions were effectively contained and extracted to the biofilter, these fugitive emissions should be reduced to zero under routine operation).

129. In general, I agree with these conclusions, but some points are noted.

130. Removing the PRP from the site's odour profile is likely to reveal the extent of other contributions to off-site effects. It is likely that some odour would still occur around the bird receipt area and it seems that this has been an issue in the past. It is also possible that small sources such as the smokehouse and the scalder stacks could create residual odour around the site.

131. Despite the results of the field survey, I am not completely confident that routine odour effects have not been occurring in the nearby residential areas. I suggested to the applicant early in the process that they might want to consider a community odour survey, where a statistically significant number of people are contacted and run through a non-leading survey form and the results collated to indicate the "percentage at least annoyed" by odour from a particular source. The applicant's response was negative, due to the likely low percentage of land lines in the area. However, such surveys have been successfully made on a face-to-face basis.

Dispersion modelling of PRP emissions

132. The application includes a comparative modelling assessment of the odour effects that may occur before and after the proposed modifications to the PRP. As discussed above, it makes a number of key assumptions that while possibly realistic are not well supported. Nevertheless, it provides a potentially-useful indication of the change in effects that may occur assuming successful implementation of the upgrades.

133. The assessment assumes an arbitrary "baseline" emission concentration of 10,000 odour units per cubic metre at the biofilter inlet, a biofilter fan flow rate of 7.4 m^3/s and a biofilter efficiency of 95% to quantify the biofilter emission; and an assumption that an additional 10% of the biofilter inlet odour emission rate is discharged as fugitive emissions from the PRP building. Two model runs were made, one assuming the existing baseline and the other assuming an 80% improvement as a result of the PRP upgrades, and the results presented in a contour plot showing the percentage reductions that were predicted across the modelling domain.

134. The modelling shows a decrease in odour effects across the modelling domain, from approximately 20% in the immediate area of the PRP, decreasing rapidly to more than 50% across most of the area.

135. While the proposed PRP improvements are likely to result in a decrease in odour effects beyond the site boundary, the extent of this is difficult to assess. The assumptions regarding emission rates and percentage improvements are uncertain and could only be demonstrated by actual performance.

Other sources

136. I have already discussed the possibility that other odour sources may become more noticeable contributors once the PRP upgrades have been effected. The bird receipt area is probably the key one and it already appears to have been the source of nuisance in the surrounding area. During my site visit I noted a distinct odour from it. Emissions from this source are difficult to control due to its open and well-ventilated nature, and the application does not propose any additional mitigation.

137. The only other substantial discharge that has not been assessed is that of particulate matter from the smokehouse.

138. The AQIA's reason for not including the smokehouse in the modelling assessment is that

> *"Particulate emissions generated from smoking, particularly those generated using the predominant friction method, are relatively small in scale. Smoking is only required during the smoking phases (which make up less than 20% of the duration of smoked cooks).*
>
> *Even if the smoking phases of each of the four smoking ovens were to coincide, smokehouse particulate emissions would equate to less than 20% of the estimated peak emissions from the boiler currently located at the site on an instantaneous basis. On a daily basis (the shortest averaging period of national ambient air quality standards and guidelines for PM_{10}), with their intermittent occurrence smokehouse PM_{10} emissions are likely to equate to less than 2% of boiler emissions (based on typical boiler load data and the emissions described in Appendix A* [of the AQIA]*)."*

139. I agree that it is likely that the smokehouse would add only a small, localised amount to the overall particulate matter effect from the site, if it was modelled according to its actual operation.

Air discharge management plan

140. The application makes references to the use of management plans including an air discharge management plan (ADMP). In particular, it refers to the ADMP covering:

- the monitoring of biofilter parameters such as bed condition and inlet air
- odour risks and controls and
- contingencies.

141. I have included a recommended consent condition requiring an ADMP, with a suggested minimum list of topics for it to include.

142. The application does not provide a great deal of detail regarding the management of the bird receipt area. Key management aspects would include stock management (for example density, removal of dead animals), cleaning practices and frequency, contingencies such as stock management during unexpected plant outages, etc. The Ministry of Education has requested clarification of this matter in its submission, and I have included these matters amongst those to be included in the air discharge management plan that I have recommended in the conditions attached to this report.

Conclusions

143. I agree with the application regarding the discharge of combustion products from the site. Although a wholesale change to cleaner fuels such as diesel or liquefied petroleum gas (LPG) would be ideal, the AQIA demonstrates that the effects of the discharges will be acceptable and an improvement on the previous situation in terms of GLCs. Since the previous consent was granted, Tegel has moved away from the combustion of coal in the boilers, which is likely to have led to an improvement in the quality of the discharges.

144. With regard to odour, it is apparent that the existing or previous site configuration (i.e. previous to the current upgrades and modifications) has created odour effects around the site that have at times been substantial. The applicant has proposed and largely implemented modifications which should markedly reduce odour impacts. These modifications have been reviewed by Mr Irvine who agrees that this is likely to be the case. Therefore, I agree with the air quality assessment and consider that the consent can be granted.

MONITORING

145. The application suggests and/or recommends a number of monitoring measures related to site processes and practices such as biofilter parameters, PRP extraction, etc. I have endeavoured to incorporate the key measures into my recommended conditions attached to this report, but some discussion may be necessary at and/or following the hearing to finalise these.

146. The application does not recommend any effects monitoring. I consider that given the sensitive location of the site, the likelihood that odour issues have occurred in the past, and the reliance that the assessment of ongoing effects places on engineering modifications, some odour monitoring should be undertaken if the consent is granted.

147. In particular, I consider that some form of systematic downwind site boundary odour observation should be required. Instrumental monitoring is, to the best of my knowledge, not practical in a way that would enable meaningful compliance although the applicant may choose to provide information otherwise. Neither is it practical to have a person at the site boundary recording observations at all times.

148. I have recommended in the attached conditions that the consent holder makes one ten minute VDI-type observation per day and records and reports the results. This suggestion is less about identifying individual odour events than about building up a picture over time of how the plant is performing, and I doubt that there is a practical way of systematically monitoring odour that would provide a trigger that would enable the site to respond to individual events (although I have also recommended a response condition if a strong site odour is observed during the monitoring period).

149. I accept that there are other potential ways of monitoring site odour and the applicant may have thoughts about how this could be done, which could be discussed at the hearing.

150. I also recommend annual emissions testing for the concentration and emission rate of PM_{10} in both boiler stacks.

CONSIDERATION OF ALTERNATIVES

151. The application does not make an extensive discussion of alternatives. As discussed earlier in this report, the exclusive use of diesel and/or another fuel such as LPG would be likely to lead to lower emissions than the LPF and RFO that are also currently used, but the assessment concludes that the effects will be acceptable.

152. The application does not include an assessment of best practicable option, but Tegel is clearly investing heavily in improving odour control at the site and appears to have settled on a system that is likely to achieve this. Ideally, the site would be located in a less sensitive receiving environment, but this is unlikely to be financially viable for Tegel and it is likely that we will hear from the applicant on that matter at the hearing.

153. I have included a recommended condition that requires Tegel to undertake an assessment of the best practicable option for odour control at the site on a five-yearly basis during the term of the consent, accounting for changes in mitigation practices that may occur during that time, the effects that the site is creating, potential costs, etc.

OBJECTIVES AND POLICIES

154. The application includes a comprehensive assessment of the applicable objectives and policies at section 6.

155. Section 104(1)(b) of the RMA states the following:

"(1) When considering an application for a resource consent and any submissions received, the consent authority must, subject to Part 2, have regard to– …
(b) any relevant provisions of—
(i) a national environmental standard:
(ii) other regulations:
(iii) a national policy statement:
(iv) a New Zealand coastal policy statement:
(v) a regional policy statement or proposed regional policy statement:
(vi) a plan or proposed plan; …"

156. In accordance with Section 104(1)(b), the relevant National Policy Statements, National Environmental Standards, Regional Policy Statement and Regional Plan are assessed below.

National Policy Statements

157. None are applicable.

National Environmental Standards and other regulations

158. The NESAQ have already been discussed in this report with regard to the processing of consent applications, and numerical contaminant standards. Regulation 17 is complied with and there are no further aspects of the NESAQ that require discussion.

159. No other regulations are applicable.

Regional Policy Statement

160. The applicable objectives and policies are summarised below.

Chapter 14 – Air Quality

Objective 14.2.2. Localised adverse effects of discharges on air quality.

Policy 14.3.3. Avoid, remedy or mitigate localised adverse effects on air quality.

Policy 14.3.5. Relationship between discharges to air and sensitive land uses.

The Canterbury Air Regional Plan

161. The applicable objectives and policies are itemised below and I have commented on some key ones.

162. Objective 5.2. Ambient air quality provides for the health and wellbeing of the people of Canterbury.

163. Objective 5.3. Competing demands for the use of the air resource of Canterbury are accommodated while unacceptable degradation of ambient air quality is avoided.

164. Objective 5.6. Amenity values of the receiving environment are maintained.

Comment: the site in its existing configuration is likely to have been creating adverse amenity effects (odour) and this application includes proposals to reduce these substantially.

165. Objective 5.8. Discharges from existing activities are managed in response to evolving characteristics of the receiving environment.

Comment: the area around the site has become more sensitive over the life of the plant. The application includes proposals to reduce odour effects as a result of this increased pressure.

166. Objective 5.9. Offensive and objectionable effects and noxious or dangerous effects on the environment are generally avoided.

Comment: The site appears to have created offensive or objectionable odour effects at times, and the application includes measures designed to avoid this occurring in the future.

167. Objective 5.10. Developments and innovation in technology that have the potential to improve air quality are enabled.

Comment: The application includes improvements that are likely to substantially reduce adverse effects due to the discharges of odour and combustion products.

168. Policy 6.1. Discharges of contaminants into air, either individually or in combination with other discharges, do not cause:

a. adverse effects on human health and wellbeing; or

b. adverse effects on the mauri and life supporting capacity of ecosystems, plants or animals; or

c. significantly diminished visibility; or

d. significant soiling or corrosion of structures or property.

169. Policy 6.8. Offensive and objectionable effects are unacceptable and actively managed by plan provisions and the implementation of management plans.

Comment: The application includes the use of an ADMP and I have included this in the recommended conditions.

170. Policy 6.11. When evaluating resource consent applications recognise locational constraints on activities, when imposing terms and conditions.

171. Policy 6.15. Recognise that changes in technology may allow for improvements in the quality of a discharge over the term of the consent and acknowledge this by imposing management and review conditions on new and replacement resource consents.

172. Policy 6.22. Applications for resource consent for discharges of contaminants into air from large scale fuel burning devices and industrial or trade activities shall identify the best practicable option to be adopted to minimise effects.

173. Policy 6.24. Within Clean Air Zones, generally avoid granting resource consents to discharge PM_{10} where concentrations in the discharge exceed 250mg/m^3.

Comment: The application states that the discharges will not exceed that criterion and I have included conditions requiring this.

174. Policy 6.25. Applications for resource consent for discharges into air from industrial or trade activities or large scale fuel burning devices classified as discretionary shall address:

a. where the discharge includes PM_{10}, the mass emission rate of the proposed discharge relative to the total emission rate of all discharges within the Clean Air Zone; and the degree to which the proposed discharge exacerbates cumulative effects within the Clean Air Zone; and

b. localised effects of the proposed discharge and the location of sensitive receptors; and

c. available mitigation and emission control options; and

d. the duration of consent being sought and the practicability for the effects of the discharge to be reduced over time.

175. Policy 6.26. When considering applications for resource consent for the discharge of contaminants into air from large scale fuel burning devices or from industrial, trade or commercial activities, the CRC will consider the combined effect of all consented discharges into air occurring on the property.

176. Policy 6.28. Manage discharges of odour and dust from the storage, transfer, handling, treatment or disposal of liquid or solid waste, by ensuring that any discharges from those activities are appropriately located.

Comment: The site is located on industrial land, but is very close to dwellings. The applicant is proposing to reduce the effects on these dwellings, and on other industrial users, to acceptable levels.

Summary

177. I consider that generally, assuming the proposed modifications and upgrades function as anticipated, the application is consistent with these objectives and

policies. All going according to plan, a considerable improvement in air quality is anticipated by the application.

178. It does not appear that this has been the case under the existing operation of the plant.

PART 2 MATTERS

179. Under section 104(1) of the RMA, the consent authority must consider applications "subject to Part 2" of the Resource Management Act 1991 (RMA), specifically sections 5, 6, 7 and 8. The Court of Appeal has recently clarified how to approach the assessment of “subject to Part 2” in section 104(1). In *R J Davidson Family Trust v Marlborough District Council [2018] NZCA 316* the Court of Appeal found that (in summary):

a. Decision makers must consider Part 2 when making decisions on resource consent applications, where it is appropriate to do so. The extent to which Part 2 of the RMA should be referred to depends on the nature and content of the planning documents being considered.

b. Where the relevant planning documents have been prepared having regard to Part 2 of the RMA, and with a coherent set of policies designed to achieve clear environmental outcomes, consideration of Part 2 is not ultimately required. In this situation, the policies of these planning documents should be implemented by the consent authority. The consideration of Part 2 "would not add anything to the evaluative exercise" as "genuine consideration and application of relevant plan considerations may leave little room for Part 2 to influence the outcome". However, the consideration of Part 2 is not prevented, but Part 2 cannot be used to subvert a clearly relevant restriction or directive policy in a planning document.

c. Where it is unclear from the planning documents whether consent should be granted or refused, and the consent authority has to exercise a judgment, Part 2 should be considered.

d. If it appears that the relevant planning documents have not been prepared in a manner that reflects the provisions of Part 2, the consent authority is required to consider Part 2.

180. The CARP is an operative plan prepared in a manner that reflects the provisions of Part 2. Therefore, I am satisfied that the relevant regional plans give effect to the relevant provisions of the higher order instruments and I have not referred to them in my recommendation. On this basis, I have not resorted directly back to Part 2 when coming to my recommendation on this proposal.

OTHER RELEVANT MATTERS

181. Section 104(1)(c) of the RMA allows the Consent Authority to consider any other matter relevant and reasonably necessary to determine the application. Other matters that the hearing commissioner may wish to consider include:

- the Mahaanui Iwi Management Plan 2013
- decisions of the Environment Court and
- previous Council decisions.

The Mahaanui Iwi Management Plan

182. The Mahaanui Iwi Management Plan 2013 includes policies related to discharges to air and cultural amenity values. I have reviewed these and I consider that the application compiles with them, given the location of the site and the distance to applicable sites of significance to Ngai Tahu.

Decisions of the Environment Court

183. I am not aware of any directly relevant court decisions that may influence the granting of this consent. While court decisions related to industrial odours (including rendering plants and meat processing sites) are numerous, they are site and process-specific.

Previous council decisions

184. The Tegel site has distinctive characteristics and I am not aware of any similar existing consents for other sites that are useful in deciding this application. However, previous consents have been granted for this site for essentially the same process, and this application seeks to continue that operation with modifications to the site that are likely to substantially reduce adverse effects.

CONSIDERATION OF APPLICATION

Section 104

185. Section 104(1) of the RMA sets out what the consent authority must, subject to Part 2, have regard to when considering a resource consent application:

> *(1) When considering an application for a resource consent and any submissions received, the consent authority must, subject to Part 2, have regard to–*
> *(a) any actual and potential effects on the environment of allowing the activity; and*
> *(ab) any measure proposed or agreed to by the applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity; and*
> *(b)any relevant provisions of—*
> *(i) a national environmental standard:*
> *(ii) other regulations:*
> *(iii) a national policy statement:*
> *(iv) a New Zealand coastal policy statement:*
> *(v) a regional policy statement or proposed regional policy statement:*
> *(vi) a plan or proposed plan; and*
> *(c) any other matter the consent authority considers relevant and reasonably necessary to determine the application.*

186. These matters are all considered in the application and my review. None preclude granting the consent.

Section 104B

187. Section 104B states that:

> *After considering an application for a resource consent for a discretionary activity or non-complying activity, a consent authority—*
> *(a) may grant or refuse the application; and*
> *(b) if it grants the application, may impose conditions under section 108.*

188. I consider that given the conclusions of the assessment and my review, the application can be granted, and I have recommended conditions that can be found in Attachment 4 of this report.

Section 104D

189. Section 104D states that:

> *Despite any decision made for the purpose of notification in relation to adverse effects, a consent authority may grant a resource consent for a non-complying activity only if it is satisfied that either—*
>
> *(a) the adverse effects of the activity on the environment (other than any effect to which section 104(3)(a)(ii) applies) will be minor; or*
>
> *(b) the application is for an activity that will not be contrary to the objectives and policies of—*
>
> *(i) the relevant plan, if there is a plan but no proposed plan in respect of the activity; or*
>
> *(ii) the relevant proposed plan, if there is a proposed plan but no relevant plan in respect of the activity; or*
>
> *(iii) both the relevant plan and the relevant proposed plan, if there is both a plan and a proposed plan in respect of the activity.*

190. The application addresses this matter, stating that the assessment demonstrates that the potential adverse effects will be no more than minor, and that the proposal is not contrary to the applicable objectives and policies.

191. I consider that assuming the plant upgrades and modifications function as anticipated by the application, the adverse effects are likely to be minor and consistent with all applicable objectives and policies.

Section 105

192. Section 105 states that:

> *(1) If an application is for a discharge permit or coastal permit to do something that would contravene section 15 or section 15B, the consent authority must, in addition to the matters in section 104(1), have regard to—*
>
> *(a) the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and*
>
> *(b) the applicant's reasons for the proposed choice; and*
>
> *(c) any possible alternative methods of discharge, including discharge into any other receiving environment.*

193. These matters have all been considered in the application and my review, and none preclude granting the consent.

RECOMMENDATION

Overall recommendation

194. I recommend that this consent application be granted subject to the conditions in Attachment 4 or variations to them as agreed by the applicable parties.

Duration

195. The application is for a consent with a duration of 20 years.

196. In considering an adequate consent duration, I have had regard to the following factors developed through case law that are relevant to the determination of the duration of a resource consent:[2]

a. The duration of a resource consent should be decided in a manner which meets the RMA's purpose of sustainable management.

b. Whether adverse effects would be likely to increase or vary during the term of the consent.

c. Whether there is an expectation that new information regarding mitigation would become available during the term of the consent.

d. Whether the impact of the duration could hinder implementation of an integrated management plan (including a new plan).

e. That conditions may be imposed requiring adoption of the best practicable option, requiring supply of information relating to the exercise of the consent, and requiring observance of minimum standards of quality in the receiving environment.

f. Whether review conditions are able to control adverse effects (the extent of the review conditions proposed is also relevant bearing in mind that the power to impose them is not unlimited).

g. Whether the relevant plan addresses the question of the duration of a consent.

h. The life expectancy of the asset for which consents are sought.

i. Whether there was/is significant capital investment in the activity/asset.

j. Whether a particular period of duration would better achieve administrative efficiency.

197. I consider that the following main factors are key to a discussion of duration:

a. The site has been at this location for several decades and is well established, but subsequent development has constrained it physically. The application does not discuss the potential cost of moving the site but this is likely to be substantial.

b. The site is an odorous one and has had odour issues in the past, but the applicant is undertaking upgrades to address this. Assuming these upgrades are successful, odour emissions should be substantially reduced.

c. I am encouraging the applicant via a proposed BPO review condition to consider ongoing odour management over the life of the consent.

d. Other effects from the site are acceptable or better.

e. There is some uncertainty around the extent to which the PRP upgrades will result in other site odours becoming more apparent.

f. The applicable regional plan (the CARP) does not provide guidance on duration.

g. Air quality in the Christchurch Airshed is steadily improving but has not yet met the PM_{10} standard. Related to this, a change to the NESAQ is pending and this is likely to tighten the regulation of $PM_{2.5}$.

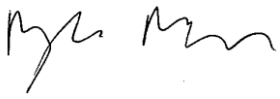
198. Overall, there are good arguments for and against the applicant's proposed duration. My view is that given the uncertainty around ongoing odour effects and the effectiveness of the PRP upgrades, that Tegel wishes to continue using boiler fuels that are not the cleanest of those currently widely-available, and that the site is

[2] *Ngati Rangi Trust v Genesis Power Ltd* [2009] NZRMA 312 (CA); *Genesis Power Ltd v Manawatu-Wanganui Regional Council* (2006) 12 ELRNZ 241, [2006] NZRMA 536 (HC); Royal Forest and Bird Protection Society of New Zealand Inc v Waikato Regional Council [2007] NZRMA 439 (EnvC); *Curador Trust v Northland Regional Council* EnvC A069/06.

located in a highly sensitive location, then a shorter duration is advisable. Therefore, I recommend a consent duration of ten years.

Recommended conditions

199. My recommended conditions are provided in Attachment 4. I anticipate discussion of these and consider them to be a starting point that could be modified depending on additional information or clarification provided by the applicant or other parties during the hearing.

Signed:  Date: 17 July 2020

Myles McCauley

Contract Consents Planner (Environmental Consultant, Enviser Limited)

Reviewer Signed:  Date: 17 July 2020

Bianca Sullivan

Contract Consents Planner (Director, Enviser Limited)

ATTACHMENT 1: APPLICANT'S SUMMMARY OF ODOUR EMISSION SOURCES

Source: Section 4.3 of the AQIA (April 2019)

4.3 Odour emissions

The site odour sources and the nature of the odour generated from each source the character and intensity are summarised in Table 4-2.

Table 4-2: Summary of poultry odour sources and types

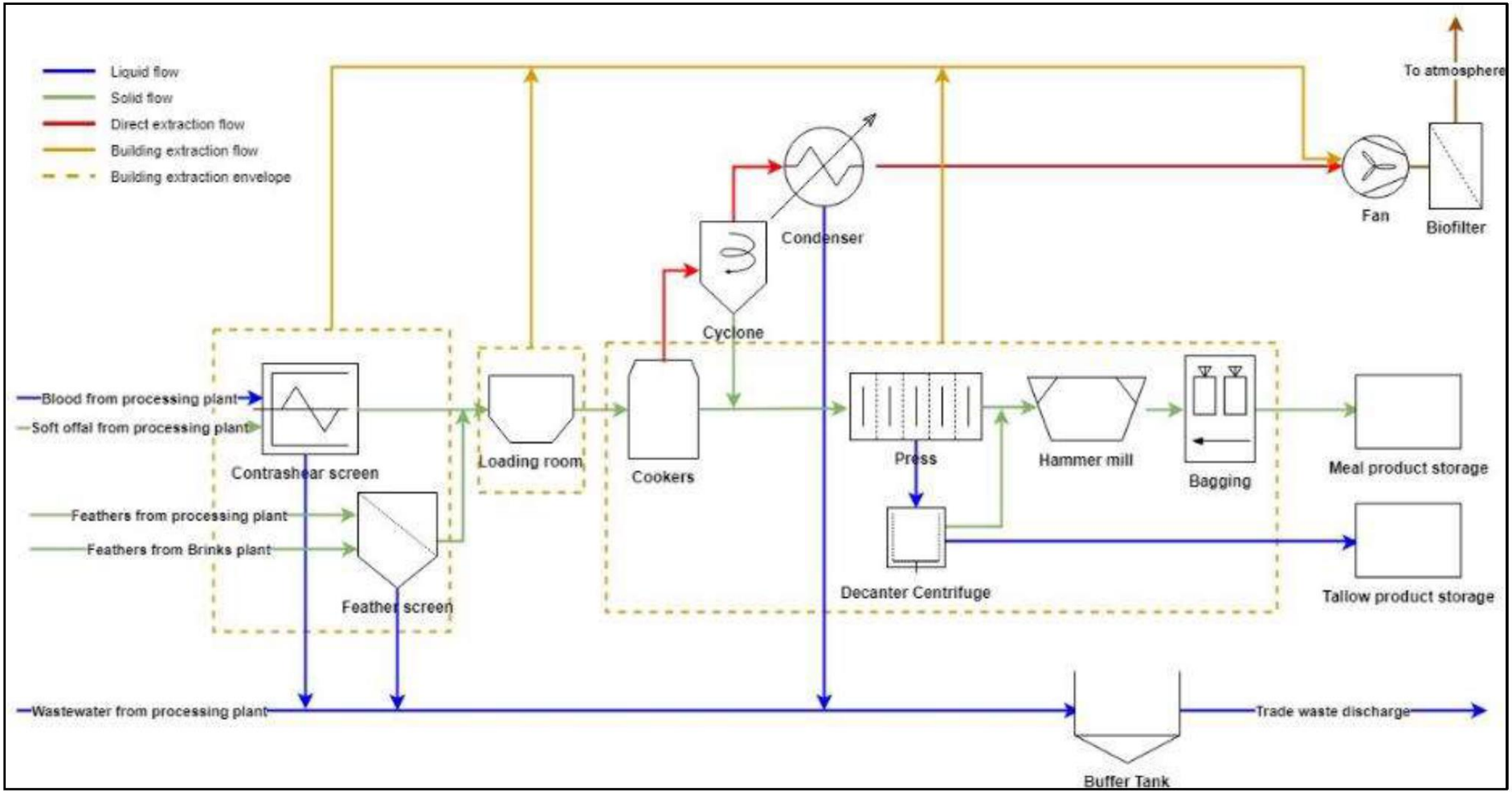
Sources	Associated odour types	Characterisation of odour generated
Bird receipt	Feather/bird type odour	Animal type odours such as those from the chickens have a moderately negative hedonic tone. This type of odour is likely to be of lower intensity than manure odour emitted from the sheds. Bird receipt is limited to primary processing period (1am to 4pm, Monday to Friday).
Scalding	Wet feather odour with potential for degradation to anaerobic odour	Wet feather type odours such as those from the chickens have a moderately negative hedonic tone. If organic matter in the scalders is allowed to degrade, anaerobic type odours have a strongly negative hedonic tone. Scalding is limited to primary processing period (5am to 4pm, Monday to Friday).
Processing plants	Sanitary chemicals/chlorine	The odour of chlorinated cleaning chemicals used to sanitise the plant can have a moderately negative hedonic tone. The intensity of these odour outside of the processing plant is generally likely to be low in most circumstances. Processing activities generally occur 5am to 6pm, Monday to Friday. Cleaning occurs in the evenings
Smokehouse	Smoked, cooked chicken odour.	Cooked meat can have a positive hedonic tone, conversely smoky odour can have a moderately negative hedonic tone. The smokehouse is operational for 16 hours per day, 5 ½ days per week. Four of the five ovens are capable of smoking. The duration of smoking phases averages 44 minutes of 3.5 hour cook time per smoking batch.
Waste storage and conveyance	Fresh blood/offal, wet feather if fresh. Degraded material can generate anaerobic odour (e.g. rancid, sewer).	Liquid waste is collected in sumps located at the processing plant and PRP and conveyed to the wastewater tank at the rear of the site prior to release to sewer (trade waste). In fresh form, the fresh blood/offal and wet feather type odours likely to be generated have a moderately negative hedonic tone and this type of odour is likely to be generated at low intensities. If waste is allowed to degrade, anaerobic type odours have a strongly negative hedonic tone and will be generated at a greater intensity. Wastewater activities are likely to occur 6 days a week (7 days if rendering occurs over 7 days).
PRP – biofilter emissions	Earthy odour from the biofilter. Potential	Treated odour emitted from the biofilter is likely to have an earthy character (moderately negative in tone) and be of a much lower intensity than untreated odour. Rendering occurs around the clock 6 days a week (7 days on occasion).
PRP – fugitive release from PRP building or	Fresh blood/offal and wet feather from raw materials. Cooked meat/offal.	Cooked meat can have a positive hedonic tone (e.g. when associated with barbeques or roast meat). However, burnt, overcooked and oily/fatty odour can trigger a moderately negative hedonic response and odour from rendering of degraded material will have a strongly negative hedonic tone. The intensity of odour generated from the cookers is generally of a strong intensity (in untreated form).

Sources	Associated odour types	Characterisation of odour generated
outdoor sources	Degraded material can generate anaerobic odour (e.g. rancid, cadaverous).	Fresh blood/offal and wet feather type odours have a moderately negative hedonic tone and are likely to be generated at a much lower intensity than cooking odour. If the material is allowed to degrade, anaerobic type odours have a strongly negative hedonic tone.
PRP – releases during upgrade implementation	PRP building odour (as described above)	PRP building odour could potentially be emitted during the implementation of the RPRP ventilation upgrade if the odour containment, ventilation and treatment system is not fully reinstated prior to recommencement of PRP operation. However, as noted in section 3.3.6, the upgrade is to be implemented in stages over weekend shutdown periods with full reinstatement of the system to be confirmed prior to recommencement of operation. As a result odour emissions during the implementation of the upgrade over weekend shutdown periods is unlikely.

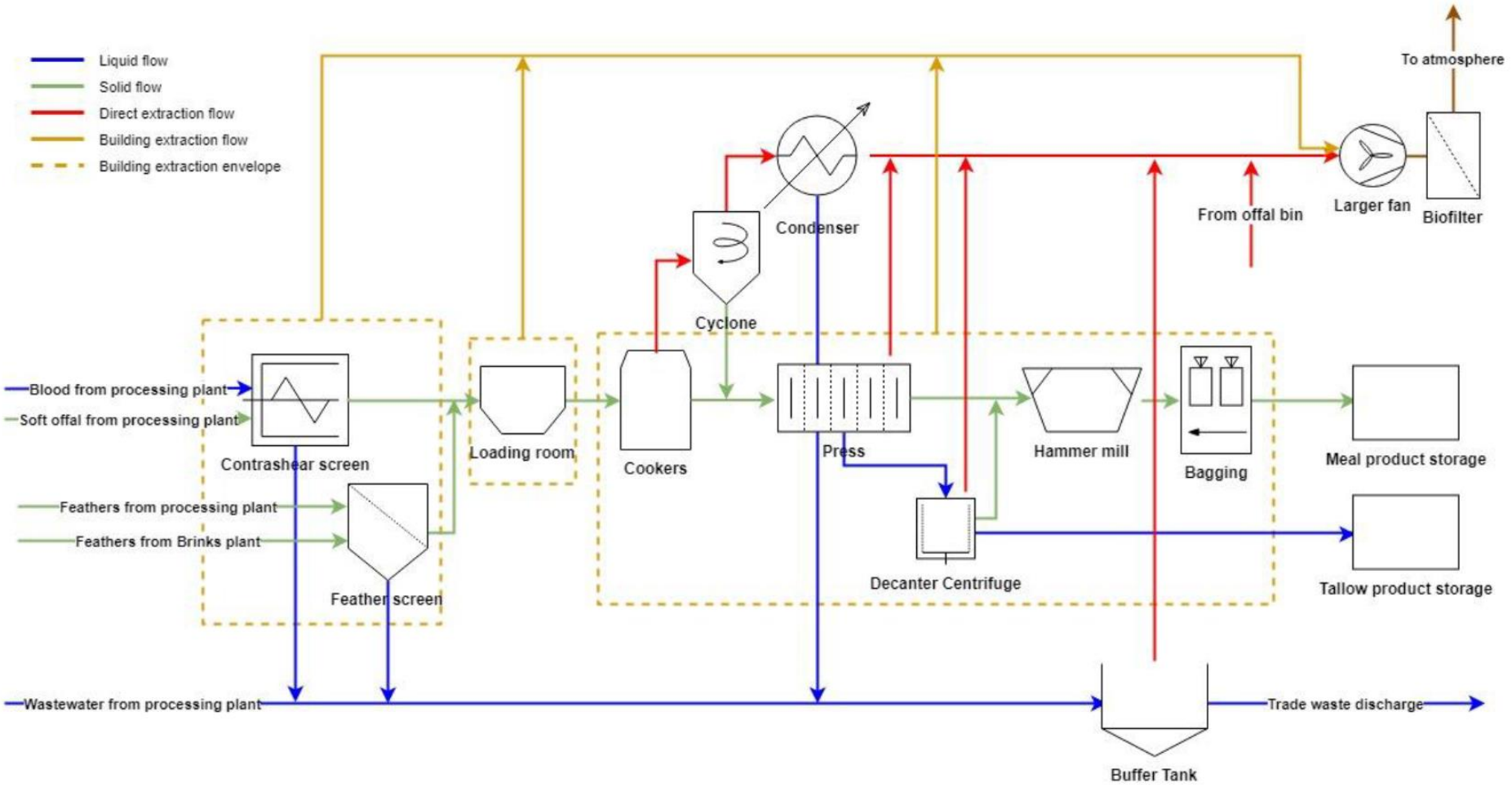
Overall, there are a variety of odour sources located in different parts of the site. Due to the potential intensity of odour generated from rendering activities at the PRP, this odour source represents the main risk of odour nuisance on site.

The proposed improvements to the management of odour should lead to an overall decrease in the frequency, duration and intensity of the odour.

ATTACHMENT 2: EXISTING AND PROPOSED PRP CONFIGURATIONS



Attachment 2A: Existing PRP process flow, air extraction and liquid extraction (Figure 3-2 from Air Quality Assessment).



Attachment 2B: Proposed PRP process flow, air extraction and liquid extraction (From Tonkin and Taylor letter to Environment Canterbury, 7 October 2019)

ATTACHMENT 3: SECTION 42A REPORT OF MR DARYL IRVINE

Before the Commissioners appointed by the Canterbury Regional Council

IN THE MATTER OF	The Resource Management Act 1991
AND	
IN THE MATTER OF	Application CRC194459 by Tegel Foods Limited, to discharge contaminants to air

Section 42A Officer's Report

Report of Daryl Davidson Irvine, Pattle Delamore Partners Limited

Hearing commences: 12 August 2020

1. My name is Daryl Davidson Irvine. I am employed by Pattle Delamore Partners Limited and have been engaged by Environment Canterbury to prepare this section 42A report.

2. I have worked in the environmental engineering field since 2000, and I have been providing operational advice to the meat and by-products industry since 2005, on wastewater treatment aspects and odour treatment aspects.

3. I have prepared this report to provide a technical audit of proposed odour management system modifications within the Tegel Foods Limited (Tegel) protein recovery plant at 112 Carmen Rd, Christchurch.

4. This report provides the decision-maker with information and advice limited to:

    a. Assessment of the proposed modifications to the plant's odour extraction and treatment system;

    b. Assessment of the proposed biofilter design, and assessment as to whether the proposed operation of the biofilter meets good practice; and,

    c. Assessment of the proposed modifications as to the likely effectiveness of odour mitigation and treatment.

5. My technical audit has been conducted based on information provided in the application document and associated assessment of environmental effects (Tonkin and Taylor 2019) and a subsequent response to a request for further information (Tonkin and Taylor, Oct 2019). A site visit has not been conducted to verify the information.

6. I have read the Code of Conduct for Expert Witnesses in giving evidence to the Environment Court. I agree to comply with that code when giving evidence to the Hearing Panel in this matter. All my evidence is within my expertise and I have considered and stated all material facts known to me which might alter or qualify the opinions I express.

PRP EXTRACTION SYSTEM AND ASSESSMENT OF PROPOSED MODIFICATIONS

7. The existing protein recovery plant (PRP) utilises building air extraction and point source extraction (Condenser only), with extraction via a single 7.4 m^3/s fan to a biofilter.

8. The applicant has identified odour from the PRP to have the potential to cause a more than minor effect for receptors, with key odour sources identified as follows (refer to Table 7-4 from the application):

    a. *"The cookers are the main potential odour source within the PRP and their effective direct extraction via the condenser is therefore likely to help minimise fugitive odour releases."*

    b. *"Air directly extracted or extracted via hood from additional hot sources that may also generate odour such as the press and decanter centrifuge would also help minimise fugitive releases."*

    c. *"Containment and extraction of air from the building provides an important means of maintaining negative pressure conditions in the building and providing secondary containment of residual odour not captured by direct extraction from process sources."*

    d. *"Under the current configuration in hot ambient weather conditions high internal building temperatures mean that containment is not able to be completely maintained (e.g. external doors are left open), which reduces the ability for negative pressure conditions to be maintained. Odour observations have indicated that fugitive releases from the building are the likely cause of elevated odour intensities in adjacent areas."*

    e. *"The complaint record indicates that the condenser is unable to treat the exhaust from more than one cooker reaching completion simultaneously. Scheduling of cooker cycles is therefore managed to avoid simultaneous completion of cooking phases."*

9. In order to minimise potential for release of odour, the applicant proposed to install the following modification/upgrades:

    a. Install point source extraction from the press, decanter centrifuge, wastewater buffer tank, and offal bin (in addition to the existing extraction from the cookers) and,

    b. Increase overall extraction from the plant, including point source and building air extraction, from the existing 7.4 m^3/s to 12.6 m^3/s.

10. A double barrier approach, with both point source extraction and building air extraction is a good approach to managing rendering plant odour sources, where receptors are in close proximity.

11. I am satisfied that the Applicant has targeted key hot source and high odour areas for point source extraction.

12. The Applicant has outlined that the proposed increase in air extraction will include building air extraction ranging 14.4 building volumes per hour to 25 building volumes per hour (refer to Table 1 of the Section 92 response letter from Tonkin and Taylor dated 7 October 2019). As a general rule, building air extraction is sized to provide between 6 and 12 building air volumes per hour. This is based on sewer pump station applications (Watercare Services Limited Wastewater Reticulation Design Guidelines).

13. The Applicant has outlined that doors being left open is a potential odour source, and the applicant proposes to maintain doors closed at all times when the plant is operating. This is an essential requirement to maintaining negative pressure in a building air extraction system. An exception to this requirement has been made, for when the air temperature within the building exceeds 35 °C, which could result in discomfort for operators. Under these circumstances, the Applicant has outlined that the Team Leader will work with the EHS manager to develop a solution. I note that

a 35 °C temperature internal to a rendering plant building can be a frequent occurrence and a solution needs to be developed that does not include opening of doors that will allow odorous air to escape,

14. The Applicant has identified that the existing condenser is unable to manage exhaust from more than one cooker and that the discharge of uncondensed air is a potential odour source. The applicant has identified that automated scheduling will help overcome this issue.

15. Good building cladding is essential to the efficient operation of building air extraction systems. It is therefore important that the Applicant maintains the integrity of the building cladding, sealing up any gaps where necessary, to minimise fugitive emissions.

ASSESSMENT OF PROPOSED BIOFILTER MODIFICATIONS

16. Following renewal of the discharge to air consent, Tegel proposes to amend the biofilter system as follows:

    a. Increase air extraction rates from the onsite protein recovery plant for treatment in a biofilter, from 7.4 m^3/s to 12.6 m^3/s, as discussed previously;

    b. Decrease the combined biofilter bed volume from 1,824 m^3 to 1,395 m^3

    c. Amend the media in the new biofilter to consist of 20-40 mm bark with 5% soil content;

    d. Temporarily decrease the biofilter bed volume 912 m^3 while the new biofilter is constructed;

    e. Modify the air distribution system in the biofilter, from manifold pipes to a distribution plenum;

    f. Improve leachate collection, moisture control and provide for easier biofilter maintenance, however, how these items are achieved is not made clear.

17. The justification for decreasing the biofilter size has not been defined, however, it is assumed that this is to free up space within the plant area. The proposed increase in extraction rate is driven by the intention of improved odour management within the PRP.

18. While the proposed increase in air extraction may help decrease the odour risk from the PRP, it is important that the biofilter treatment system is modified and managed to facilitate the increase in air extraction rates, particularly given the close locality of the biofilter to the site boundary.

19. The proposal to increase the air extraction rate and decrease the biofilter size will result in a decrease in empty bed residence time (EBRT) from 246 s (currently) to 111 s. This is a significant reduction in residence time and needs to be considered in relation to not only guideline EBRT but to what also utilised by other rendering plants, particularly those in close proximity to neighbours.

20. The proposed EBRT of 111 s is at the lower end of the scale for rendering plant biofilter applications[1] (90s – 1000s). However, the proposed loading rate is similar to a design loading rate of 35 m^3 per cubic metre of media per hour, utilised at a service rendering plant, also in close proximity to neighbours. I have observed operation of the example biofilter on numerous occasions and it performs well when

[1] Luo J., van Oostrom, A., 1995; '*Odour Control Using Biofilters - A Survey Report*'; MIRINZ Publ. No. 960. (source from *Manual for Wastewater Odour Management*, NZWWA 2000 2nd Ed.)

it is maintained appropriately. In addition, pilot trials[2] suggest that the proposed decrease in EBRT may result in a 1-5% reduction in odour removal performance depending on biofilter media.

21. It is unclear from the Tonkin and Taylor letter as to whether the extraction rate will be increased prior to construction of the new biofilter. It is recommended that while only one of the existing biofilters is operational that the extraction rate is maintained at approximately 7.4 m^3/s until the new biofilter is in place. Even at this rate the EBRT is reduced to approximately 80 s.

22. The proposed biofilter media of 20 – 40 mm bark and 5% soil is quite coarse, with a minimal amount of fines. The coarse nature of the media and low level of fines will potentially result in reduced treatment performance and reduced ability to maintain sufficient moisture levels. It is recommended that either the grade of bark is decreased to a fine bark, and/or the levels of fines are increased with a greater portion of soil, for both odour removal performance and moisture management.

23. When developing the new biofilter media, it is recommended that a portion of the existing biofilter media is incorporated into the new media, to both seed the biofilter and to provide additional fines. It is noted that PDP has not inspected the existing media so it is assumed that the existing media contains a sufficient level of fines for this to be of benefit.

24. Without a specific design around the proposed plenum distribution system, PDP cannot provide a review of this proposed distribution system.

25. The applicant has detailed that continuous temperature, pressure and moisture content monitoring is conducted in the biofilter and that monthly pH monitoring is conducted. The Applicant has indicated agreement with the following operating parameters:

    a. Temperature: generally < 40 degrees Celsius;

    b. pH: >5, <9; and,

    c. Moisture content: >30%, <70%.

26. The applicant has indicated that a pressure drop across the biofilter of 150mm WG is achievable though 100mm WG is commonly utilised as an upper limit for bed pressure drop. As such, I recommend that both the inlet air pressure and the bed pressure are monitored, with the following upper limits:

    a. Inlet air pressure (compared with atmosphere) <150 mm WG;

    b. Bed pressure drop: < 100 mm WG (sampled from the distribution media);

27. It is essential that the biofilter media moisture levels are maintained at all times. It is recommended that moisture spray is included in the inlet air stream, and/or automated irrigation is applied to the biofilter surface, based on continuous moisture monitoring.

CONCLUSIONS ON ODOUR REDUCTION POTENTIAL

28. Based on the proposed system modifications, the Applicant has indicated that the nuisance odour should be mitigated and for odour dispersion calculations, the Applicant has assumed an 80% reduction to odour emissions and a 95% level of treatment through the biofilter.

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[2] Luo J., van Oostrom, A., 1997; *Biofilters for controlling animal rendering odour – A Pilot Scale Study*, Meat Industry Research Institute of New Zealand

29. Based on my desk review, it is not possible to accurately ascertain the level of reduction in odour emissions that will be achieved from proposed works, however, based on the information presented by the applicant, the following summary has been provided:

30. Data presented by the applicant has identified that there has been a general reduction in odour complaints, however, based on an odour survey the Applicant has indicated that odours are still being produced from the site, to a level where it will potentially have a more than minor effect.

31. The Applicant has not provided details of the nature of the odours of which odour complaints have been made, other than a 2014 event which was associated with excess cooker emissions, beyond the condenser capacity. From the odour survey, the applicant has identified that the odour is primarily from the PRP but is also identified some odour generation from the bird receival area. The odour assessment does not identify the odour sources within the PRP but suggests a strong rendering type odour "(render, meat, burnt etc)". This would suggest that the odour is primarily from cooking processes and/or condensate systems.

32. The applicant has proposed an increase to extraction rates and additional point source extraction, and automated scheduling of the cookers to avoid overloading of the condenser. Based on the description of the 2014 odour complaints and the targeted approach to increasing point source extraction and building air extraction, it is concluded that there will likely be a reduction in odour emissions from the rendering system and building. It is noted that the bird receival area is excluded from this assessment, which is my understanding that it is outside the scope of this assessment.

33. The proposal to decrease the size of the biofilter while increasing the rate of air entering the biofilter will result in a significant increase in the loading rate per cubic metre of media in the biofilter. However, provided that the proposed media has a larger portion of fines (than currently proposed) and the proposed biofilter operating parameters are maintained, then the overall performance of the biofilter may only be reduced by 5% compared with the existing loading rate.

34. Overall, comparing the improvements to air extraction within the PRP, with the increase in loading rate on the biofilter, it is concluded that the risk of odour release from the overall rendering plant (including the biofilter) will likely decrease as I consider the improvements in air extractions system will outweigh the slight reduction in performance of the biofilter.

Signed: _____ Date: 17 July 2020

Name: Daryl Irvine
Technical Director – Air Quality, Pattle Delamore Partners

ATTACHMENT 4: RECOMMENDED CONSENT CONDITIONS

1. The discharges shall be only:
   a. Odour from the processing and cooking of poultry, the rendering of by-products and the storage and conveyance of wastewater;
   b. Combustion products from boilers fuelled on diesel oil, light fuel oil, reprocessed oil or liquefied petroleum gas; and
   c. Smoke and odour from meat smokehouses;

   located at 112 Carmen Road, legally described as Section 27 Survey Office Plan 459717, at or about map reference NZTM 1562227, 5179717, as shown on Plan CRC194459A, attached to and forming part of this consent.

2. A maximum of 75,000 chickens and 5,000 turkeys shall be processed per day.

3. The discharges shall not cause odour or the deposition of particulate matter that is noxious, dangerous, objectionable or offensive beyond the boundary of the property on which the consent is exercised.

4. The boilers shall have a combined maximum heat output of 6.7 megawatts, configured as follows:
   a. One boiler with a maximum heat output of 2.3 megawatts, in the front boiler house; and
   b. A maximum of four boilers with a maximum combined heat output of 4.4 megawatts, in the rear boiler house;

   as shown on Plan CRC194459B, attached to and forming part of this consent.

5. The sulphur content of fuel burnt in the boilers shall not exceed 0.5 percent by weight.

6. The reprocessed oil burnt in the boilers shall comply with the following specifications:
   a. Lead 100 parts per million maximum;
   b. Arsenic 5 parts per million maximum;
   c. Cadmium 2 parts per million maximum;
   d. Chromium 10 parts per million maximum;
   e. Total halogen content 1,000 parts per million maximum (no polychlorinated biphenyls allowed); and
   f. Flash point 60 degrees Celsius minimum.

7. The discharges from the boilers shall occur:
   a. From the front boiler house, via a single stack at a height of 19 metres above local ground level;
   b. From the rear boiler house, via a single stack at a height of 22 metres above local ground level; and
   c. From both stacks, directed vertically into air and not impeded by any obstruction above the chimney stacks which decreases the vertical efflux velocity.

8. The efflux velocity of the exhaust gas from the boiler stacks, when the boilers are operating at 100 percent of their maximum continuous ratings, shall be not less than:
   a. 16 metres per second from the front boiler house stack; and
   b. 18 metres per second from the rear boiler house stack.

9. Particulate matter with an equivalent aerodynamic diameter of ten microns or less (PM_{10}) shall not exceed:
   a. A concentration in either boiler stack of 250 milligrams per cubic metre (corrected to 0 degrees, dry gas, 1 atm and 12 percent carbon dioxide); and

b. A mass emission rate of 0.2 grams per second (0.72 kilograms per hour) in the discharge from the front boiler house; and
c. A mass emission rate of 0.4 grams per second (1.44 kilograms per hour) in the discharge from the rear boiler house.

10. The concentration and mass emission of PM_{10} in the combustion gas discharged from each of the boiler stacks shall be measured in accordance with the following:
    a. The test shall be undertaken at least once every 12 months. The results shall be expressed as the average of at least three measurements.
    b. Each test shall comprise three measurements and shall be undertaken as far as practicable when the boiler plant is operating at greater than 70 percent of the peak operating load or at the maximum safe load that can be maintained throughout the testing period.
    c. Particulate concentration results shall be adjusted to zero degrees Celsius, 101.3 kilopascals and 12 percent carbon dioxide by volume on a dry gas basis and mass emission results shall be expressed as grams per second and/or kilograms per hour.
    d. The consent holder shall record the plant's operational steam load or fuel usage rate during the tests.
    e. The method of monitoring shall comply with US EPA Method 201A or an equivalent method as agreed by the Consent Authority.
    f. Tests are to be designed and carried out by an appropriately qualified and independent person (i.e. holding ISO 17025 accreditation and with accreditation for the test methods from IANZ or an equivalent body).
    g. The results of the analysis, including a description of the method used, the rate of fuel consumption during testing and any assumptions made, shall be provided to the Canterbury Regional Council, Attention: Regional Leader – Monitoring and Compliance, within 20 working days of the date of testing.

11. The boilers and any associated emission control systems shall be maintained in accordance with the manufacturers' instructions by a person(s) competent in the maintenance of such appliances. The maintenance shall include as appropriate:
    a. ash removal;
    b. adjustment, if necessary, of the fuel to air ratio; and
    c. testing of the ratio of combustion gases discharged, i.e. carbon monoxide, carbon dioxide and oxygen.

    Maintenance reports shall be prepared and copies shall be provided to the Canterbury Regional Council on request

12. The consent holder shall keep a record of the amount, type and sulphur content of fuel used each month in each boiler. The record shall be provided to the Canterbury Regional Council on request.

13. The opacity of the emissions from the boiler stacks shall not be darker than Ringelmann Shade 1 as described in New Zealand Standard 5201:1973; except:
    a. In the case of a cold start for a period not exceeding 30 minutes in the first hour of operation; and
    b. For a period not exceeding a total of four minutes in each succeeding hour of operation;
    c. For a period not exceeding two minutes continuously, in each succeeding hour of operation
    d. During the first 60 minutes of start-up and during shut down.

14. The discharge to air from chicken scalding shall be via two stacks, each with a height of 18 metres above local ground level.

15. Odorous air from the protein recovery plant and wastewater balance tank shall be extracted and conveyed to a soil-bark biofilter. The extraction system shall operate at all times during operation of the protein recovery plant, and the rate and method of extraction shall be sufficient to ensure that the protein recovery plant building is held in a state of negative pressure at all times.

16. All doors and windows on the protein recovery plant shall be kept closed to the maximum practicable extent.

17. The extraction of air from the protein recovery plant and wastewater balance tank shall be in accordance with Plan CRC194459C, attached to and forming part of this consent.

18. The wastewater system shall be operated to ensure that the wastewater does not become anaerobic at any stage of its storage, conveyance or discharge off site.

19. The biofilter shall be operated and maintained such that the following parameters are complied with:
    a. A minimum media volume of 1,395 cubic metres;
    b. A minimum empty bed residence time of 111 seconds;
    c. A minimum fine bark or soil content of 30 percent;
    d. A maximum inlet temperature of 40 degrees Celsius;
    e. A maximum pressure drop across the biofilter plenum of 100 millimetres water gauge;
    f. A media pH between 5 and 9; and
    g. A moisture content between 30 percent and 70 percent.

20. The following biofilter parameters shall be measured and recorded:
    a. The pressure drop and pH once per month;
    b. Moisture, inlet air temperature and inlet air pressure continuously.

    The records shall be kept and provided to the Canterbury Regional Council on request;

21. All raw material to be processed at the protein recovery plant shall be:
    a. Only by products from the processing of poultry; and
    b. Stored in sealed bins and processed within 24 hours of its production.

22. All incoming loads of raw material for processing at the protein recovery plant shall:
    a. be inspected prior to receipt; and
    b. Shall not be accepted if they cannot be processed within 24 hours of being produced, and/or are excessively odorous in comparison with a normal load received from that source.

23. Once per day when the site is in operation including the protein recovery plant, the consent holder shall undertake a site boundary odour assessment at a downwind location in general accordance with the Verein Deutscher Ingenieure [VDI] method 3940.

24. The results of the assessments made in compliance with condition 23 shall be recorded and kept at the site and:
    a. Be summarised in a report that is provided to the Canterbury Council at the end of March and September every year; and
    b. provided to the Canterbury Regional Council on request.

25. The report provided in compliance with condition 24a shall include but be not limited to:
    a. A statistical summary of the results of the surveys and a discussion of this;
    b. A discussion of compliance with the applicable conditions of this resource consent;
    c. Whether any events occurred that were offensive or objectionable, and the reasons for them;
    d. Any other notable odour events and the reasons for them; and
    e. Whether any events occurred that could be correlated with complaints made either to the consent holder or to Environment Canterbury.

26. If a site boundary odour assessment undertaken in accordance with condition 23 identifies that an odour event is occurring that would be classified as offensive or objectionable, the consent holder shall immediately take all practicable steps to identify the source of the odour and rectify the problem, and shall report the incident to the Canterbury Regional Council, Attention: Regional Leader - Monitoring and Compliance as soon as practicable and no later than two hours following the initial observation of the odour event.

27. The operation of the site shall be in accordance with an Air Discharge Management Plan, which shall include but be not limited to:
    a. A description of all odour sources;
    b. A description of all odour mitigation practices and associated operation, management and maintenance;
    c. Managing raw material quality, including that from off-site sources;
    d. Operation and management of the bird receipt area including cleaning, stock management, temperature control and ventilation;
    e. Operation and management of the protein recovery plant extraction system and the biofilter;
    f. The management of cooking cycles to avoid overloading of the condensers;
    g. Alternative arrangements in the event of loss of operation of the protein recovery plant;
    h. Boiler operation, servicing and maintenance;
    i. Wastewater system operation and cleaning;
    j. Contingency situations and responses; and
    k. Monitoring required by this resource consent.

28. The consent holder shall, at five-yearly intervals, undertake an assessment of the best practicable option for the control of odour from the site. The assessment shall:
    a. Summarise the current practices for odour control from processes of the type undertaken at the site;
    b. Account for the sensitivity of the receiving environment and odour effects being created by the site at that time;
    c. Indicate whether, on consideration of factors including but not limited to the effects from the site that are occurring at that time, the effectiveness of the mitigation alternatives, their applicability to the site, and their cost, the practices are the best practicable option for the site;
    d. Indicate, if new practices are considered to be best practicable option and required at the site, the consent holder's strategy for implementing them; and
    e. Be provided to the Canterbury Regional Council, Attention: Regional Leader - Monitoring and Compliance not later than five, ten and fifteen years following the commencement of this resource consent.

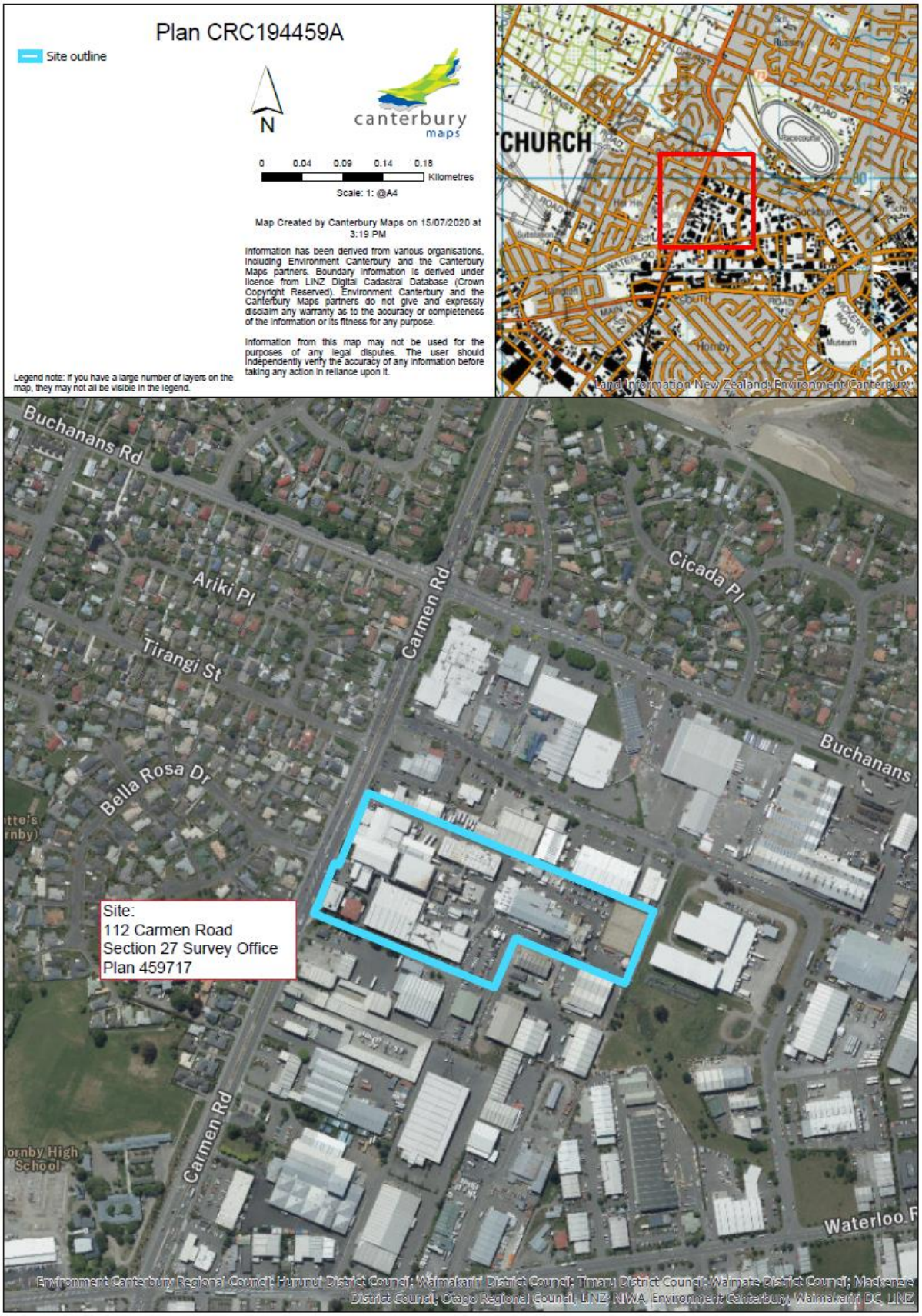
29. A record of all complaints relating to odour or particulate matter caused by the discharge shall be maintained, and shall include:
    a. The location where the odour or particulate matter was detected by the complainant;
    b. The date and time when the odour or particulate matter was detected;

c. A description of the wind speed and wind direction when the odour or particulate matter was detected by the complainant; and
d. The most likely cause of the odour or particulate matter detected and steps taken to address the cause(s).

A copy of the record shall be provided to the Canterbury Regional Council, Attention: Regional Leader - Monitoring and Compliance, within 10 working days of a complaint received by the consent holder, or otherwise on request.

30. The Canterbury Regional Council may, on the last five working days of March or November each year, serve notice of its intention to review the conditions of this consent for the purposes of:
    a. Dealing with any adverse effect on the environment which may arise from the exercise of the consent; or
    b. Requiring the adoption of the best practicable option to remove or reduce any adverse effect on the environment.

31. The lapsing date for the purposes of Section 125 of the Resource Management Act 1991 shall be 31 December 2025.


Plan CRC194459A
Site outline
N
canterbury maps
0 0.04 0.09 0.14 0.18
Kilometres
Scale: 1: @A4
Map Created by Canterbury Maps on 15/07/2020 at 3:19 PM
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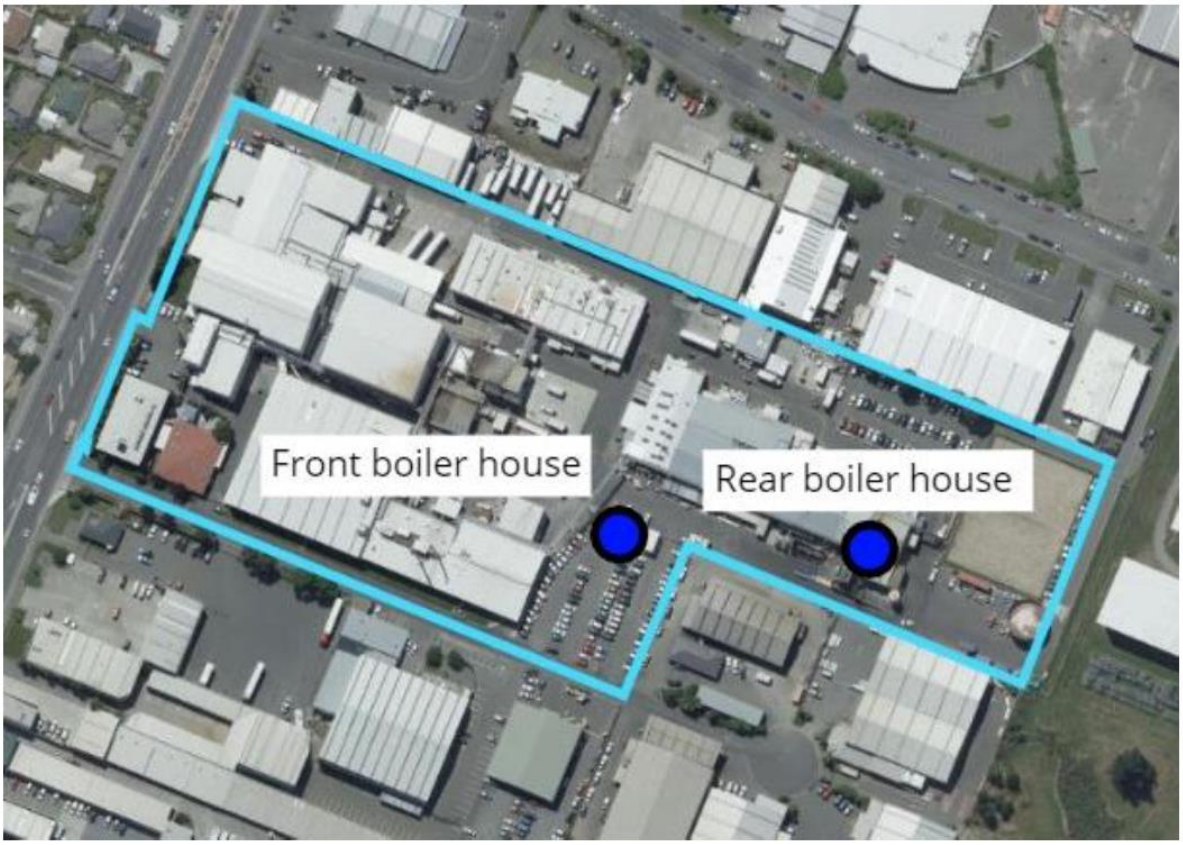
CHURCH
Land Information New Zealand | Environment Canterbury
Buchanans Rd
Ariki Pl
Tirangi St
Carmen Rd
Cicada Pl
Bella Rosa Dr
Buchanans
Site:
112 Carmen Road
Section 27 Survey Office
Plan 459717
Carmen Rd
Waterloo R
Environment Canterbury Regional Council; Hurunui District Council; Waimakariri District Council; Timaru District Council; Waimate District Council; Mackenzie District Council; Otago Regional Council; LINZ; NIWA, Environment Canterbury, Waimakariri DC, LINZ

Plan CRC194459B



Plan CRC194459C