



Determination 2021/006

Compliance with Building Code Clause G13 Foul water of an effluent field that is part of a domestic foul water treatment system at 17 Rua Road, Mangawhai

Summary

This determination considers the compliance with Building Code Clause G13 Foul water of an effluent field that is part of a domestic foul water treatment system. The determination discusses the slope, stability and size of the disposal field.

1. The matter to be determined

- 1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004¹ (“the Act”) made under due authorisation by me, Katie Gordon, National Manager Determinations, Ministry of Business, Innovation and Employment (“the Ministry”), for and on behalf of the Chief Executive of the Ministry.
- 1.2 The parties to the determination are:
 - Kaipara District Council (“the authority”), carrying out its duties as a territorial authority or building consent authority, and who applied for the determination
 - R and C Hill, the owners of the property (“the owners”).
- 1.3 I consider the following to be persons with an interest in this determination:
 - the design and installation company responsible for the foul water treatment system (“the wastewater company”)
 - the owner of an adjacent property at No. 21 Rua Road (“the neighbour”).
- 1.4 The determination concerns an effluent field which is part of the owners’ on-site foul water treatment system and which has been installed on land sloping down towards the neighbour’s property. The neighbour has complained repeatedly about the effluent field’s performance and raised various issues associated with its location.
- 1.5 The authority issued a building consent for the owner’s new house, including the foul water treatment system, and also issued a code compliance certificate for the completed building work. However, the authority now questions its previous view that the effluent field complies with Clause G13 Foul water².
- 1.6 Accordingly, the matter to be determined³ is whether the effluent field as designed and installed complies with the relevant requirements of Building Code Clause G13.

¹ The Building Act and Building Code (Schedule 1 of the Building Regulations 1992) are available at www.legislation.govt.nz. Information about the legislation, as well as past determinations, compliance documents and guidance issued by the Ministry, is available at www.building.govt.nz.

² In this determination references to sections are to sections of the Act and references to clauses are to clauses of the Building Code.

³ Under section 177(1)(a) of the Act.

1.7 In making my decision I have considered the submissions of the parties and persons with an interest, the report of the independent wastewater expert commissioned by the Ministry to advise on this dispute (“the expert”), and the other evidence in this matter.

1.8 Appendix A contains extracts from the legislation and Appendix B contains details from a review commissioned by the authority and also from the expert’s report.

1.9 Matters outside this determination

1.9.1 As the authority has limited its application to the effluent field’s compliance with Clause G13, this determination does not consider the field’s compliance with any other Building Code clauses. Further, the determination does not consider the compliance of any other components of the foul water treatment system apart from those directly associated with the effluent field (i.e. those installed and working together on the part of the owners’ property where the field is located), or the compliance of any other building work covered by the building consent.

1.9.2 I note that determinations can consider matters of Building Code compliance and decisions of an authority⁴ but cannot consider issues outside the scope of section 177, such as issues associated with liability or other civil disputes.

1.10 Key terms

1.10.1 The following terms are used in this determination:

foul water – this term is defined in Clause A2 of the Building Code as the discharge from any sanitary fixtures or sanitary appliances

wastewater – this term is not defined in the Act or the Building Code but may be used to mean foul water⁵, or in some Standards such as *Australian / New Zealand Standard AS/NZS 1547:2012: On-site domestic wastewater management* (which is frequently referenced in this determination) to mean foul water plus other water disposed of from a house

foul water treatment system – the entire system for the treatment and dispersal of foul water from the owners’ house, including the effluent field

effluent field – the land-based disposal bed for the owners’ foul water treatment system and associated components such as dripper lines, as described in paragraphs 2.3.1 to 2.3.3. Also referred to as the LPED⁶ land disposal area, dispersal field or irrigation field.

2. The building work

2.1 The property

2.1.1 The owners’ property (Lot 13, DP 335816) is at 17 Rua Road, Mangawhai, which was part of a subdivision of former farmland into 18 lots (refer to Figure 1). It is an irregularly shaped property with an area of about 1.15ha and road access via a shared driveway. To the north is a bush-clad area jointly owned by seven properties in the same subdivision. A right of way (“the path”) provides access to the shared bush area

⁴ In this case, the matter for determination is confined to the effluent field’s compliance with Clause G13. This determination does not consider the authority’s decisions in relation to the building consent or code compliance certificate for the work.

⁵ Refer to the Ministry’s website www.building.govt.nz “Onsite disposal of wastewater”.

⁶ Low Pressure Effluent Distribution

and runs along the owners' eastern boundary.

- 2.1.2 The neighbour's property (Lot 12) is at 21 Rua Road, northeast of the owners' property and on the other side of the path.

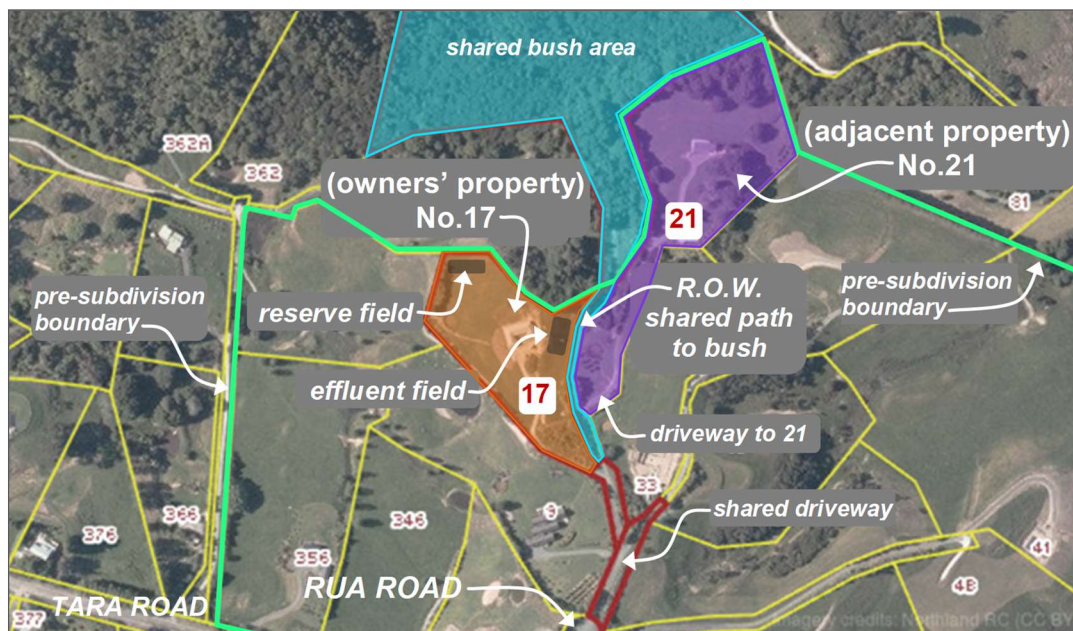


Figure 1: The property

- 2.1.3 Aspects of the original site and surrounding land are described in a geotechnical report of 18 June 1998 (“the 1998 geotechnical report”) prepared by a geotechnical engineering firm (“the geotechnical engineers”) to support a resource consent application⁷ for the original subdivision. In describing the whole area of the subdivision this report said “both the elevated and low lying land have large areas with very gentle gradients, but steep slopes occur around the northern and eastern sides of the central ridges and in the central gully”.
- 2.1.4 The 1998 geotechnical report also said there was “evidence of previous instability”:
- A fairly large, semi-circular old slump basin exists in the north-west part of the subdivision covering part of Lots 11, 12 and 13. Active instability is occurring on the eastern side of this feature, above an existing farm track which leads down to Lot 12.

2.2 The foul water treatment system

- 2.2.1 The owners' house is a three-bedroom, single-level dwelling constructed in 2016. The owners' on-site foul water treatment system is one of a range of systems designed, manufactured and installed by a local company (“the wastewater company”).
- 2.2.2 In essence, the on-site foul water treatment system operates as follows:
- Wastewater from the toilet and kitchen sink goes into a composting type treatment tank.
 - The output from this tank is mixed with wastewater from the laundry and bathroom in a “dose tank” for further treatment involving settlement and filtration.

⁷ Under the Resource Management Act 1991

- From there, the treated effluent is discharged to a land-based disposal area (“the effluent field”). This comprises a LPED pipe network which operates by flooding inverted nested lateral pipes (“dripper lines”) via spaced perforations. The concept is to wet the topsoil and maximise evapotranspiration⁸ helped by plant growth.

2.2.3 Figure 2 shows details of the owner’s foul water treatment system including the effluent field. This figure also indicates approximate contours and areas of previous instability as identified in the 1998 geotechnical report.

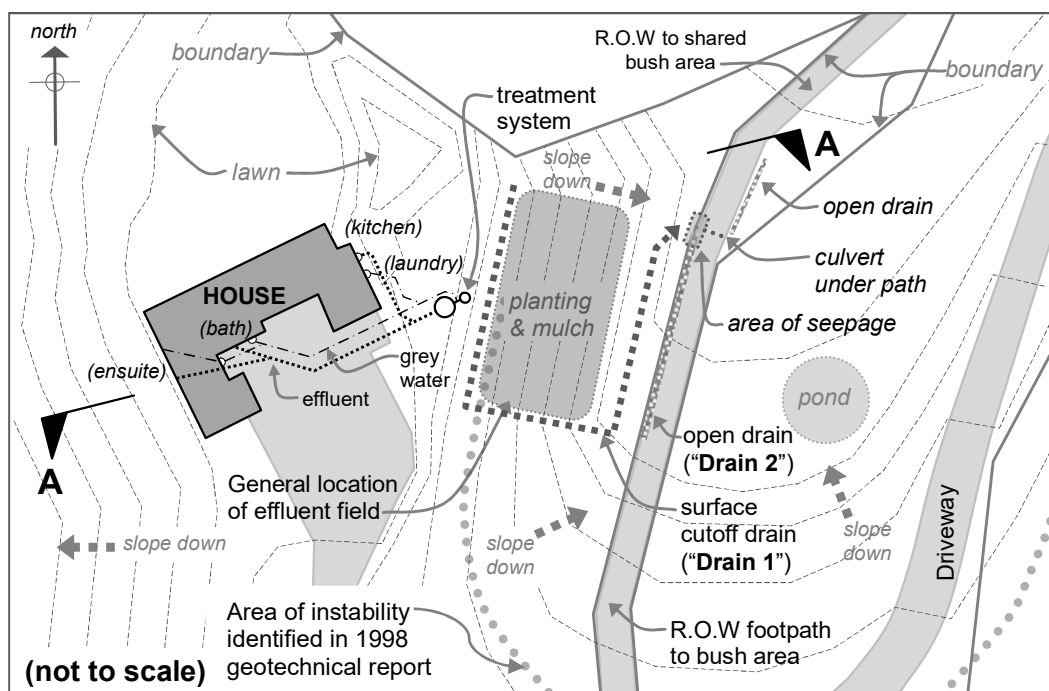


Figure 2: The foul water treatment system and relevant features (Draft figure only)

2.2.4 The design and site specifics for the owners’ foul water treatment system are contained in the wastewater company’s Onsite Wastewater Design Report of 15 December 2014 (“the wastewater design report”). This report, which is one of the consented documents⁹, describes the wastewater company’s testing and assumptions including:

- the owners’ system was designed for a single three-bedroom house with five occupants and total daily wastewater volume of 725 litres (145 litres per person “as per AS/NZS 1547:2012 Table H3, Note 2”)
- no stability assessment was carried out on-site as the wastewater company considered the location was “low slope” at 10-20°(18-36%) / 5-10°(9-18%) and there were “no signs of instability”
- the site was described as an “elevated knoll, well above any water ways or bodies, no known aquifers in the immediate area”, and the water table was estimated to be more than 1.2m depth
- the soil was identified as “sandy clay-loam, clay loam and silty clay-loam” and

⁸ Evaporation plus plant transpiration from the land and water surface to the atmosphere

⁹ Building consent BC 15001 issued by the authority on 3 March 2015 for the owners’ house, including the foul water treatment system

“moderate to slow draining”. This was determined from two 600mm deep test pits: one west of the proposed house, and the other to the east within the effluent field’s current location.

2.3 The effluent field

2.3.1 The effluent field is located on a slope about 5-6m from the owners’ eastern boundary (refer to Figure 3). The expert measured the degree of slope where the field is located at approximately 24-27° (44-51%).

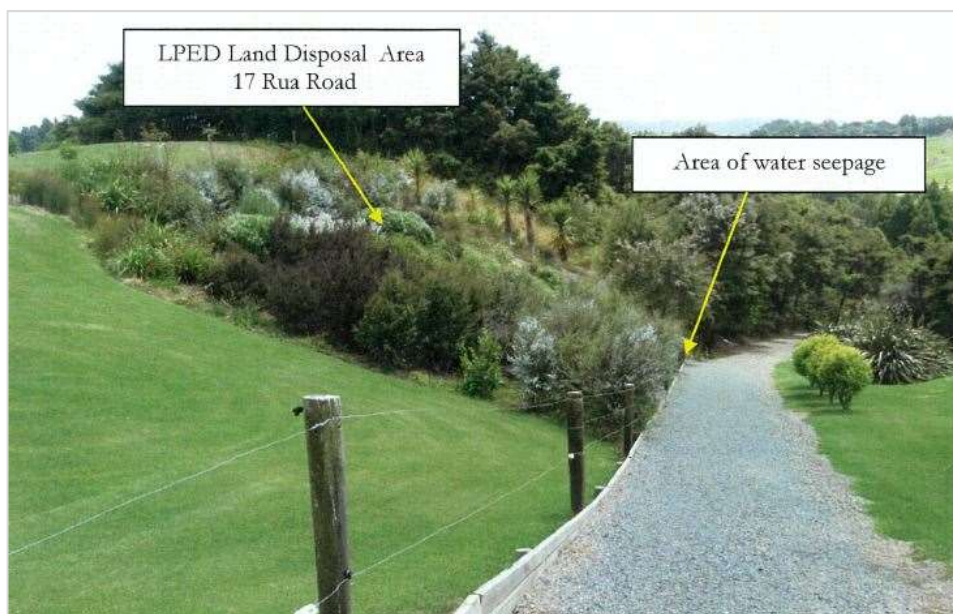


Figure 3: View north along the path – the effluent field is within the planted area left of the boundary fence (image taken from the expert’s report)

2.3.2 As described in the wastewater design report, the effluent field design includes the following:

- an LPED system, said to have a design areal loading rate¹⁰ of 3mm/day (3 litres/m²/day) “as per AS/NZS 1547 Table L1 and M1”
- the LPED system set out “as per schematics” and comprising six surface laid lateral dripper lines each 27m in length at 1.5m centres, with the edge of the effluent field set back at least 1.5m from property boundaries
- the dripper lines with 3mm perforations set at 1.4m centres and each perforation covered with a squirt guard
- dripper lines laid on the surface and covered with at least 150mm of landscape mulch, and planting of the effluent field recommended in order to increase evapotranspiration.

2.3.3 Other features installed in and near the effluent field include 100 x 25mm boards added below the dripper lines; and a surface water cut-off drain (100mm diameter perforated coil drainage laid about 400mm deep) which runs along the top (west) of the field, down the south side, and then along the bottom (east) some 3-4m below the lowest dripper line. Some additional boarding has been added along the base of the

¹⁰ The areal loading rate refers to the disposal of effluent over the entire effluent field, including between the dripper lines.

boundary fence posts.

3. Background

3.1 Application for building consent

3.1.1 On 15 January 2015 the owners applied to the authority for building consent for construction of their new house, including the associated foul water treatment system. The consent application form identified the means of compliance with Clause G13 Foul water as Acceptable Solution¹¹ G13/AS1¹², and the supporting documents with the application included:

- the wastewater design report from the wastewater company plus attachments including a site layout plan, effluent field schematics for the effluent field, design and installation specifications, and a homeowners' care guide
- the 1998 geotechnical report
- a letter dated 13 January 2015 from the geotechnical engineers to the owners regarding the proposed building work, which said:

In [the 1998 geotechnical report] we identified a basin shaped area to the east of your building site which was identified as an ancient landslip. Your proposed building site lies slightly to the south-east of the previously designated building site, but still appears to be well away from the old slip area. The site has been levelled by excavation of a knoll and we understand from you that all spoil was removed from the site...

3.1.2 During the consenting process the owners sent the authority a further geotechnical report by the geotechnical engineers dated 28 January 2015 (“the 2015 geotechnical report”), which the owners had commissioned to check foundation conditions for the proposed house. The 2015 geotechnical report considered soil composition and ground water levels within the house platform. It noted seepage at 4m depth in one of three boreholes within the house outline but said the other boreholes were dry¹³. The report recommended shallow surface drains at the toe of the cut batter “and as necessary around the building site to ensure the site remains in a dry condition”.

3.1.3 On 3 March 2015 the authority issued building consent No. BC 150017. The authority’s processing checklist stated the proposed building work complied with the requirements of Clause G13.3.4 (refer to Appendix A), noting:

Provisions of G13.3.4 are satisfied – proposal demonstrates that facilities will be properly constructed. Refer to [the wastewater design report] and drainage site plan [Drawing L02B 12/1/15].

3.2 Construction and completion

3.2.1 Construction of the owners’ house and foul water treatment system progressed and was substantially complete by 22 March 2016, when the authority received a complaint from the neighbour who was concerned about the location of effluent fields on the owners’ and another neighbour’s property.

3.2.2 The neighbour said both these effluent fields were on steep banks “very close to our boundary in what are saturated areas during winter and spring”; that water would

¹¹ Acceptable Solutions and Verification Methods are produced by the Ministry and, if followed, must be accepted by a building consent authority as evidence of compliance with the Building Code.

¹² Acceptable Solution G13/AS1 Sanitary Plumbing

¹³ I note that this investigation was carried out in mid-summer.

migrate from these fields onto an already saturated area at the boundary; and there was a probability the neighbour's property and springs in the area of both fields would be contaminated.

3.2.3 On 3 May 2016 the authority emailed the neighbour and the owners after visiting the site, saying that the slope and position of the effluent field had been assessed. The authority said this field had been installed "as per the approved plan" and its position was within the setback requirements of Table R1 in AS/NZS 1547.

...the slope with effluent field should be planted out as per the [wastewater company's] design recommendations and this will help in absorbing any extra effluent off the bank so there will be very minimal if any addition to the existing natural stormwater flow off this slope.

3.2.4 On 21 June 2016 the authority's drainage inspection at the owners' property failed for reasons including "[Clause G13] Please complete the planting to the effluent field as per the design recommendations."

3.2.5 The authority passed work at the final drainage inspection on 28 July 2016 and issued a code compliance certificate in respect of all the consented work on 1 August 2016.

3.3 Ongoing complaints and actions (June 2017-September 2018)

3.3.1 Actions during June 2017-May 2018 included:

- **the neighbour** – sent a complaint to the authority on 15 June 2017 regarding "waste water bylaws" which referred to the 2016 complaint and said the authority had determined "the possibility of migration of a small amount of effluent across onto our property was basically acceptable"; said the effluent field was located on a 25-30° slope very close to their boundary, near a spring, and in a creep prone area identified in the 1998 geotechnical report; continued to raise concerns including that mulch was washing down the slope, there was lack of planting, a drainage trench installed by the owners terminated on the neighbour's property, seepage continued even through summer, and there were blocked drains and exposed dripper lines
- **the authority** – visited the site several times to assess issues, sample the drain below the effluent field (no contamination was found) and conduct dye testing; advised the owners that remedial work still needed to be done/what they had done was ineffective; said the effluent field was failing to produce results necessary to meet the Building Code, and told the owners to fix this urgently and seek assistance from a drainage engineer to achieve the required ongoing performance
- **the owners** – carried out some remedial work including more planting, placing boards below the dripper lines and additional mulch; advised the authority and said continued plant growth would have a positive effect, the sample testing had not found any evidence of runoff and the dye testing was also clear, the effluent field was 4m from the boundary whereas the "legal requirement" was 1m, and that over the past two years the perimeter drain had remained dry.

3.3.2 On 7 June 2018 the authority advised the owners their effluent field was failing to meet AS/NZS 1547 and was causing a nuisance, said the owners were required to rectify this immediately, and recommended again that they get engineering advice. The authority also said the owners' house would be deemed insanitary as it did not have adequate sanitary facilities, that without adequate repairs the authority's only

option would be to issue a notice under the Building Act¹⁴, and the likely outcome would be to require the house to be vacated until adequate facilities were provided.

3.3.3 The owners' lawyer replied on 3 July 2018, supplied a copy of the wastewater company's annual service checklist¹⁵ which said the foul water treatment system was "in perfect working condition", and said (in summary):

- the authority's final drainage inspection had confirmed compliance with the building consent, and a code compliance certificate had been issued for the completed work; the authority had also confirmed that the effluent field was within the setback requirements of Table R1 in AS/NZS 1547 (and the owners had advised the field was 4m from the boundary versus the "1m required")
- the owners considered there was nothing wrong with the effluent field; a more appropriate type of mulch had been applied; sampling and dye testing had not shown any contamination, no risks to health were apparent and no further testing was needed; and the authority was being "unduly sensitive" to "unfounded complaints".

3.3.4 On 13 August 2018 the authority emailed the owners regarding a barrier erected to mitigate mulch runoff across the boundary. The authority said it would not pursue further action at that time, but if a further complaint was received and substantiated the owners would be required to redesign the field or remedy the situation.

3.3.5 Also on 13 August 2018 the authority advised the neighbour that because of the barrier erected by the owners and as samples and dye testing had not shown any contamination the owners could not be forced to redesign or move the effluent field. The neighbour replied on 13 August 2018 and 24 September 2018 expressing dissatisfaction with the authority's response.

3.4 The 2018 wastewater review (October 2018)

3.4.1 In late 2018 the authority engaged an engineering/geology consultant ("the wastewater consultant") to review the effluent field as designed and installed. The wastewater consultant visited the site on 24 September 2018 and provided a review dated 1 October 2018 ("the 2018 wastewater review"), which the authority forwarded to the wastewater company for comment.

3.4.2 The 2018 wastewater review concluded that the effluent field should not have been installed in its current position "due both to the extreme slope and the historic instability of the area"; that it was "not appropriate and significantly under-designed for the location"; and there was a "significant concern" that the field would not function within the requirements of the regional water and soil plan if the owners' house was fully occupied¹⁶.

3.4.3 The review identified a number of departures from AS/NZS 1547 in the wastewater design report (refer to Appendix B for more details), including:

- the design had "taken no regard for the slope of the site" – the wastewater consultant said AS/NZS 1547's design irrigation rates applied to systems on flat to moderate slopes up to 10% (5.7°), but the slope where the effluent field was located was ~25° and "extreme", not "low" as stated in the design

¹⁴ Under section 124 Dangerous, affected, or insanitary buildings: powers of territorial authority.

¹⁵ 'On Site System Service Checklist' dated 25 June 2018.

¹⁶ I understand that two people currently occupy the house.

- an LPED system was not appropriate for slopes greater than 27% (15°), the system used was under-designed and was deficient by 80m of dripper line, and the dripper lines had been laid on the ground surface instead of in trenches.

3.4.4 The 2018 wastewater review also included concerns arising from observations on-site including the effluent field's location; limited mulch cover (50mm where investigated); and that the lower drain would catch any surface water flowing through the field and concentrate this, to be released at the drain's lowest point.

3.4.5 The wastewater consultant recommended moving the effluent field to another part of the owners' property that was "appropriate for the design, either the reserve area currently defined or a new area".

3.5 Further concerns (November 2018 – February 2019)

3.5.1 During late 2018/early 2019 the neighbour continued to express concerns about the effluent field to the authority.

3.5.2 On 20 December 2018 the authority advised the owners their sitework had compounded issues with the effluent field and said if they did not do any remedial work either the authority or the neighbour would have no choice but to apply for a determination to reverse the code compliance certificate so a notice to fix could be issued to remedy the work.

3.5.3 A site meeting followed on 25 January 2019 between the wastewater consultant, the owners and the wastewater company. The wastewater consultant sent an account of this meeting to the authority on 30 January 2019, saying the conclusions from the 2018 wastewater review remained and noting there was "ample space on reasonable slopes to put a new field".

3.5.4 The wastewater consultant's account included discussion of ponding below the effluent field (which the owners believed could originate from the neighbour's pond 10m away) and slope measurements (which the wastewater company estimated as ~20° towards the slope's toe).

3.5.5 The wastewater consultant summarised points made by the wastewater company including:

- that the effluent field appeared to be performing well
- the standards cited were not prescriptive and should be interchangeable
- the wastewater company's experience should be taken into account.

3.5.6 The wastewater consultant's responses to these points included:

- the effluent field might perform with only two occupants in the house, but problems would be "more than likely" with increased occupancy
- and there were design differences between standards, and one or the other should be specified and applied.

3.5.7 On 22 February 2019 the authority emailed the owners and the wastewater company saying as no agreement had been reached to resolve the matter it had decided to apply for a determination. The authority said the effluent field was not compliant, and effluent and mulch runoff issues would increase if the owners' house was fully occupied.

3.5.8 The authority said it was clear the wastewater company considered the effluent field would work in spite of non-compliance with AS/NZS 1547 and that its design was not required to comply with that Standard. The authority said this was incorrect as AS/NZS 1547 was nominated in the wastewater design report and no alternative design proposal was nominated.

3.6 Application for a determination and related correspondence

3.6.1 On 26 February 2019 the Ministry received the authority's application for a determination. This was accepted on 2 April 2019 after clarifying the matter to be determined with the authority.

3.6.2 On 24 May 2019 the authority emailed the Ministry requesting the determination to be put hold; it emailed the Ministry again on 23 August 2019 asking to proceed as no agreement as to a solution had been reached.

4. The submissions and the draft determination

4.1 The initial submissions

The authority

4.1.1 The authority provided a submission dated 21 February 2019¹⁷, summary of key events, relevant photographs and a copy of its property file which included (among other things) the building consent application and consent documents, inspection records and the code compliance certificate; the wastewater design report, 1998 geotechnical report and 2015 geotechnical report, the 2018 wastewater review and record of the 25 January 2019 site meeting; and relevant correspondence.

4.1.2 The authority submitted that the building consent application incorrectly stated G13/AS1 as the means of compliance with Clause G13 (as G13/AS1 concerns sanitary plumbing). However, as the wastewater design report referred to AS/NZS 1547 in several places the authority said it was reasonable to assume that Standard was used to measure compliance.

4.1.3 The authority also said while the wastewater company's checklist stated there was no need for a site slope assessment because of "low slope" and "no signs of instability", that was incorrect and at variance with the geotechnical reports: the slope was 25-30°, which "well exceeds" AS/NZS 1547's maximum of 15° for LEPD systems, and the effluent field was located within an area reported as unstable. In addition, the dripper lines were surface laid but AS/NZS 1547 required them to be laid in trenches.

4.1.4 The authority's comments in subsequent correspondence included (in summary):

- Unless an alternative solution¹⁸ was used as the proposed means of establishing compliance, the only means of compliance with Clause G13 for on-site foul water treatment systems was Verification Method G13/VM4 which cites AS/NZS 1547.
- The reference to the Resource Management Act ("the RMA") in Clause G13.3.4(d) implied that an authority was required to consider RMA "rules" in relation to a building consent application; the criteria of discharge could not be considered without referring to the wastewater system as a whole; and as the

¹⁷ The letter of submission was dated 2018

¹⁸ An alternative solution is all or part of a building design that demonstrates compliance with the Building Code, but differs completely or partially from the relevant Acceptable Solutions or Verification Methods.

effluent field was an integral part of the entire wastewater system, compliance with G13.3.4(d) could not be “separated and deferred to the regional council”.

- If the effluent field failed the whole wastewater system would not convey the discharge from the owners’ house in a safe and hygienic manner, the foul smell would accumulate on the immediate property as well as neighbours’ properties.

The owners

- 4.1.5 On 10 March 2020 the owners provided a copy of their 3 July 2018 lawyer’s letter to the authority. The owners’ comments included that the effluent field was some 50m from their house and 250m from any buildings on the neighbour’s property; there had not been any smell from the field in the past three years; the effluent field was not located on unstable land; and the wastewater consultant had been advised before the site visit that there was positive E.coli count at the boundary but this was incorrect.

The neighbour

- 4.1.6 The neighbour provided background information to the dispute, copies of relevant correspondence and the 2018 wastewater review, as also provided by the authority. In emails 9 September 2019 - 11 November 2019 the neighbour criticised the accuracy of the documentation submitted for building consent and the authority’s subsequent actions, and asked that the determination consider “all issues in regard to the original complaint regarding non-compliance with the Building Code”.

The wastewater company

- 4.1.7 The wastewater company did not make an initial submission.

4.2 The draft determination and responses received

- 4.2.1 A draft of this determination was issued to the parties for comment on 3 July 2020. The draft concluded that the effluent field as designed and installed does not comply with Building Code Clause G13 Foul water.
- 4.2.2 The authority responded on 15 July 2020, accepting the draft without further comment.
- 4.2.3 No response to the draft was received from the owners, the wastewater company, or the neighbour.

5. The expert’s report

5.1 General

- 5.1.1 As mentioned in paragraph 1.7, I engaged an independent wastewater expert to review the design and installation of the owners’ foul water treatment system and to provide an expert opinion on the effluent field component of this system. I note that the expert has a background in engineering geology and particular expertise in on-site wastewater systems.
- 5.1.2 The expert was provided with relevant information supplied by the parties, visited the site on 26 November 2019, and sent a final report on 12 March 2020 which was copied to the parties the following day.

- 5.1.3 The expert's report noted that the review of the owner's effluent field was made with reference to Verification Method G13/VM4 via the on-site wastewater design Standard AS/NZS 1547.
- 5.1.4 The expert also said the treated effluent standard produced by the owner's foul water treatment system was not stated "in the literature and supporting documentation", but that reviewing the treatment system's performance was outside the scope of the expert's report.

5.2 Key findings

- 5.2.1 The expert's report concluded:

Based on the LPED design criteria specified in AS/NZS 1547:2012, we conclude that the location of the existing LPED land disposal system ... is unsuitable. In addition the LPED land disposal system has not been correctly designed in accordance with AS/NZS 1547:2012.

- 5.2.2 The expert's report also said the installed effluent field "does not comply with the Building Code and cannot comply with the Building Code via an alternative solution".
- 5.2.3 The expert measured the slope of the effluent field on-site at approximately 24-27° (44-51%), and observed recent active soil creep and "scarp slopes" (shallow slope instability) within the effluent field. The expert said the effluent field was located in an area with evidence of slope instability and the wastewater design report's statement that the field was located on slopes of 5-20° with no signs of instability was "in direct conflict" with the previous geotechnical reports.
- In our opinion the LPED system design should have been subject to specific geotechnical investigation and design by a suitably qualified geotechnical specialist to determine if the area was suitable for land disposal of treated effluent or not.
- 5.2.4 The expert's report identified a significant number of departures from AS/NZS 1547. These are described in more detail in Appendix B and include (in summary):
- An LPED system was used, but AS/NZS 1547 states that LPED systems are not appropriate on slopes greater than 27% (15°). The maximum slope for placement without specific design by a suitably qualified and experienced person is 30% (17°).
 - The LPED system is "significantly under designed (undersized)" for reasons including the use of a design irrigation rate (DIR) of 3mm/day for an incorrect soil category and which should have been no more than 2.5mm/day, and as the irrigation area was incorrectly calculated using the 1.5m spacing between dripper lines instead of 1m as required. The expert said based on a DIR of 2.5mm/day the effluent field area should be at least 435m² instead of 242m².
 - Further, the expert said AS/NZS 1547 requires a 50% reduction in the DIR for slopes greater than 10% (6°), which was not applied, and specialist design for slopes greater than 30% (17°) which was not done.
 - The soil investigation test pits were too shallow (at 600mm instead of 1.5m).
 - The dripper lines have been laid on the surface instead of in trenches.
- 5.2.5 The expert also said the LPED system's location did not comply with AS/NZS 1547's guidelines for setbacks from surface water or the property boundary given the angle of the slope, and that the wastewater designer did not complete a risk assessment for this. The expert said the location posed a "high risk of periodic

discharge of partially treated effluent to surface water”.

5.3 Other observations

5.3.1 The expert also observed that the owner’s foul water treatment system appeared to have been designed in part based on AS/NZS 1547 and Auckland Regional Council’s on-site wastewater design guidelines known as TP 58¹⁹.

5.3.2 The expert’s observations from the site visit, in addition to noting soil creep and scarp slopes as mentioned earlier, included:

- There was no evidence of “effluent breakout” at the time of inspection, which was a fine sunny day, and the ground surface of the effluent field was dry. However, seepage at the slope toe (downslope from the field’s northeast corner) was “flowing strongly”.
- This seepage ran into a culvert under the path and from there into a surface water channel. The expert said the source of the seepage was uncertain but it could come from soil beneath the effluent field or from the neighbour’s nearby pond, rainwater within the path aggregate, or ground water seepage emerging as a spring.
- An excavation of a short section of drainage coil in the northeast corner of the effluent field (close to and below the lowest dripper line) revealed moisture inside but no standing or flowing water. Soil around the drain was only moist, which indicated there was no significant seepage from the effluent field into the drain at the time.

5.4 Responses to the expert’s report

The owners

5.4.1 On 29 March 2020 the owners responded to the expert’s report saying:

- they requested a “detailed current comprehensive professional geotechnical report” including sample bore holes to prove their land was unstable and that quoting from other reports was not acceptable, and also asking for the results of the authority’s previous dye test and water sampling
- the neighbour had erected a boundary retaining wall and filled the open trench with metal, so ground water from their property had no choice but to end up in the “so called area of water seepage”
- the expert’s statement that seepage at the slope toe was flowing strongly during the site visit was incorrect (the owners considered it was “a very slow trickle”) and asking why a sample was not taken for analysis.

The wastewater company

5.4.2 On 16 March 2020 the wastewater company responded to the expert’s report, saying:

- The wastewater design supplied in 2014 had been accepted as an alternative solution “based on the TP 58 guidelines”, and those guidelines included surface laid LPED systems.

¹⁹ On-site Wastewater Systems: Design and Management Manual”, Auckland Regional Council Technical Publication No. 58 (TP 58), third edition 2004

- At the time, the authority had accepted the wastewater company’s designer as a suitably qualified and experienced person.
- Class 5 soil in AS/NZS 1547 equated to Class 6 soil under TP 58 “and allows for a design irrigation rate of 3mm to 5mm/day on Class 5 – 6 soils”.
- “As stated in the TP 58 guidelines it was general practice to design for areal loading over the entire 1500mm area between LPED lines.”
- All setbacks were in accord with TP 58 when the effluent field was installed, and “cut-off drains, culvert, access path etc” had been constructed since then.

5.4.3 On 17 March 2020 the Ministry emailed the wastewater company asking it to clarify on what basis it considered the foul water treatment system was designed and approved by the authority as an alternative solution. The Ministry said there were multiple references to AS/NZS 1547 and G13/VM4 in the wastewater design report and specifications and that, as noted in the authority’s submissions, the authority had considered the system was designed to AS/NZS 1547 and G13/VM4 and had granted building consent on that basis.

5.4.4 On 26 June 2020 the wastewater company replied:

... at this stage (2014) the Team here and [the authority] were working across both the [AS/NZS] 1547 Standard and the TP 58 Guidelines as one combined Specification Criteria.

... how can 2 standards or guidelines contradict themselves and yet both meet the Building Code and G13/VM4 etc... as it is [accepted] NZ wide, that they do.

5.4.5 The wastewater company also quoted from the preface to AS/NZS 1547, including that the Standard “covering as it does a range of climates, soils, and jurisdictions” provided conservative advice, and “local conditions and local experience should be used whenever possible where they demonstrate that there are no significant risks to public health or to the environment ...”.

5.4.6 The wastewater company said it understood any authority had absolute discretion to accept a design or method that they determined would meet Clause G13, and the owners’ system had been operating for a number of years “with no sign or evidence of failure”.

The neighbour

5.4.7 On 26 June 2020 and again on 29 June 2020 the neighbour commented on the wastewater company’s response (paragraphs 5.4.4 to 5.4.6). In the neighbour’s view, TP 58 “stipulates requirements in line with the Building Act which need to be followed”. The neighbour said the requirements of TP 58 and G13/VM4 had not been met, and this was documented in reports by two wastewater engineers.

5.4.8 The neighbour’s other comments included that there were “multiple design and installation failures” relating to the effluent field which had been highlighted over the previous years.

6. Discussion

6.1 The legislation and means of compliance

- 6.1.1 The Building Code's requirements for foul water are contained in Clause G13 (as set out in full in Appendix A). The objectives of this clause include safeguarding people from illness due to contamination and from loss of amenity due to odours or offensive matter.
- 6.1.2 Clause G13.2 requires dwellings to have adequate foul water storage, treatment and disposal systems if no sewer is available. Clause G13.3.2 includes performance requirements for the drainage system to convey this foul water to an "appropriate outfall". Clause G13.3.4 contains performance requirements for facilities that store, treat and dispose of foul water, including that they must be constructed with "adequate capacity" and also to avoid the likelihood of contamination of soils, ground water and waterways except as permitted under the RMA, avoid the likelihood of blockage and leakage, and avoid damage from "normal ground movement".
- 6.1.3 Compliance with Clause G13 can be demonstrated by following a relevant Acceptable Solution or Verification Method²⁰. Any other way is known as an alternative solution and requires demonstrating compliance directly with the relevant performance requirements of this clause.
- 6.1.4 For the owners' on-site foul water treatment system, including the effluent field, the only applicable Acceptable Solution or Verification Method is G13/VM4 Foul Water: On-Site Disposal. The version of this Verification Method when the effluent field was designed and installed²¹ (which I note is unchanged in the version at the time of writing this determination²²) states in its entirety:

1.0 General

1.1 Scope

1.1.1 This document describes the design methods for systems used for the collection, storage, treatment and disposal of foul water.

1.1.2 A design method and construction details given in sections 5.1 to 5.5 and 6.1 to 6.2 of AS/NZS 1547 (and the appendices referred to in these sections), for the treatment of domestic foul water for flow rates up to a maximum 14,000 litres/week from a population equivalent of up to 10 persons, may be verified as satisfying the performance criteria of G13 Foul Water.

- 6.1.5 In other words, if the owners' effluent field is in accordance with the relevant sections of AS/NZS 1547 as stated in G13/VM4 it can be considered to comply with Clause G13. Otherwise, it must demonstrate compliance with Clause G13 directly as a proposed alternative solution.
- 6.1.6 I note that a number of references have been made in this determination to TP 58 and that there appears some confusion over its status. TP 58 was published by Auckland Regional Council (now part of Auckland Council) "to provide guidance for the design and maintenance of on-site treatment and disposal systems for domestic wastewater from households and institutions". TP 58 is not deemed to comply with the Building Code under section 19 of the Act and it has more relevance to matters

²⁰ Refer to section 22 of the Act: Acceptable solution or verification method for use in establishing compliance with building code.

²¹ 'Acceptable Solutions and Verification Methods for New Zealand Building Code Clause G13 Foul Water', Second Edition, Amendment 5, effective 14 February 2014 to 30 May 2017

²² Second Edition, Amendment 9, effective from 5 November 2020

under the RMA and district planning regulations, which are outside the scope of the determination. That said, evidence of design in accordance with aspects of TP 58 may be used to support an alternative solution proposal.

6.2 Whether the effluent field complies with Clause G13

6.2.1 In the expert's view the owners' effluent field as designed and installed is not in accordance with the relevant sections of AS/NZS 1547 as outlined in paragraph 5.2.4 and Appendix B; these reasons include:

- the choice of an LPED system, which should not have been used on such a steep slope
- inaccuracies in the design of this LPED system which resulted in it being "significantly under designed (undersized)"
- dripper lines surface laid instead of in trenches, and soil investigation test pits that were too shallow.

6.2.2 I note that the wastewater consultant engaged by the authority identified some of the same departures from AS/NZS 1547 (refer to paragraph 3.4.3). The wastewater company has not disputed the expert's assessment of these departures from the Standard but has said the installation is based on TP 58 guidelines.

6.2.3 Taking account of the expert's findings and the other available evidence, it is my view that the effluent field has not been designed and installed in accordance with the relevant sections of AS/NZS 1547, and therefore it cannot be regarded as deemed to comply solution using Verification Method G13/VM4.

6.2.4 I now consider whether the owners' effluent field demonstrates compliance with Clause G13 directly. Relevant performance requirements of Clause G13 include that the effluent field must be constructed:

- "with adequate capacity for the volume of foul water and the frequency of disposal" (G13.3.4(a))
- "to avoid the likelihood of contamination of soils, ground water, and waterways except as permitted under the Resource Management Act 1991" (G13.3.4(d))
- "to avoid the likelihood of blockage and leakage" (G13.3.4(f)), and
- "to avoid the likelihood of damage from superimposed loads or normal ground movement" (G13.3.4(j)).

6.2.5 In evaluating a proposed alternative solution it can be useful to make comparison with the relevant Acceptable Solution or Verification Method to assist in establishing whether the proposed work is compliant. Usually, when there is non-compliance with one provision of these documents, it will be necessary to add one or more other provisions to compensate for that in order to comply with the Building Code.

6.2.6 In this case, the effluent field falls short of the relevant standard in a significant number of respects. While the wastewater company apparently considers that the design follows TP 58 in at least some aspects, it remains that the effluent field is located on a slope which is considerably steeper than assumed in the design. Moreover, previous geotechnical reports have noted historic instability in the area and there is also recent evidence of soil creep (observed by the expert), so this would not appear to "avoid the likelihood of damage from... normal ground movement".

- 6.2.7 The expert has also concluded that the LPED system installed is “significantly” undersized and that by one measure against the relevant Standard it should have an area of at least 435m² instead of the current 242m². I note that there are currently only two occupants in the owners’ house but there could be as many as five. Accordingly, I do not consider the effluent field has been designed and installed “with adequate capacity for the volume of foul water and the frequency of disposal”.
- 6.2.8 Further, with respect to the “likelihood of contamination of soils, ground water, and waterways” I appreciate that mitigation work has been carried out, including surface drainage and boards below the dripper lines to limit mulch runoff. However, I accept the expert’s opinion that the effluent field’s location poses a “high risk of periodic discharge of partially treated effluent to surface water”.
- 6.2.9 In conclusion, I consider the effluent field does not demonstrate compliance with Clause G13 of the Building Code.

7. The decision

- 7.1 In accordance with section 188 of the Building Act 2004, I determine that the effluent field as designed and installed does not comply with Building Code Clause G13 Foul water.

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 19 March 2021.

Katie Gordon
National Manager, Determinations

Appendix A – The legislation

A.1 The Building Act 2004

19 How compliance with building code is established

- (1) A building consent authority must accept any or all of the following as establishing compliance with the building code:
- (a) compliance with regulations referred to in section 20:
 - (b) compliance with an acceptable solution:
 - (ba) compliance with a verification method:
 - (c) a determination to that effect made by the chief executive under subpart 1 of Part 3:
 - (ca) a current national multiple-use approval issued under section 30F, if every relevant condition in that national multiple-use approval is met:
 - (d) a current product certificate issued under section 269, if every relevant condition in that product certificate is met:

...

22 Acceptable solution or verification method for use in establishing compliance with building code

...

- (2) A person who complies with an acceptable solution or a verification method must, for the purposes of this Act, be treated as having complied with the provisions of the building code to which that acceptable solution or verification method relates.

A.2 The Building Code (Schedule 1 of the Building Regulations 1992)

Clause G13 – Foul Water

Objective

G13.1 The objective of this provision is to:

- (a) safeguard people from illness due to infection or contamination resulting from personal hygiene activities, and
- (b) safeguard people from loss of amenity due to the presence of unpleasant odours or the accumulation of offensive matter resulting from foul water disposal.

Functional requirement

G13.2 Buildings in which sanitary fixtures and sanitary appliances using water-borne waste disposal are installed must be provided with—

- (a) an adequate plumbing and drainage system to carry foul water to appropriate outfalls; and
- (b) if no sewer is available, an adequate system for the storage, treatment, and disposal of foul water.

Performance

G13.3.1 The plumbing system shall be constructed to:

- (a) convey foul water from buildings to a drainage system,
- (b) avoid the likelihood of blockage and leakage,
- (c) avoid the likelihood of foul air and gases entering buildings, and
- (d) provide reasonable access for maintenance and clearing blockages.

G13.3.2 The drainage system shall:

- (a) convey foul water to an appropriate outfall,
- (b) be constructed to avoid the likelihood of blockage,
- (c) be supported, jointed and protected in a way that will avoid the likelihood of penetration of roots or the entry of ground water,
- (d) be provided with reasonable access for maintenance and clearing blockages,
- (e) be ventilated to avoid the likelihood of foul air and gases accumulating in the drainage system and sewer, and
- (f) be constructed to avoid the likelihood of damage from superimposed loads or normal ground movement.

G13.3.3 Where a sewer connection is available, the drainage system shall be connected to the sewer, and the connection shall be made in a manner that avoids damage to the sewer and is to the approval of the network utility operator

G13.3.4 If no sewer is available, facilities for the storage, treatment, and disposal of foul water must be constructed—

- (a) with adequate capacity for the volume of foul water and the frequency of disposal; and
- (b) with adequate vehicle access for collection if required; and
- (c) to avoid the likelihood of contamination of any potable water supplies in compliance with Clause G12 Water supplies; and
- (d) to avoid the likelihood of contamination of soils, ground water, and waterways except as permitted under the Resource Management Act 1991; and
- (e) from materials that are impervious both to the foul water for which disposal is required, and to water; and
- (f) to avoid the likelihood of blockage and leakage; and
- (g) to avoid the likelihood of foul air and gases accumulating within or entering into buildings; and
- (h) to avoid the likelihood of unauthorised access by people; and
- (i) to permit easy cleaning and maintenance; and
- (j) to avoid the likelihood of damage from superimposed loads or normal ground movement; and
- (k) if those facilities are buried underground, to resist hydrostatic uplift pressures.

Appendix B – Details of the wastewater consultant’s and the expert’s assessments

B.1 The 2018 wastewater review

The wastewater consultant reviewed the wastewater design report and listed “all concerns with the design”. These are summarised in the following table.

The wastewater consultant ‘s concerns (2018 wastewater review)	AS/NZS 1547 references where provided
Slope and stability - design report indicates no slope stability assessment carried out as “low slope” and “no signs of instability”, but this is incorrect – slope within the effluent field is ~25° (i.e. “extreme”), and the previous geotechnical reports/reviews note historic area of instability. The 2015 geotechnical letter also recommends shallow surface drains at toe of cut batter and as necessary around the building site.	-
Test pits were 600mm deep but AS/NZS 1547 requires 1.5m minimum below disposal depth required by, estimates of water table depth given, but not based on results of required investigation.	Table B1
Soil identified as “Category 5” so a design irrigation rate (DIR) of 2.5mm/day should have been applied instead of 3mm/day (which is consistent with Category 4 soil).	-
Design water flow of 145L/person/day applied, but this is for standard water reduction fixtures in the household. Requirement for these fixtures not stated in design report, and not known if the house has these fixtures.	-
Choice of LPED system not appropriate as per AS/NZS 1547 on slopes greater than 27% (15°).	<i>“LPED systems are not appropriate on slopes greater than 27% (15°) due to uncertainty with even distribution being achieved on steep land.” (Section CM9.3)</i>
LPED system as installed is under-designed – deficient in size by 80m of LPED line. (Design report specifies six dripper lines 27m long at 1.5m spacings, but AS/NZS 1547 specifies 1m width maximum.)	<i>“The maximum effective soakage area that should be used for design purposes is 1m width along the irrigation lines.” (Section CM7.1)</i>
Design takes no regard for the slope of the site – the DIRs in AS/NZS 1547 Table M1 apply to systems on flat to moderate slopes (up to 5.7°).	<i>“Design Irrigation Rates (Table M1) apply to systems on flat to moderate slopes, up to 10% (5.7°).” (Section CM7.1)</i>
Dripper lines have been surface laid and covered with mulch, but AS/NZS 1547 requires dripper lines for LPED systems to be laid in trenches.	<i>“Pipes for LPED systems shall be laid in 200 x 200mm trenches...” (Section M9.4.1)</i>
Securing of mulch - mulch should be held in place by durable bird resistant mesh netting pinned securely to the ground surface (noting that covered surface dripper lines should not have been used in the first place).	Section M3.2

B.2 The expert's report

The expert assessed the effluent field against relevant criteria in AS/NZS 1547 as follows.

The expert's assessment (expert report dated 12 March 2020)	AS/NZS 1547 references where provided
Design daily flow volume	
Design flow assessment based on 3 bedroom, 5 person occupancy dwelling, and flow allowance of 145L/person/day. This is in accordance with AS/NZS 1547, which gives 145L/day for households with on-site roof water tank supply and standard water reduction features (the expert did not confirm if the owners' house had these features).	Table H3
Site and soils investigation	
Two test pits excavated to 600mm depth but 1.5m depth is recommended minimum – does not comply . Topsoil stated in design as 250-300mm – soil depth complies.	Table B1 Table M1 (Note 4)
Wastewater disposal design	
Design Irrigation Rate (DIR) of 3mm/day stated, but DIR for LPED systems in Category 5 soils is up to 2.5mm/day (excluding reductions for slope angle). (Also soil categories applied to the design are not those in AS/NZS 1547) – does not comply .	Table M1
LPED system should not have been constructed in the current location AS/NZS 1547 states LPED systems not appropriate on slopes greater than 27% (15°). Maximum slope for placement without specific design by a suitably qualified and experienced person is 30% (17°).	CM9.3
Design areal loading rate not reduced for the stated slope angle of 10-20° (18-36%) – rates in Table M1 are for slopes less than 10% – does not comply .	CM7.1, Table M1
Dripper lines laid on the surface but lines for LPED systems required to be laid in 200mm wide x 200mm deep trenches – does not comply .	M5, CM5
Effluent field significantly undersized/under designed – does not comply. Based on dripper lines at 1.5m centres, design irrigation area of 1m downslope from each line and areal loading rate of 3mm/day the enclosing area of the effluent field should be at least 363m ² : <ul style="list-style-type: none"> • Design report section E4 calculates required disposal area as 242m² (725L/day/ areal loading rate of 3mm/day) but section E6 specifies six dripper lines of 27m at 1.5m centres = total length of 162m. • AS/NZS 1547 gives effective irrigation area of 1m width downslope from each line, so effective irrigation area is 162m² and therefore an areal loading rate of 4.47mm/day which exceeds the recommended rate in AS/NZS 1547. In addition: <ul style="list-style-type: none"> • design areal loading rate does not comply with Table M1, which requires DIR of 2.5mm/day for LPED in Category 5 soils on flat to moderate slopes of up to 10% (5.7°) • the design report included soil category table from TP58 and these categories were incorrectly stated in terms of AS/NZS 1547 • based on DIR of 2.5mm/day <u>effluent field area should be at least 435m²</u> • AS/NZS 1547 requires a 50% reduction in the DIR for slopes 20-30% (8-17°) and requires specialist design for slopes over 30% (17°) – the expert measured slopes where effluent field is located at about 44-51% (24-27°) but the design report did not reduce DIR or include specialist design. 	CM7.1 Table M1 Table M2 Soil categories in Table 5.1 and Table E1
The LPED system does not comply with setback guidelines regarding surface water or the property boundary in view of the slope angle, and the wastewater designer did not complete a risk assessment for this. The risk for runoff is high (factors contributing to this included the surface located dripper lines, the steep slope, and less than 3-4m separation between the lowest dripper line and the surface water drain below the effluent field.	Appendix R Table R1 Table R2