

IN THE MATTER of applications pursuant to the
Resource Management Act 1991

BY Weston Lea Limited

FOR land use and subdivision consents
for a large scale residential
development and associated land
use activities and sites works at
Peacocke, Hamilton

STATEMENT OF EVIDENCE (Wastewater Infrastructure)

Chris Hardy

27 March 2019

1 INTRODUCTION

1. My full name is Christopher Allington Hardy.
2. I hold the qualification of BE (Civil) from the University of Auckland, 2003, and NZCE (Civil) from the Waikato Polytechnic, 2000.
3. I am a Associate Director at AECOM Hamilton. I have held a position with AECOM since 2010. Prior to that I worked as a civil engineer with MWH NZ Ltd. I have 18 years of experience as a civil engineer working on stormwater, water and wastewater (three waters) networks.
4. I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014 and have complied with that practice note in preparation of this evidence. I agree to comply with it in presenting evidence at this hearing. The evidence that I give is within my area of expertise, except where I have stated my reliance on other identified evidence. I have considered all material facts that are known to me that might alter or detract from the opinions that I express in this evidence.

2 SCOPE OF EVIDENCE

5. I have been retained by HCC to provide wastewater infrastructure and servicing advice relating to the consent applications by Weston Lea Limited (the applicant).
6. I have been involved in planning for development in the wider Mangakotukutuku Catchment, including the Peacocke Structure Plan area, as part of the initial stages of the development of an Integrated Catchment Management Plan (ICMP) for Hamilton City Council (HCC).
7. I have also been involved in the development of the Hamilton City Wastewater Masterplan and the assessment of a number of individual development proposals for impact and suitability in association with the city Wastewater Network Hydraulic Model which AECOM operates and maintains on behalf of HCC.

8. The purpose of this statement of evidence is to address matters raised in the application relating to wastewater infrastructure and consideration of submissions in this regard.
9. My evidence covers:
 - a. Review and assessment of applicant's preliminary wastewater network design and network assessment
 - b. Response to submissions
 - c. Recommended conditions
 - d. Conclusion
10. In preparing this evidence I have reviewed the following:
 - a. Assessment of Environmental Effects prepared by Merestone Ltd;
 - b. Report on Wastewater Disposal for the Amberfield Development – Peacocke Structure Plan Area – Hamilton South, O'Callaghan Design Ltd. (OCDL), 16 May 2018 (*WW Disposal Report*)
 - c. Amberfield Civil Infrastructure Report, Harrison Grierson, 18 May 2018 (*Infrastructure Report*)
 - d. Amberfield Preliminary Engineering Drawings, Harrison Grierson, 18 May 2018 as follows:
 - i. Finished Contour Plan sheets 1211 to 1216
 - ii. Wastewater – Trunk Rising Main sheets WW500 to WW514
 - iii. Wastewater – Rising Mains sheets WW520 to WW525
 - iv. Wastewater – Pump Stations sheets PS100 to PS 400
 - e. s92 response received 17 August 2018 titled Amberfield Civil Infrastructure Responses to HCC Further Information Request – Weston Lea Limited, Harrison Grierson, 17 August 2019 (*Infrastructure Response*).

2 DISCHARGE SOLUTION

11. The review undertaken does not constitute a detailed technical design review in regard to design flows and sizing of infrastructure. I have reviewed the documentation in terms of overall feasibility and alignment with HCC requirements for wastewater network assessment and design.

12. The existing and planned city wastewater network has been assessed by the applicant in the WW Disposal Report (May 2018). Two discharge options have been presented as follows:
 - a. Discharge to the Far Eastern Interceptor.
 - b. Discharge to the Western Interceptor.
13. A permanent discharge east to the Far Eastern Interceptor is the Applicant's preferred option. Discharge west to the Western Interceptor with storage and flow controls is presented in the WW Disposal Report as a backup option to the preferred eastern discharge.
14. A meeting was requested by OCDL Ltd. on behalf of the Applicant on 20 February 2019 at Hamilton City Council offices to discuss an additional interim solution. An interim connection at 134 Peacocke Road was proposed as a means to temporarily connect up to 400 lots to the existing network before permanent public infrastructure discharging to the Far Eastern Interceptor is constructed by HCC. It was agreed at the meeting that AECOM, who manage the city's wastewater network model on behalf of HCC, would run the model to test the interim connection for up to 200 lots.
15. I support the eastern discharge option as the best practical option. The eastern discharge option has the lowest impact on the existing wastewater network which is less constrained to the east.
16. The eastern option as proposed is consistent with the Wastewater Masterplan. The Hamilton City Wastewater Masterplan sets out the strategic direction for the wastewater network taking into account existing and future requirements.
17. The western discharge option has not been assessed in enough detail to determine if it can be practically achieved without adverse impacts on the existing or proposed network. Assessment undertaken to date in the HCC Wastewater Network Hydraulic Model (*the Model*) has shown that the proposed western discharge solution is not viable under wet weather conditions.

18. The western interceptor services a significant portion of the city and it is more constrained than the eastern network and will continue to be so into the future. Anticipated growth within the existing western catchment will further exacerbate the current network constraints.
19. A programme of upgrades is planned to relieve the current capacity constraints on the western interceptor and provide for growth and development within the current service area.
20. Network master planning has identified several opportunities to alleviate pressure on the western interceptor in the future as follows:
 - a. Divert a portion of flows from the lower western interceptor into the far western interceptor through the Rotokauri Growth cell.
 - b. Divert a portion of the existing western network upstream of the Fitzroy wastewater pump station to the eastern interceptor via Peacocke wastewater network.
21. A number of developments within the existing western interceptor service area have recently been assessed and have required flow control to be able to connect to the western interceptor. There is limited capacity for this to keep happening and it is recommended that any existing and planned spare capacity is retained for the purpose of addressing growth in the existing service area.
22. The interim connection (OCDL, 20 February 2019) is proposed to discharge to the existing wastewater network at 134 Peacocks Road. The Peacocks Road wastewater network discharges to the Western Interceptor via the Fitzroy wastewater pump station.
23. As stated in 20(b) the network upstream of the Fitzroy pump station is proposed to be diverted east. Diversions upstream of the Fitzroy pump station will alleviate pressure on the Fitzroy pump station and the western interceptor to which it eventually discharges.

24. The proposed Amberfield pump station has been assessed in the Model based on a pump rate of 7 L/s and an emergency storage volume of 330 m³ as proposed by OCDL.
25. The Model has shown that during wet weather almost all wastewater discharged from 200 additional lots will overflow at the Fitzroy pump station (approximately 94% by volume). The Fitzroy pump station therefore does not have sufficient capacity to cater for any additional volume. Refer to the Model Report which is appended as Attachment A, for additional detail.
26. The emergency storage volume is predicted to be fully utilised where pump station controls are put in place in the Model to limit discharges to times when the receiving network is less than 100% pipe full. Where controls are in place both the Fitzroy pump station and the Amberfield pump station emergency storage are predicted to overflow.
27. The interim connection to 134 Peacockes Road cannot be achieved without an increase in the predicted network overflow volume during wet weather based on assessment in the Model.
28. At the time of writing this evidence, no further modelling has been undertaken on behalf of the Applicant in response to the interim connection results and the assessment of other discharge locations. There is still not sufficient evidence to recommend an interim connection to the Western network.
29. I recommend that a condition is imposed that the development can proceed with the eastern discharge solution only.

3 INTERNAL NETWORK PRELIMINARY DESIGN

30. The proposed internal wastewater network is presented in the Infrastructure Report¹. Four wastewater pump stations are proposed. Pump Station 4 is the main discharge pump station for the development to the proposed Far

¹ Amberfield Civil Infrastructure Report, Harrison Grierson, 18 May 2018

Eastern Interceptor. The remaining three pump stations discharge to Pump Station 4.

31. The location of the pump stations has been reviewed in conjunction with the proposed final topography and was limited by the fact that pipeline long sections are not provided at this stage. The following are the key findings of the review:
 - a. A single pump station (Pump Station 4) initially discharging to the Far Eastern Interceptor, and eventually to the Peacock wastewater network, is an acceptable solution.
 - b. Pump Station 3 and Pump Station 4 are both required due to the spatial layout of the development and its existing and final topography.
 - c. The catchment serviced by Pump Station 2 may be able to gravitate directly to the Pump Station 3 catchment via a pipeline across the adjacent road embankment however feasibility and depth cannot be assessed using the preliminary design information provided to date.
 - d. Pump Station 1 appears to be required based on the information provided. Pump Station 1 cannot be discharged to Pump Station 3 as it requires a pipeline across a proposed road bridge that slopes in the opposing direction. Pump Station 1 may be able to be gravitated to the Pump Station 4 catchment in a deep pipeline but feasibility cannot be assessed using the preliminary design information provided to date.
32. The internal network preliminary design items identified above do not need to be addressed in this phase of the project. I recommend that the preliminary engineering design is reviewed and optimised as part of the detailed design and approval phases of the project to identify and efficiencies that can be made in terms of the number of the number of pump stations and the associated pumping versus gravity regime.

4 SECTION 92 REPONSE

33. Item 28 (Section 2.31) of the Infrastructure Response states that the western discharge option is retained in the application as an interim solution. It also states that the western option has been modelled to confirm wet weather overflows can be managed with storage.
34. In response, HCC requested that the applicant provide further information to enable the assessment of effects of the western option to be properly considered. This included:
- a. Additional assessment to finalise the required storage volume and demonstrate the performance of the storage during extended or consecutive wet weather periods, when based on the modelling undertaken, the storage could be at risk of not emptying.
 - b. Assessment of operational matters associated with the option and how they will be managed (e.g. odour, septicity, operation and maintenance costs).

To date this requested information has not been provided by the applicant.

35. As stated in Paragraphs 17 to 21 the western option has not been resolved in sufficient detail to demonstrate that storage can manage wet weather flows under all conditions. The western interceptor is under significant pressure; discharge restrictions are in place and future diversions are planned to alleviate that pressure.
36. Overflow reduction is a primary network planning objective for public health, environmental and cultural reasons. The eastern discharge option is technically feasible and represents the lowest risk solution in terms of network performance and overflows.

5 SUBMISSIONS

37. The submissions of Chan & Zhong (20) and Lin and Zhang (21) state that wastewater infrastructure should be in place prior to development and that it should take account of more frequent weather events and have strong provisions to avoid wastewater fouling stormwater and discharging to the river upstream of the city water intake.

38. I agree that adequate wastewater infrastructure should be in place and operation prior to development connections being made.
39. I note that capacity and overflow service levels required by HCC will be met provided the proposed wastewater infrastructure is designed in accordance with the requirements of the Regional Infrastructure Technical Specifications (RITS) with respect to pipeline capacity, pump station capacity and emergency storage. I also note that it is my understanding that the issue of system integration and wet weather overflows to the gully system and the Waikato River will be dealt with in the design and operational solution of the Strategic Wastewater Pump Station through which the development will ultimately discharge.
40. The submission of N & C Edwards (26) expresses concern in regard to the timing and co-ordination of the proposed development into the Peacocke wastewater pump station and associated discharge solution to the Eastern Interceptor. The submission also notes the applicant's statement that they do not need to address issues of capacity and efficient operation of the wastewater network.
41. I support an interim solution as proposed provided that elements to be retained and integrated into the future Peacocke Wastewater solution are designed in accordance with the RITS and provide sufficient capacity for upstream planned development where applicable. Connection to Strategic Peacocke Wastewater Infrastructure should be made as soon as it is available and unused infrastructure decommissioned appropriately.
42. The Eastern Interceptor sewer has been designed to provide capacity for the Peacocke Structure Plan Area and this is reflected in the Wastewater Masterplan. It is my opinion that the applicant does not need to consider capacity and operation of the existing wastewater network provided that discharge is direct to the Eastern Interceptor.
43. The submission of G B McBride (42) notes potential health impacts of wet weather sewage overflows reaching the city water intake and notes that the possibility of overflows does not seem to have been addressed by the applicant.

44. I refer to my response in Section 39 in regard to wet weather capacity and overflows. Further, I note that the concept design of the Strategic Wastewater Pump Station includes wet weather storage. It is my understanding that the detailed design of the Strategic Pump Station will consider and optimise storage volume in conjunction with network operation, overflow treatment (if required) and environmental impacts and risks.
45. The submission of S McConnell (46) questions whether the conveyance of wastewater across the Waikato River to the Eastern Interceptor is a more favourable option than discharging to the Western Interceptor. The submission also asks whether there will still be spare capacity in the Eastern interceptor in the future if more development occurs in the eastern fringes of the city.
46. The Eastern Interceptor sewer was designed to provide capacity for the Peacocke Structure Plan Area and this original design intent is reflected in the Wastewater Masterplan. The Wastewater Masterplan allows for infill and new development within the foreseeable boundary of Hamilton City.
47. The submission of S McConnell (46) also raises the viability of a pipeline thrust under the Waikato River and the cultural impacts of doing so.
48. I cannot address the constructability of the pipeline under the Waikato River or the appropriateness from a cultural perspective. However the pipeline should function as intended provided the pipeline is installed as a continuous welded pipe with a pressure rating suitable for the installation process and the operational conditions thereafter. I support the decommissioning of the pipeline in favour of an aerial pipeline across the future road bridge for reasons of better access for inspection and maintenance.
49. The submission of Hamilton City Council's (HCC) Open Spaces and Facilities Unit and Strategic Infrastructure Unit (65) outlines the requirement for wastewater to be discharged to the Eastern Interceptor and not the Western interceptor.
50. I agree with and support the requirement to discharge to the Eastern Interceptor as I have outlined earlier in my evidence.
51. The HCC submission also outlines requirements for upsizing of the proposed wastewater pipeline north of the Waikato River for the purpose of

accommodating future development from other areas within the Peacocke Structure Plan Area. The submission also proposes that the section of pipeline from Proposed Pump Station 4 and under the Waikato River is decommissioned once the Strategic Wastewater Pump Station and associated pipelines on the proposed road bridge are operational.

52. I support the requirement to upsize infrastructure to accommodate for other planned development where it aligns with the Masterplan and provides a more cost effective solution overall, which it will in this case. I also support the decommissioning of the pipeline under the Waikato River as stated in Section 51.



Christopher Hardy

27 March 2019

ATTACHMENT A – Model Report Letter

7 March 2019

Jackie Colliar
Strategic Manager - Infrastructure | City Development
Hamilton City Council
Private Bag 3010
Hamilton 3240

Dear Jackie

Amberfield Interim Wastewater Connection (200 lots)

1.0 Introduction

AECOM has previously undertaken modelling assessments on behalf of Hamilton City Council (HCC) in relation to the proposed Amberfield Development in Stage 2 of the Peacocke Development Area. Previous assessments focussed on connection of the development to the Western Interceptor sewer downstream of the Lorne St pump station. It was concluded that the western connection was unlikely to be viable due to discharge restrictions and resulting storage requirements.

Amberfield has carried out further investigations and in February 2019 proposed an interim connection for 200-400 lots to the existing wastewater network at 134 Peacocke Road. The existing network at this location discharges to the Western Interceptor via the Fitzroy pump station (SPS025). The proposed interim connection is described in a report titled *Amberfield Development – Information report on interim Amberfield wastewater connection to existing wastewater main at 134 Peacockes Road, O’Callaghan Design Ltd, February 2019*.

HCC requested that AECOM undertake an assessment under the commission of PSP18039 for a 200 lot development discharging to the existing wastewater network at 134 Peacockes Road. The basis of the assessment is generally as outlined in the OCDL information report. Additional information and parameters used in the assessment are outline in Section 2.0 of this letter.

This letter outlines the modelling method and the outcome of the assessment.

2.0 Assessment Methodology

The objective of the assessment was to provide an understanding of the impact of the proposed interim discharge on the existing network, if any. The assessment was undertaken using the HCC Wastewater Model Version 3 (the Model). The baseline is defined by the Baseline 2021 horizon model (2017 model update).

The 2021 horizon using the wet weather flow (WWF) simulation for the largest overflow event from the 10 years of rainfall was agreed and adopted. Network impacts used in the assessment are defined as follows:

- a. New pump station overflow locations or manhole spill locations in addition to those predicted by the Model.
- b. Increase in volume or frequency of an existing manhole spill or pump station overflow predicted by the Model.

The results of the baseline model (without the Development) were compared with the results of the Development model (including the 200 lot development) to determine the impact.

The Development Model

The Development model includes the following modifications and additions.

- The Development was modelled as a standalone catchment with the following parameters:
 - 200 lots – it was agreed that 200 lots would be the starting point for the assessment. Development up to 400 lots would only be modelled if no impact was shown for 200 lots.
 - 600 people based on an assumed 3 people per dwelling. This is consistent with Peacocke Stage 2 population assumptions used in modelling undertaken to date.

- Consumption rate of 200 L per person per day as per the ITS. This is also consistent with undertaken to date for new development.
- Inflow & Infiltration parameters were modelled in accordance with the baseline model methodology (10 m² per lot for inflow and 10% of ADWF for GWI for the 2021 horizon).
- The local network servicing the Development consists of the following:
 - The Development discharges into a 330 m³ emergency storage tank that can be utilised for wet weather storage. A weir at the top of the storage was modelled to quantify any spilled volume.
 - A conceptual gravity pipe connection (DN300) between the storage tank and the development pump station.
 - Pump station E1-PS_N3 has been included in the developed model to service future development. The pump station has a constant pump rate of 7 L/s as proposed by OCDL and agreed by HCC.
 - A 250 OD HDPE rising main is represented in the Model between pump station E1-PS_N3 and the proposed discharge point into a new gravity pipe on Weston Lea Drive as per the OCDL Information Report.
 - A DN300 UPVC gravity line from Weston Lea Dr to existing manhole WWV25002 located on Peacockes Road in the vicinity of number 134 as per the OCDL Information Report.

Controls were applied to the proposed pump station (E1-PS_N3) to limit pumping to times when the receiving network has spare capacity. HCC normally adopts a limit of 50 % pipe full in networks that have capacity issues. This was increased to 100 % pipe full for this assessment to reflect the interim nature of the connection and to maximise the available capacity.

Pump station operation was controlled by the water level in manhole WWV25008 using the following RTC control set up:

- IF the water level at manhole WWV25008 is less than 30.36 m RL THEN pump station E1-PS_N3 is ON.
- IF the water level at manhole WWV25008 is greater than or equal to 30.36 m RL THEN pump station E1-PS_N3 is OFF.

3.0 Assessment outcome

The effects of the wastewater discharge from the proposed 200 residential lots on the wastewater network are as follows:

- a. The total development discharge volume for the simulation is 845 m³. The simulation duration was 3.5 days and includes two dry weather days after the rainfall event ends.
- b. The proposed 330 m³ storage tank fills up shortly after the beginning of the rainfall event. An overflow from the storage occurs almost continually during the rest of the simulation duration.
- c. The total overflow volume from the proposed storage tank is 384 m³ for the simulation duration.
- d. The total volume discharged by the pump station (E1-PS_N3) is 122 m³.
- e. No increase in overflow volumes of existing manhole spill locations or new manhole spill locations are predicted by the model.
- f. The model predicts an increase in the overflow volume at Fitzroy pump station of 118 m³. The increase in the overflow is noted as being almost the same volume as what is discharged by the pump station.

4.0 Conclusions

The outcomes of this assessment indicate that:

- a. The interim discharge of 200 lots into the existing gravity pipe line at 134 Peacockes Road will have an adverse effect on the existing network during wet weather.
- b. The Fitzroy pump station does not have sufficient capacity to accommodate any additional volume. Almost the entire volume discharged from the development pump station overflows at the Fitzroy pump station.

5.0 Disclaimer

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Kind regards



Stepanka Vajlikova
Principal Engineer, Civil Infrastructure
stepanka.vajlikova@aecom.com

Direct Dial: +64 7 857 1819
Direct Fax: +64 7 834 8981



Chris Hardy
Associate Director - Civil Infrastructure
chris.hardy@aecom.com

Mobile: 021 379 160
Direct Dial: +07 959 1764

cc: Manjit Singh Devgun
Infrastructure Engineer | Strategic Development