Before an Independent Hearings Panel at Waimakariri District Council

under:	the Resource Management Act 1991
in the matter of:	Proposed Private Plan Change Request 31 (PPCR31) to the Waimakariri District Plan

Evidence in Chief – Colin Roxburgh
Waimakariri District Council

On behalf of Waimakariri District Council

Evidence on Water, Wastewater and Stormwater Servicing Relating to Private Plan Change Request PPCR31 – 535 Mill Road, Ohoka Plan Change Application

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INTRODUCTION

0. The purpose of this evidence is to provide to the Commissioners comment on water, wastewater and stormwater servicing relating to Private Plan Change PC31 – Mill Road, Ohoka, located south of the Ohoka township.
1. My name is Colin Roxburgh and I am the Project Delivery Manager for the Waimakariri District Council. In this position I have responsibility for the Project Delivery Unit of the Council, which is an internal consultancy responsible for providing professional services relating to infrastructure delivery within the Council. I have been in this role since May 2023, however prior to this I was the Council's Water Asset Manager from 2016.
2. I am a Chartered Professional Engineer, with a Degree in Natural Resources Engineering and over 15 years of experience in three waters engineering.
3. I have been requested to provide comments to the Commissioners on water, wastewater and stormwater servicing relating to Private Plan Change PC31, which requests rezoning of approximately 156 hectares of land from rural to a mixture of Residential 3, Residential 4a, Residential 8 and Business.
4. Although this is a Council hearing, I note that in preparing my evidence I have reviewed the code of conduct for expert witnesses contained in part 9 of the Environment Court Practice Note 2023 (the Practice Note). I have complied with it in preparing my evidence. I confirm that the issues addressed in this statement of evidence are within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.
5. My evidence has predominantly been based on assessing the information presented in the Infrastructure Report (Appendix G to the PPCR31 application) prepared by the applicant's consultant, Inovo Projects (**Inovo**).

COUNCIL PLANS AND DOCUMENTS

6. The Waimakariri District Plan sets out requirements for development and subdivision within the District. Of note for water, wastewater and stormwater servicing, Policy 18.1.1.1(l) requires proposals to show they will *"ensure the efficient and effective integration of any new infrastructure into the existing network"*. Additionally, Policy 11.1.1.3 states that "*subdivision and development should not proceed within areas that do not have access to appropriate utilities, or where the utilities are operating at full capacity"*. The Waimakariri District Council's Engineering Code of Practice sets out the minimum engineering standards for infrastructure, including water, wastewater and stormwater.

WATER

7. The plan change area is currently not serviced by a reticulated water supply. The application notes there are several irrigation bores across the site. The plan change area will require a new potable

water supply source and network; the existing primary well in the Ohoka township does not have capacity to service an additional development area of this size and density.

8. The Inovo report summarises water projects outlined in WDC's Long Term Plan (2021 – 2031), which are based on current projected growth for the area. The demand growth uses the existing zoning under the District Plan. It does not consider the plan change area. For clarity the planned upgrades and extension projects identified in the LTP will not have capacity to service the plan change area. No Development Contributions are currently included in the Developments Contribution Schedule to fund any infrastructure required to service the plan change area. Any new infrastructure required to service the plan change area will need to be wholly funded by the Applicant.

9. The application proposes the area will be serviced by an on-demand scheme, with the Residential 4A zone having a restricted supply of 2m^3/day. This aligns with WDC's current approach to water servicing. The predicted annual water take for the development has been estimated by Inovo as 412,000m^3/year. I note the peak demand figures for the Res8 units are based on 1.5 people per unit which, although based on industry feedback, is low for design purposes and is not consistent with the Engineering Code of Practice. Business zone demand has been based on a Watercare standard. This should be calculated based on WDC ECoP requirements. However, these are both relatively minor amendments and the calculations can be checked under detailed design. Overall, the estimated annual water take figure seems reasonable.

10. The current primary Ohoka well has a yield of 12.8L/s (387,432m^3/year). The Pattle Delamore Partners (**PDP**) preliminary community water supply assessment appended to the Inovo Report concludes it is viable to establish a community drinking water supply within the plan change area. PDP estimate four new bores, drawing water from the deeper aquifer at a similar depth to the existing Ohoka Well No.2 bore (84m deep; BW24/0262), will provide adequate redundancy (N+1). PDP do not propose locations, but do note bore spacing of at least 300 to 500 metres is recommended to reduce drawdown interference between supply bores and neighbouring bores (s7, Conclusions). Further specific work will need to be undertaken once the proposed bore locations are progressed to confirm that drawdown interference will be avoided.

11. The Inovo Report identifies the plan change area has numerous existing wells consented for irrigation use, and specifically mentions CRC991022 (which permits a total take of 4,968m^3/day (1.81million m^3/yr) for irrigation use) and CRC991827 (which permits a total take of 3,612m^3/day subject to flow in the Ohoka Stream).

12. CRC991022 permits water take from bores M35/9423 (30 metres deep), M35/3064 (12.5 metres deep) M35/3065 (12.0 metres deep) for irrigation of crops and pasture for grazing livestock, including milking dairy cows. It expires on 12 September 2041. These wells are too shallow to meet the Class 1 requirements of the Drinking Water Quality Assurance Rules. As noted in the PDP report, new, deeper bores, in a different aquifer, would need to be drilled for the public water supply. The existing shallow bores would be decommissioned.

13. The application proposes CRC991022 could be transferred to WDC for reallocation for use as a community drinking water supply, and notes change of consent conditions to reallocate the water use and source (i.e. a new deep bore) will be required, along with a permit to install new deep bore(s).

14. Under current Environment Canterbury (**ECan**) rules, the Eyre Groundwater Allocation Zone is overallocated. Following Plan Change 7 and the recent AWA Court of Appeal decision, any further

take and use of groundwater in an overallocated zone is a prohibited activity. A transfer of an existing use (irrigation) to another (drinking water) is also potentially affected by the decision. PDP's preliminary community water supply assessment appends email correspondence with Ecan (appendix C), which seems to outline three potential consenting routes. Submission 253 (D.Holmes) has identified a concern regarding the ability to obtain Ecan consent for a new groundwater source supply. I note the situation here is different as there is an existing consent which is proposed to be transferred. However, the ability to obtain an Ecan consent is outside the scope of this report and is an issue the applicant will need to address with Ecan directly in due course. At this time, the transfer has not been applied for and no new Ecan consents have been granted. The ability to transfer the existing consents, or obtain new ones, are therefore uncertain at this time.

15. As a general comment, the application does not describe how the new water supply to service the plan change area will integrate and operate within the wider Council reticulated water network. Submission 216 (Waimakariri District Council) also identifies this matter. The Infrastructure Report does refer to the existing Council supply as a source in some sections, which suggests the new water network may effectively absorb the existing Ohoka township supply. Alternatively, it could operate as a standalone network. Either option is viable, but additional work is required to understand which option would provide the most resilient and cost-effective solution to the community and Council.

16. Inovo confirm the proposed development can be provided with reticulation to comply with SNZ/PAS 4509:2008 (Fire Service Code of Practice) for all Residential 3, Residential 8 and Business Zoned areas. They further note hydrants for fire-fighting supply within the Residential 4A areas will be provided to a similar standard to the surrounding Mandeville and Ohoka areas. The development pipework will be designed to accommodate peak demand, including for fire-fighting demand, in accordance with the ECoP and SNZ/PAS 4509:2008. The details of the reticulation design and hydrant locations can be addressed through the resource consent process.

17. I note land will be required for the headworks site including surface reservoirs, and potentially for the locations of the new bores. The headworks may also need to allow for UV, chlorine, fluoridation to sufficiently future proof them. The applicant has not identified locations for these new utility lots so it is not certain they are allowed for in the overall development scheme design. It should be noted that the Council land is not sufficient for a new bore and/or headworks. It is the responsibility of the applicant to provide land for the required water supply infrastructure.

18. Further to the above point, the information provided by PDP refers to what is now a redundant version of the Drinking Water Standards for New Zealand. The secure groundwater classification system referred to does not form part of the revised 2022 Drinking Water Quality Assurance Rules (DWQAR) published by Taumata Arowai. While the existing supply met the 2018 Drinking Water Standards for New Zealand, further treatment (UV disinfection) is required to meet the DWQAR. This is not of major significance with the overall conclusions. However, it will need to be ensured that the design of the future system is in accordance with the current requirements, rather than the previous ones.

19. As a general theme throughout the PDP report, it is concluded that it is feasible a water supply with adequate capacity can be provided, but the bores will need to be drilled and tested to confirm this. This is different to saying that there is adequate information to conclude that an adequate supply will be able to be developed with a degree of certainty. Any project such as this relying on certain aquifer parameters being achieved carries with it a degree of uncertainty. The information provided by PDP

does not thoroughly explore this uncertainty, or comment on the implications if the aquifer parameters differ from those assumed. There is presumably a scenario in which the required yield cannot be achieved without unacceptable levels of drawdown, and it is unclear how this scenario would be addressed.

20. Overall, the Infrastructure Report and supporting PDP investigations demonstrate a water supply could be provided for the proposed plan change area, providing that the assumptions around aquifer parameters are valid. However, if the assumptions around the aquifer are found not to be valid once a bore is drilled and tested, there is not a viable option for water supply for the development. For this reason, the application cannot be supported until test bore(s) are drilled confirming quantity and quality of water is available that does not have unacceptable levels of drawdown.

WASTEWATER

21. Ohoka is serviced by the Mandeville Area Wastewater Scheme, which is included as part of the wider Eastern Districts Wastewater Scheme (**EDS**). The scheme consists of the Bradleys Road Pump Station and rising main – a 200mm OD pipe along the western side of Bradleys Road, known as the Mandeville-Ohoka rising main. The main conveys wastewater to the Rangiora Wastewater Treatment Plant (**WWTP**), 11.2km away.

22. Dwellings to the south of the plan change site are serviced by Septic Tank Effluent Pumping (**STEP**) systems, which pump wastewater to the Bradleys Road Pump Station. Existing dwellings within Ohoka are typically serviced by individual low-pressure sewer pump stations which discharge directly into the Mandeville-Ohoka rising main in Mill Road, or via a sub-main connection in Bradleys Road. Larger lifestyle properties, older dwellings and farms have individual on-site wastewater treatment and disposal systems.

23. Currently the Mandeville Area Wastewater Scheme (including Ohoka) accounts for approximately 3.5% of the treatment capacity of the Rangiora WWTP, and 2.5% of the Rangiora to Kaiapoi WWTP discharge pipe capacity (as at 2021). The treatment plant has capacity to accept additional flows from the proposed plan change area (approximately 7% of Rangiora WWTP treatment capacity).

24. If the site were to develop to MDRS standard, as things stand today the WWTP would have capacity to accept the additional flows. However, if MDRS developments were to increase significantly across the MDRS areas in the District which discharge to Rangiora WWTP, it could reach capacity sooner than forecast. It is important to understand how strategic assets like the WWTP are designed. The WWTP has been sized based on population growth forecasts; it is not linked to specific development areas or development densities. Forecast population growth vs density of development are two subtly different things, and strategic assets like the Rangiora WWTP are designed with population growth rather than development density in mind. However, more local infrastructure, i.e. pipes and pumpstations, are sized based on the specific catchment they are servicing, and this does take into account density of development within that area. Developing to MDRS standard in an area could therefore require localised upgrades to the reticulation system.

25. The Rangiora WWTP, as part of the Eastern Districts Sewer Scheme, has Development Contributions identified which are required to fund certain upgrade projects (including additional aeration ponds and an additional pump). If population growth were to happen faster than expected so more people are using the Rangiora WWTP sooner than expected, these upgrades would need to be brought forward.

26. The applicant's consultant has outlined wastewater collection and conveyance within the plan change area could be provided by gravity network, low pressure sewer systems, or a combination of both. Council standards require a gravity sewer system to be utilised for higher density residential development (to meet Council's standard level of service, and provide a lower maintenance cost for residents). Low-pressure sewer may be suitable for Residential 4A areas, or where ground conditions (e.g. high groundwater; liquefaction risk) mean conventional gravity systems are not viable. The infrastructure report outlines two options which have been assessed for the plan change area:

    i. Conventional gravity sewer for Res3, Res8 and commercial areas, with low pressure sewer for the Res4A area;
    ii. Low pressure sewer network for entire plan change area.

27. The capacity of the existing system has been documented in the Infrastructure Report. The report suggests there is limited spare capacity in the existing rising main for some of the Res4A properties. I do not agree with the capacity assessment set out in the report, and conclude there is no spare capacity in the existing rising main (discussed further below). The current operating pressure is 77m, and the pressure class of the pipe is PN10. Based on the number of pump starts in 2022 (average 11.2 per day over 253 days from 22/4/22 to 31/12/22), the Fatigue Load Factor on the pipe means the existing pipe may have an equivalent operating pressure above its PN rating. This should be further investigated, as it may mean the pipe will not last for its design life of 100 years, but also importantly suggests the pipe is currently being more than fully utilised. Any increase in pressure is therefore an unacceptable risk to Council. It is not possible to increase velocity without increasing pressure.

28. At section 3.5.2 Inovo set out an analysis to support their assessment that there is spare capacity in the rising main. There are two key points I do not agree with. Firstly, Inovo propose removing the flow data from 2013-2014 from the data set because, following that rain event, repairs and upgrades were carried out on the Mandeville sewer system which mean this level of inflow and infiltration (I&I) will not be experienced again. Secondly, they note the flow data analysis demonstrates the rising main is only at capacity 2% of the time.

29. Excluding the 2013-2014 data from the assessment is not accepted, as unfortunately I&I issues were encountered again in 2021 during the May rain event. I&I is still a challenge which needs to be allowed for in sizing the reticulation. Typically, I&I increases with network age, so future increases in I&I need to be accounted for. The argument that the pipe is only operating at capacity 2% of the time demonstrates the pipe is at capacity; even if the majority of the time the pipe is not flowing full, it does still reach capacity. It therefore does not have any spare. The assessment also does not account for other growth areas which are already planned to connect into the rising main, and it does not allow for deterioration in pipe condition.

30. The disagreement over whether the rising main has spare capacity is an item that can be worked through at detailed design stage. I agree with Inovo's conclusion that a new rising main to the WWTP will be required, and it is the size of that main which needs to be agreed.

31. The Infrastructure Report proposes the volume of storage required at a central pump station would depend on whether smart system controls are implemented on the low-pressure system to control when individual pump stations start/stop (as compared to the existing Mandeville system which has STEP tanks with high-level float control only). Council does not currently utilise smart controllers on low-pressure schemes, and Inovo proposes this could be introduced. Council would need to understand the cost impact of introducing a new maintenance and operational cost into the sewer system which it does not currently have. Due to Council's ownership policy for pressure sewer (i.e. each property owner owns the sewer infrastructure located on their property (pump station, pipes)), it would create a potentially complex scenario in which Council has ownership and responsibility for the smart controls, but not the private pump stations which are operated under the controls.

32. The sewer servicing for the plan change area, and how it integrates with Council's wider wastewater network, needs to be considered and designed together. Council's preference would be for a gravity plus low-pressure system in Res 4A, and low pressure elsewhere only when required due to ground conditions. In the long-term gravity systems provide a better level of service to residents at lower cost to them. Gravity systems do incur a higher up-front construction cost, but in the long-term provide a resilient and lower-cost service to residents.

33. S3.5 of the Inovo report mentions the "in built storage provided in STEP tanks, individual pump stations and main pump stations has the effect of attenuating peak wet weather flows", and that dynamic modelling to optimise storage volumes and residence time within the system would be carried out at detailed design stage. I'm not clear if Inovo is suggesting attenuation of peak wet weather flows should be allowed for in the design calculations. Council's ECoP requires 8-hour storage tanks at pump stations. These are <u>not</u> used to attenuate wet weather flows; instead, the 8-hour storage requirement is for emergencies such as outages due to electrical or mechanical failure. There is limited storage in existing STEP tanks, which is also not for wet weather attenuation. Some limited attenuation in the onsite pump stations in an LPS can be assumed, but this needs to be quantified. The attenuation volume required for the proposed development area needs to be quantified assuming no storage is available in the existing system, or the Bradleys Road pump station.

34. A further design element that will need to be considered is the residence time within the system, and septicity. These will need to be looked at as part of any detailed design.

35. With regards to the WWTP capacity, Council modelling suggests the capacity available in the system will be used up over the next 40 to 50 years. Inclusion of the plan change area within the plant capacity will likely bring forward the need for certain upgrades to the plant, and may affect DCs as projects which currently sit outside the 10-year horizon may be brought within it. This is something that would need to be assessed in more detail, and discussed with the developer.

36. The Inovo report concludes there is potential to utilise spare capacity in the existing Mandeville-Ohoka rising main if peak wet weather flows within the existing Mandeville or Ohoka area can be attenuated within the system. I disagree with this design approach, and consider a new rising main and a new main pump station is required to ensure discharge capacity from the plan change area to

the Rangiora WWTP is always available. Inovo do propose a new rising main, and their report outlines an option for gravity and low-pressure sewer. The Infrastructure Report demonstrates there are viable options for wastewater servicing. I note Council policy requires gravity systems to be installed where possible, due to the lower ongoing maintenance and servicing costs. Ground conditions in the area will be a major challenge to the installation of infrastructure, but the details of the network configuration can be worked through at a later stage. Ultimately it may be an expensive system to design and install, but it is not impossible.

STORMWATER

37. There is no formal stormwater infrastructure located on the site. Three land drains transect the site (the Ohoka Stream, the mid branch and the Ohoka south branch). As noted in the Infrastructure Report, the site is located on poorly drained soils with springs present and high groundwater levels found across the site (an average of 0.64m, with a high of 0.14m bgl in June 2018). As Inovo conclude, this means the increased stormwater runoff from impervious surfaces will not be able to be infiltrated, and the development will need to manage stormwater runoff through a primary, development-wide system. Groundwater will be the main challenge to ensuring viable stormwater infrastructure can be provided across the plan change area to ensure stormwater neutrality, and treatment of stormwater, is achieved as per the ECoP standards.
38. There is little detail provided on the proposed stormwater reticulation system design itself (e.g. pipe sizes, locations of basins, size of basins etc.). It would be helpful to understand what the system is proposed to consist of, including any stormwater infrastructure which will be privately owned. Council does not typically encourage the installation of private infrastructure, as Council does not have resource to monitor maintenance of private infrastructure and owners often do fail to properly maintain their own assets. When they fail it results in service requests to Council, despite Council not having any involvement in the maintenance of private infrastructure assets.
39. Inovo has identified an area of land required for stormwater management basins, but not provided any additional detail on what the design may involve. The Infrastructure Report states the infrastructure has been designed for the 20% AEP, and attenuation for the 2% AEP. This is in line with Council ECoP requirements. It is important to understand what stormwater infrastructure is intended to be constructed. Submissions such as 230 (D Myall) and 73 (L Hurley & C Stephen) demonstrate the very real challenges of stormwater run-off in this area.
40. As recognised in the Infrastructure Report, further groundwater investigations over a period of time will need to be undertaken. Inovo has provided an estimate that, assuming a basin depth of 0.5m, 7 – 9% of the plan change area will be required for stormwater attenuation. A general ‘rule of thumb’ for developments is to allow 5%, so by proposing a higher figure Inovo seem to have acknowledged the challenge of developing stormwater management in this area. I note there is a risk more land area could be required if further groundwater studies show a depth assumption of 0.5m for attenuation is too deep. Setting aside an insufficient area for stormwater management early on in

development planning is a very real risk; the applicant needs to be prepared to provide additional area in the event groundwater investigations demonstrate basins need to be shallower, or are not viable in certain areas of the site. The outline development plan does not show much area identified as future drainage reserve.

41. Anecdotally, submission 382 (D. Leslie) from an individual familiar with the site notes “it is a swamp”. The whole Ohoka area experiences high groundwater levels, and this site is no different. For the nearby Mill Road Stormwater Management Area designed for the ODP160 area, groundwater was on average 80% of the time 0.6m below existing ground surface, and shallower than 0.45m 20% of the time. With the challenges of stormwater management for this site in mind, I would recommend the ODP does not lock in specific area, but instead includes a requirement to amend development densities to ensure adequate stormwater management area is provided for the plan change area.

42. The PDP Stormwater Management Report appended to the Infrastructure Report concludes stormwater quantity can be managed via formalised flow paths and attenuation/flood storage to be provided by basins, compensatory storage and rain tanks. Water quality treatment is proposed to be provided by a combination of wetland, rain gardens, swales and bioscapes. The PDP report (s6.3.1) proposes HDPE or concrete surrounds to rain gardens and bioscapes in areas of high groundwater, with (i) inverts lower than the groundwater levels, (ii) filter media operating under partially saturated conditions and (iii) a submerged subsoil outlet to pipe infrastructure. It would be helpful to understand how such a system would operate in practice.

43. More detail regarding proposed stormwater treatment options has been provided in the PDP Stormwater Treatment report. However, there is an inconsistency between the Inovo report and the PDP Stormwater Treatment report. Inovo at s4.3 state “wetlands which would typically be used for such a large development have been ruled out for this site due to the potential groundwater take…”, whilst PDP propose a wetland within the treatment train for WQ1 and WQ10. Both reports identify groundwater is a challenge for the site, and any attenuation and treatment system ultimately need to meet ECoP and WWDG standards. This is a technical and consenting challenge the applicant’s consultants will need to resolve. As mentioned above, Council is currently unable to obtain an ECan consent for a stormwater management area located in Mill Road due to Plan Change 7 and the recent AWA decision.

44. Note a higher level of service is required in central business areas as the shops are typically at ground level with entrances straight off the footpath level. As this reduces any freeboard and poses a high risk of flooding from stormwater, the primary stormwater system has a higher design standard (10% AEP) in central business areas. The exact nature of buildings and proposed floor levels in relation to the road geometry is not known at this stage, however, will need to be considered at the subdivision or building consent stage. The Inovo and PDP reports do not appear to have recognised this.

45. In this area, road underdrains are likely to be required to protect the road structure. Roading underdrains which intercept groundwater in an overallocated groundwater zone are a prohibited activity. This is a current issue which another developer in the district is seeking to address with Ecan, as under current rules they cannot obtain consent to construct the roading network for the development. Although a consenting issue, this is a very practical problem developers and

Canterbury Councils are currently trying to manage. Neither the Inovo nor PDP report refer to roading underdrains, but these are likely to be required due to high groundwater levels.

46. The Inovo and PDP reports put forward technically viable stormwater treatment options, which meet District Plan requirements. The configuration and location of treatment will be detailed through the design process. The design of the stormwater reticulation and attenuation needs to be developed, but at a concept level Inovo and PDP have calculated a land area required for attenuation, and details of the reticulation network can be progressed later. However, due to current consenting challenges with Ecan which, as at the date of writing, remain unresolved, it is not clear if Ecan consents can be obtained for the stormwater management solutions proposed. Under PC7 the take and use of groundwater in an overallocated zone is a prohibited activity, and therefore under current rules cannot be consented. The "consentability" of the proposed stormwater solutions is a greater hurdle to overcome than the technical feasibility of the stormwater management approaches put forward.

SUMMARY

Recommendations

Water

47. The water supply and network proposed are feasible, but not guaranteed. Based on the assumptions made within the PDP analysis, it is demonstrated it is possible that sources may be able to be established without causing excessive drawdown within the aquifer, and without having unacceptable impacts on other bore users. However, this is not to say that this outcome will definitely be achieved, and it is not clear what the implications would be if the actual aquifer parameters encountered were different to those assumed, as it is acknowledged within the PDP evidence that these can be variable. As a minimum, a sensitivity analysis would need to be conducted to demonstrate that even if the actual parameters varied from those assumed, an adequate supply would still be able to be achieved, or alternatively test bores drilled to demonstrate the aquifer parameters with a greater degree of certainty. Correspondence with Ecan provided by the applicant suggests there are consenting pathways available, but until a consent has been applied for and issued this is not certain.

48. Another key item to clarify is whether the system will be a new, standalone system, or integrate with the existing Ohoka water supply.

Wastewater

49. There are further details of the wastewater system to be work through and agreed between WDC and the Applicant. However, the servicing report demonstrates there is a viable solution (although from a construction and cost perspective could be challenging due to ground conditions).

Stormwater

50. Stormwater is the most difficult of the “three waters” to provide for at this site. The servicing report does not contain much detail around the reticulation network, or the size / depth of proposed ponds. It is recommended the location and size of the ponds is not “locked in” under an ODP; there is a real possibility the size may have to change, particularly if they need to remain above groundwater levels to comply with the CLWRP. If Ecan consent for a stormwater system which is considered to “take and use” groundwater cannot be achieved because this is a prohibited activity, the stormwater system will need to be designed to comply with the CLWRP. That would require much larger areas of land and alternative solutions to be provided.
51. It will be critical to understand how stormwater volume will be managed through the development to avoid off-site effects. Groundwater is a major feature that will need to be adequately allowed for in the design; as Inovo notes further groundwater investigations are required. Post-development stormwater neutrality must be achieved and no nuisance effect on neighbouring properties can be created.