Additional requirements for Kings Gardens Stage I

The onsite stormwater retention system within the Kings Gardens subdivision differs in principle from past urban stormwater systems. Conventional domestic stormwater systems often discharge directly into the reticulated stormwater system, usually via connections from spouting into the road kerb and channel, or directly into the underground stormwater system.

To minimise downstream flooding, the stormwater system within the Kings Gardens subdivision has been designed to maximise on-site stormwater retention. This means that all stormwater from roof and paved areas is to be directed into soak holes within each section. In the event of very high rainfall, secondary overland flow paths are to be established and retained, to allow surface water to flow onto the road.

These requirements are laid out in the Cambridge North Deferred Residential Zone Structure Plan and the associated "Guidelines for on-site soakage". There is a link to the "Guidelines for on-site soakage" on the Waipa District Council's web site at www.waipadc.govt.nz, under publications. You may already have been advised of these issues by the developer or his agent at the time you purchased your property.

The implication for the property owner applying for a building permit, is that a specific stormwater system will be required to be designed by an engineer with suitable experience. The proposed design, including a producer statement from the engineer, is to be included with the building permit application for Council approval.

Attached to this advice sheet is a Design Checklist and Explanatory Notes for On-Site Stormwater Soakage, that your engineer should use to ensure that the design is compatible with the requirements of the Cambridge North Structure Plan.

An additional fee may be required for the processing associated with the checking of the stormwater design by Council staff.

On-site stormwater soakage/detention system

Design Checklist

Permeability tests

1.	Were two holes tested?	Y/N
2.	Is a description of the soil profile from each hole included?	Y/N
3.	Was the water table encountered? If so, at what depth?	Y/N
4.	Was the correct soil permeability test procedure followed?	Y/N
	If not, are the reasons for this acceptable?	Y/N
5.	Has the permeability been calculated correctly?	Y/N
	Are graphs included depicting the discharge v time results for each test?	Y/N
6.	Do the two holes show similar geology and permeability?	Y/N

Soakage system design

7.	Is a Producer Statement Design PS1 included that is signed by a suitably qualified engineer?	Y/N
8.	Is a site plan showing test locations, house and driveway location and layout of designed soakage system included?	Y/N
9.	Is a drawing of the designed soakage system, with dimensions included?	Y/N
10.	Does the soakage system have a minimum 1.0m setback from all boundaries and the house footprint? Will the location and structure of the soakage system affect the building and its foundations?	Y/N
11.	Are runoff calculations included?	Y/N
	Do the runoff calculations incorporate 2-year ARI events from 10 minutes to 72 hours in duration?	Y/N
12.	Is the storage/soakage capacity of the system calculated correctly?	Y/N
13.	Does the storage/soakage system meet the runoff requirements?	Y/N
	If not, what steps have been taken to dispose of the surplus stormwater?	Y/N
14.	Does the system overflow to the kerb or bubble-up via a driveway grate and not flow onto adjacent property?	Y/N
15.	Is a pre-treatment cesspit included? (Council prefers a grated cesspit with a minimum dimensions 0.6m diameter, 1.2m depth with minimum storage depth 0.8m below outlet invert).	Y/N

16. Is there access for maintenance? Y/N

17. Is the base of the system at least 0.5m above the groundwater table? Y/N

Construction review

18. Has the soakage system been constructed in accordance with the design drawings?

If not, detail any variations and determine their acceptability based on the design requirements.

- Are the soakage holes at least 1.0m away from boundaries? Y/N
- Will the location and structure of the soakage system affect the building and its foundations? Y/N
- Are the soakage holes at the depths specified in the design drawings? Y/N
- Is the overflow system constructed correctly? Y/N
- Have pre-treatment systems been installed? Y/N
- Is the system accessible for maintenance purposes? Y/N
- Other Y/N
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+On-site stormwater soakage system design

Explanatory Notes

1. Two permeability tests are required for each individual lot.

2. A soil profile for each hole is required.

3. The soil profile should include observations about groundwater.

   If perched water tables are encountered, stormwater soakage can not occur within the saturated zone.

   If the groundwater table is within 1.5m of the surface, and it is demonstrated that on-site disposal of stormwater is not practicable for the site, WDC reserves the right to request a detention system as an alternative, or reduce the required design capacity, or allow connection to the Council's piped stormwater network.

   If the groundwater table is not encountered, for design purposes it should be assumed to be within 0.5m of the base of the hole unless there is good evidence to suggest otherwise.

4. The test procedure is outlined in Appendix A of the *Cambridge North Residential Zone Guidelines for On-site Stormwater Soakage.*

   The test procedure should be followed except in areas of low permeability where the water takes longer than 2 hours to drain away. In these situations the test can be commenced after 2 hours and monitored for as long as practicable. Two tests per hole are still preferred but one should be adequate in low permeability zones.

5. The correct permeability equation is included in Appendix A of the *Cambridge North Residential Zone Guidelines for On-site Stormwater Soakage.*

   Permeability should be expressed in m/day. Graphs of each test are required.

   Soil categories and their indicative soakage characteristics are presented in Table 1. This information is included as a guide only.

6. If the holes show significant differences in permeability or geology these will need to be considered in the soakage system design.

   Where a large variation occurs, an average permeability for the site should not be used. Areas of differing permeability should be treated separately in the design process, some areas may need to be excluded from the soakage system.

7. A Design Producer Statement signed by an engineer WDC considers suitably qualified is required for all on-site stormwater soakage

systems.

8. A site plan including the location of permeability tests, proposed house, driveway and layout of soakage system is required.

   The layout plan should take into account any areas of low permeability that were found.

9. A drawing showing the system design is required. It must include dimensions. Refer to Figures 3 and 4 of the WDC Soakage Guidelines for typical drawing details.

10. A minimum 1.0m setback from all boundaries and the house footprint is required and more if required to ensure the integrity of the building foundations.

11. Runoff calculations should incorporate total roof area as well as driveway area.

    A runoff coefficient of 0.9 should be used in runoff calculations for impervious surfaces.

    Rainfall data for 2 year ARI events in included in Appendix B of the *Cambridge North Residential Zone Guidelines for On-site Stormwater Soakage.*

    Runoff calculations should incorporate events between 10 minutes and 72 hours in duration.

12. Runoff (m^3) – Storage (m^3) – Soakage (m^3) should be less than or equal to 0

13. The storage/soakage system should be designed to dispose of the largest stormwater volume generated from the rainfall events considered in the runoff calculations.

    In cases of low permeability, it may not be practicable to dispose of the required volume of stormwater. WDC reserves the right to request an alternative stormwater management design in these circumstances.

14. An overflow system is required for all systems.

    WDC prefers a bubble-up grate located within the driveway unless a kerb or lateral overflow connection has been provided by the subdivider.

15. Stormwater pre-treatment is required to reduce the potential for blockage of the soakage system. WDC prefers that the use of a cesspit sump to capture sediment and grit prior to discharge into the soakage system. Refer to the Soakage Guidelines for typical drawing details or talk to your Building Inspector.

16. The soakage system must be accessible for maintenance purposes.

17. The base of the deepest part of the system should be at least 0.5m

above the groundwater table.

Table 1 – Soil categories and indicative soakage characteristics

Soil category	Soil texture	Indicative permeability (m/day)	Indicative drainage class	Indicative soakage system design
1	Gravels and sands	>3.0	Rapidly drained	Typical soak hole system
2	Sandy loams	1.4 - >3.0	Well drained	
3	Loams	0.5 - 3.0	Moderately drained	Soak hole or trench system
4	Clay loams	0.06 – 1.5	Imperfectly drained	Soak hole or trench system, detention tanks maybe required
5	Light clays	<0.06 – 0.5	Poorly drained	On-site soakage may not be suitable where permeability is <0.06 m/day.
6	Medium-heavy clays	<0.06 – 0.5	Very poorly drained	

Adapted from AS/NZS 1547:2000, On-site domestic-wastewater management.

This information is intended as a guide only, it deals with homogenous soils only.

EXAMPLE SOAKAGE TRENCH AND SECONDARY OVERLAND FLOW PATH