


Assessing A20 permit applications for onsite wastewater management systems

Training for Council Officers


Risk Based Designs

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Tier 1 setback distances


Surface waters	300	300	150
Dam, lake or reservoir (used as source water for drinking or within a special water supply catchment) (See Notes 5, 6)	300	300	150
Wetlands (used as a source of water for drinking or within a special water supply catchment) (See Notes 4, 5)	100	100	50
Wetlands not used as source of water for drinking or within a special water supply catchment (for example, wetlands (continuous or ephemeral), estuaries) (See Note 4)	60	30	30
Open beach of high-tide mark, dams, reservoirs or lakes not used as source of water for drinking or within a special water supply catchment (See Note 4)	60	30	30
Dam, lake or reservoir (used as source water for drinking or within a special water supply catchment) (See Notes 5, 6)	300	300	150
Drainage lines (See Note 7)	40	20	20
Up-slope of cutting/encroachment (See Note 8)	15	15	15
Groundwater bores			
Groundwater bore - category 1 and 2a soils	NA	50	20
Groundwater bore - category 2b to 4 soils	20	20	20
Soil depth (See Note 9)			
Depth to highest seasonal water table (See Note 10)	15	15	15
Depth to hydraulically limiting layer (for example, bedrock)	15	0.6	0.6

- Be sure to check associated notes for table to confirm feature descriptions and definitions
- Table 4-11 describes risk factors for assigning setbacks

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Assessment of setback distances

- Setback distances (buffers) to sensitive receptors are defined to minimise risks of failure or poor OWMS performance
- Have typically been conservatively set as 'single figure' values for individual landscape features or structures, defined by the level of treatment
- GOWM (Section 4.5) describes a 2-tier approach to determining 'appropriate' setbacks to OWMS
- Table 4-10 outlines the standard (Tier 1) setbacks to be applied

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Special Water Supply Catchment Areas

In SWSC areas (potable water supply), setbacks could be reduced by up to 50% conditional on defined requirements, typically:

- Secondary effluent standard (20 BOD / 30 TSS)
- A maintenance and service contract is in place
- Council is satisfied the reduction is necessary to permit appropriate development of the site and risks to public health and the environment are minimised
- Has often been assumed

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Tier 1 setback distances

Landscape feature or structure	OWMS with secondary treated effluent		
	OWMS with primary treated effluent	OWMS with Level 1 or Level 2 generated effluent	OWMS with Level 1 and 2 generated effluent
Building/settlement boundary			
Up-slope of building (See Note 1)	6	3	3
Down-slope of building	3	15	15
Up-slope of adjacent lot	6	3	1
Down-slope of adjacent lot	3	15	0.5
Services			
Water supply pipe	3	15	15
Up-slope of potable supply channel (stock and domestic)	300	150	150
Down-slope of potable water supply channel (stock and domestic)	30	10	10
channel (stock and domestic)			
In-ground water tank (See Note 2)	15	7.5	3
Closed stormwater drain	6	3	2
Open stormwater drain	50	30	10
Gas supply pipe	3	15	15
Recreational areas			
Children's grassed playground (See Note 3)	6	3	2
In-ground swimming pool	6	3	2

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Risk-based assessment

Council is satisfied "that the risks to public health and the environment were minimised"

- Clear need to demonstrate that identified risks have been adequately assessed
- Appropriate risk assessment procedure applied
- Should be quantitative or a least semi-quantitative
- Suitable methodology for assessment of setback distances is outlined in AS/NZS1547:2012, Appendix R

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Appendix R, AS/NZS 1547:2012

- If Tier 1 setbacks are not achievable for 1 or more site features, Appendix R (Table R1 and R2) provides a methodology for a 'risk and performance-based' approach to determining appropriate setbacks
- Allows quantitative assessment of setback distances for site features across a specified range
- Appropriate setback distances determined by evaluating feature-specific constraints
- Allows suitable control measures (mitigation) to be used to reduce identified risk

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Constraint scale for setbacks

Table R2:


- Describes the key factors contributing to risk and the 'relative' scale of constraint (lower to higher) applicable for each item of specific concern (A-J)
- Presents quantifiable ranges for constraint scale interpretation and assignment
- Provides useful descriptions of key attributes contributing to the constraint analysis
- EDRS Guideline (Table 24) supports modification of the approach to establish location specific criteria

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Setback ranges and Constraints


Table R1:

- Presents recommended ranges for 'horizontal' and 'vertical' setback distances, based on identified site features or design elements
- Assigns site constraint 'items of specific concern' as applicable to assessing risk
- Considers 9 site / system features for analysis
- Includes qualifying notes to assist in selection and interpretation

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Constraint scale for setbacks

Item	Site constraint items of specific concern	Constraint scale ¹		Sensitive features
		Lower	Higher	
A	Microbial quality of effluent ²	Secondary treated effluent with disinfection	Primary treated effluent (no disinfection)	Groundwater and surface pollution hazard; public health hazard
B	Surface water ³	Category 1 to 3 ⁴ soils no surface water down gradient within 100m; low rainfall area	Category 4 to 5 soils permanent surface water <50m down gradient; high rainfall area; high resource/environmental value ⁵	Surface water pollution hazard for low permeability soils; low lying or poorly draining areas
C	Groundwater	Category 5 and 6 soils; low resource/environmental value	Category 1 and 2 soils; gravel aquifers; high resource/environmental value	Groundwater pollution hazard
D	Slope	0-6% (surface effluent application); 0-10% (subsurface effluent application)	>10% (surface effluent application); >30% (subsurface effluent application)	Offsite export of effluent; erosion
E	Position of land application area in landscape ⁶	Downgradient of surface water; property boundary; recreational area	Upgradient of surface water; property boundary; recreational area	Surface water pollution hazard; offsite export of effluent
F	Drainage	Category 1 to 2 soils; gently sloping area	Category 5 soils; sites with visible seepage; moisture tolerant vegetation; low lying area	Groundwater pollution hazard
G	Flood potential	Above 1 in 20 year flood contour	Below 1 in 20 year flood contour	Offsite export of effluent; system failure; mechanical faults
H	Geology and soils	Category 3 and 4 soils; low porous regolith; deep uniform soils	Category 1 and 6 soils; fractured rock; gravel aquifers; highly porous regolith	Groundwater pollution hazard for porous regolith and permeable soils
I	Landform	Hill crests; convex side slopes; and plains	Drainage plains and incised channels	Groundwater pollution hazard; resurfacing hazard
J	Application method	Drip irrigation or subsurface application of effluent	Surface/above ground application of effluent	Offsite export of effluent; surface water pollution

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Setback ranges and Constraints

Site feature	Setback distance range (m) ¹	Site constraint items of specific concern (see Table R2) ¹
Horizontal setback distance (m)		
Property boundary	1.5 - 50.0 ²	A, D, J
Buildings / houses	2.0 - 6.0 ³	A, D, J
Surface water ⁴	15.0 - 100.0	A, B, D, E, F, G, J
Bore, well ⁴	15.0 - 50.0	A, C, H, J
Recreational areas, children's play areas, swimming pools ⁵	3.0 - 15.0 ⁶	A, E, J
In-ground water tank	4.0 - 15.0 ⁷	A, E, J
Retaining wall, embankment, escarpment, cutting ⁸	3.0 or 45° from toe of wall (whichever is greatest)	D, G, H
Vertical setback distance (m)		
Groundwater ^{4, 9, 12}	0.6 - 1.5	A, C, F, H, I, J
Hardpan, bedrock	0.5 - 1.5	A, C, J

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Method

- For the proposal, relevant Site Features from column one of Table R1 should be identified and listed
- Only those where Tier 1 setbacks CANNOT be achieved need be considered
- For each identified Site Feature (e.g. surface water), the items of specific concern (key factors) should be identified (Table R2) and their relative level of constraint considered (i.e. Low, Moderate or High)

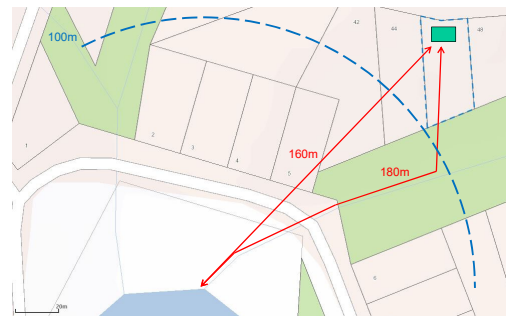
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Method

- For some site / system features, a simple binary decision may be required (Low or High)
 - Flood potential (Item G) is an example, where the site is either above or below the 1 in 20 year (5% AEP) flood level
- In other situations (e.g. slope) a site / system feature may occur along a continuum between the constraint extremes (Low / High), so an intermediate constraint rating of Moderate may be appropriate

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Site Plan




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Worked example

Scenario:

- Two bedroom cabin with full water-reduction (WELS) fixtures
- Occupancy: three persons (3EP)
- Site area 1,180m²
- Located ~100m from shoreline of a water reservoir of high environmental value within SWCA
- An intermittent drainage feature discharging to the reservoir is located downslope of the Site

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Example – Surface water method

For surface Water:

- Setback constraint range is defined = 15m - 100m
- Items of 'specific concern' = A,B,D,E,F,G,J
- Applicable constraint criteria described for each item
- The risk is then quantified and assigned a level; Low, Moderate or High using a weighted 'Risk Rating' for each site feature

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Worked Example

Proposed OWMS Design:

- Design flow rate (daily hydraulic load): 450L/day
- Secondary treatment (20/30mg/L BOD/TSS) using an aerated wastewater treatment system (AWTS)
- Effluent reuse via subsurface irrigation (SSI)

Relevant Site Feature:

- High value surface water within SWCA (≤ 300 m)

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Recommended Approach

- The weighted 'Risk Rating' is the sum of the individual scores for the particular site feature
- Values of 1 for Low; 2 for Moderate; and 3 for High are proposed
- The 'Risk Rating' is assigned based on where the calculated score lies on the possible range of aggregated scores
- Aggregated score ranges depend upon the number of site constraint items of specific concern described for each site feature

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Recommended Approach

- In the case of setback distances to identified site features, appropriate setback distances are determined at an appropriate point on the setback distance range for the level of risk
- The required setback distance is calculated based on the risk rating, with the setback distance range divided proportionally according to the risk rating
- The available setback or buffer distance (what can be realistically achieved) should be described and compared with the required setback distance

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Example - Site characteristics

- Site area 1,180m²
- Proposed cabin located ~160m from shoreline of a water reservoir of high environmental value
- Downslope intermittent drainage feature discharging to the reservoir (180m flow path)
- Slope >30%
- Soil: Loam (Category 3)
- Rainfall (moderate)
- Flooding: above 1 in 20 year flood level

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Site feature	Number of site constraint items of specific concern	Risk Rating Aggregated score range		
		Low	Moderate	High
Property boundary	3	3 - 4	5 - 7	8 - 9
Buildings/houses	3	3 - 4	5 - 7	8 - 9
Surface water	7	7 - 11	12 - 16	17 - 21
Bore, well	4	4 - 6	7 - 9	10 - 12
Recreational areas, children's play areas, swimming pools	3	3 - 4	5 - 7	8 - 9
In-ground water tank	3	3 - 4	5 - 7	8 - 9
Retaining wall, embankment, escarpment, cutting	3	3 - 4	5 - 7	8 - 9
Groundwater	6	6 - 9	10 - 14	15 - 18
Hardpan, bedrock	3	3 - 4	5 - 7	8 - 9

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Example – determination of acceptable setback to water body

- List Site Constraint Items of Concern (Table R1)
- Describe the applicable constraint criteria for each item
- Determine the level of Constraint; High, Moderate or Low (Table R2) for each item and assign the associated weighted 'Risk Rating'; 1 for Low, 2 for Moderate and 3 for High
- Calculate Aggregated Score and determine overall Risk Rating from Aggregated Risk Score


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Surface water - example

Low (7)	Moderate (14)	High (21)
Cat 1 to Cat 3 soils; no surface water down gradient within 100m; low rainfall area		Cat 4 to Cat 6 soils; permanent surface water <20m down gradient; high rainfall area; high resource/environmental value

15m ← → 30m ← → 50m ← → 100m

- For all OWMS designs, emphasis should be placed on mitigating all risk to a Low level
- For risk elements identified as Moderate or High, measures should be described which will reduce the risk to the lowest practicable level
- The assigned setback range will reflect the risk

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Example Risk-based assessment template

Site Feature	Site Constraint Items of Concern	Constraint Scale			Risk Assessment	Risk Assessment				Risk Rating
		Low Constraint	High Constraint	Applicable Constraint		Low (1)	Moderate (2)	High (3)	Justification	
Monitor Quality of Effluent	Secondary treated effluent path, distribution and Containment Service Agreement		Primary treated effluent (no discharges)	Primary treated effluent (no discharges)	High	0	0	3		
Surface Water	Category 1 to 3 soils; surface water down gradient within 100m; low rainfall area	Category 4 to 6 soils; permanent surface water <20m down gradient; high rainfall; high resource / environmental value	Category 2 soil; proposed LAA; 100m from downslope; drainage to reservoir; surface water; moderate rainfall area		Moderate	0	2	0		
Slope	<5% (surface effluent application); >5% (subsurface effluent application)	>5% (surface effluent application); >20% (subsurface effluent application)	Slope >15% in LAA; surface drainage system for land application		High	0	0	3		High (>10)
Position of Land Application Area in Landscape	Downgradient of surface water; primary boundary; recreational area	Uprgradient of surface water; primary boundary; recreational area	Proposed LAA; upgradient of surface water features		High	0	0	3		
Drainage	Category 1 to 2 soils; gently sloping area	Category 3 soils; area with visible seepage; moderate rainfall; vegetation; low lying area	Category 4 soils in an eroded, sloping landscape		Moderate	0	2	0		
Flood Potential	None 1 in 20 year flood contour	None 1 in 20 year flood contour	Proposed LAA above 1 in 20 year flood contour		Low	1	0	0		
Application Method	Site irrigation or subsurface application	Surface above ground application (drift)	Surface application		Low	0	0	3		

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