

Schedule 2 Fish Screen Standards and Guidelines

1. Where the diversion or take does not exceed a maximum rate of 10 L/s and a maximum volume of 100 m³ per day, a fish screen shall be installed to prevent fish from entering the intake. The fish screen shall be designed to the following standard and kept functional at all times that water is being taken:
 - (a) Water shall only be taken when a fish screen with a mesh size or slot width not exceeding 2 mm for intakes within 2 km of the coast, a coastal lake or estuary, or 3 mm for anywhere else, is operated and maintained across the full width of the intake to ensure that fish and fish fry are prevented from bypassing the screen into the intake; and
 - (b) The screen area shall be designed to ensure the calculated average through screen velocity does not exceed 0.12 m/s (screens should generally be designed to exceed this area to account for some routine level of clogging of the screen with detritus). The required area (m²) of fish screen should exceed = Flow (L/s)/120.

Example: The minimum required fish screen area for a cylindrical screen can therefore be calculated from

$$\text{Area} = 2\pi r(r + h) \times z$$

Where: $\pi = 3.14159$

r = radius of cylinder (m)

h = length or height of cylinder (m)

z = proportional open mesh area of screen material (i.e. 0.5 for mesh that is 50% open area)

Note: The above formula holds where the screen is fully immersed in water as is usually the case with pump takes. Where this is not the case, the area will need to be adjusted accordingly. Where 50% of the screen may be exposed, then the area calculation will need to be adjusted to half (or multiplied by 0.5), or the actual screen area would need to be doubled (multiplied by 2) in order to achieve the same area immersed. This example makes no allowance for the area taken up by the end of the intake pipe. Where high levels of detritus and other clogging materials are present, screen areas should be increased to account for reduced effective screen area.

2. Where the diversion or take does not exceed a maximum rate of 10 L/s and a maximum volume of 100 m³ per day but does not meet the standards in 1 above; or where the diversion or take exceeds a maximum rate of 10 L/s and a maximum volume of 100 m³ per day and the diversion is less than 10 m³/s or the take is less than 500 L/s pumped, a fish screen shall be installed to prevent fish from entering the intake. The fish screen shall be designed with the following features:
 - (a) The site is located as close to the river source as possible to minimise exposure of fish to the fish screen structure, and minimises the length of stream affected while providing the best possible conditions for (b) - (f) below;

Canterbury Land and Water Regional Plan

- (b) Water velocity through the screen (“approach velocity”) is slow enough (generally <math><0.12\text{ m/s}</math>) to allow fish to escape entrainment (being sucked through or washed over the screen) or impingement (being squashed or rubbed against the screen);
 - (c) Water velocity across (or past) the screen (“sweep velocity”) is greater than the approach velocity (b) and is sufficient to sweep the fish past the intake;
 - (d) An effective bypass system is provided that is easily accessible to entrained fish, and fish are taken away from the intake and back into the source channel, or into water which provides the fish with unimpeded passage back into the source channel;
 - (e) Screening material (mesh, profile bars or other) on the screen needs to have a smooth surface and openings that prevent any damage to fish coming into contact with the screening material; and
 - (f) The intake structure and fish screen are operated to a consistent, appropriate standard with appropriate operation and maintenance procedures, and this operation and maintenance should be regularly checked or monitored. A record should be kept of all the maintenance and monitoring carried out
3. Where the diversion is more than 10 m³/s or the take is more than 500 L/s pumped, in addition to the features listed in 2 (a) to (f) above, it will be necessary for the intake to be purpose designed and to consider on a case by case basis whether any additional features will be necessary to ensure fish are prevented from entering the intake.

Notes:

1. *Submerged galleries (abstracting water vertically) and galleries in river banks (abstracting water horizontally), or behavioural barriers and devices such as those that use light and sound diversions may not meet all of the engineering features set out in 2 above, but shall be considered to comply with them where it is demonstrated that they are able to exclude fish to the same degree of effectiveness*
2. *In conjunction with a number of stakeholder groups, the CRC has developed good practice guidelines for fish screening in Canterbury. A copy of this guideline can be obtained from the CRC to help in ensuring fish screens are designed, installed and operated to include the features identified in 2 above.*