

State code 18: Constructing or raising waterway barrier works in fish habitats

Purpose statement

The purpose of the code is to ensure that development involving the constructing or raising of **waterway barrier works** in a **fish habitat**:

1. maintains **fish** movement and connectivity throughout **waterways** and within and between **fish habitats**
2. maintains the health and productivity of **fisheries resources** and **fish habitat**
3. maintains the community and **fishing** sectors' use of the area and access to **fisheries resources**
4. provides adequate **fish** passage including a **fish way**, if necessary
5. avoid impacts or, where the **matters of state environmental significance** cannot be reasonably avoided, impacts are reasonably minimised and mitigated does not result in a **significant residual impact** on a **matter of state environmental significance** unless the **significant residual impact** is acceptable, and an **offset** is provided

Performance outcomes and acceptable outcomes

Table 18.1: Operational work

Performance outcomes	Acceptable outcomes
All development - Impacts on waterways	
PO1 Waterway barrier works do not result in adverse impacts on waterways that provide for fish passage .	No acceptable outcome is prescribed.
PO2 Development is designed, constructed and maintained to avoid and minimise impacts on matters of state environmental significance .	No acceptable outcome is prescribed.
PO3 Where development impacts on matters of state environmental significance , development mitigates impacts and provides an offset for any acceptable significant residual impact on matters of state environmental significance . Statutory note: For Brisbane core port land, an offset may only be applied to development on land identified as E1 Conservation/Buffer, E2 Open Space or Buffer/Investigation in the Brisbane Port LUP precinct plan.	No acceptable outcome is prescribed.
All development in general	

Using this code

The assessment benchmarks for this code comprise:

- purpose statement which identifies the overall intent of the code
- performance outcomes which set benchmarks to achieve the purpose statement of the code
- acceptable outcomes which identify one way to achieve the relevant performance outcome.

Development complies with the code where:

- it complies with the acceptable outcomes for the performance outcome; or
- it complies with all the performance outcomes, where not complying with the acceptable outcomes; or
- development does not meet relevant performance outcome(s) and SARA determines, on balance, that the development complies with the purpose statement.

NOTE: The use of stepped spillways cannot comply with this code.

This code also includes the glossary of terms for definitions relevant to this code and reference documents; including the guideline, **State Development Assessment Provisions guideline: State Code 18: Constructing or raising of waterway barrier works in a fish habitats** which provides direction on how to address this code.

Performance outcomes	Acceptable outcomes
<p>PO4 Aspects of development are only permitted within a waterway where there is a functional requirement and the development cannot be feasibly located elsewhere. Ancillary elements are to be located outside of the waterway.</p>	<p>No acceptable outcome is prescribed.</p>
<p>PO5 For the life of the barrier, adequate fish passage is provided and maintained through:</p> <ol style="list-style-type: none"> 1. fish way(s) that adequately provide for the movement of fish; or 2. the movement of fish is adequately provided for in another way. 	<p><i>For all crossings:</i></p> <p>A05.1 Hydraulic conditions (depth, velocities and turbulence) from the downstream to the upstream limit of the structure allow for fish passage of all fish attempting to move through the crossing at all flows up to the drownout of the structure.</p> <p>AND</p> <p>A05.2 For the life of the crossing, the relative levels of:</p> <ol style="list-style-type: none"> 1. a bed level crossing or a culvert invert 2. bed erosion protection 3. apron scour protection; and 4. the stream bed <p>are maintained to avoid drops in elevation at their joins.</p> <p>AND</p> <p>A05.3 The crossing and associated erosion protection structures are installed at no steeper gradient than the waterway bed gradient.</p> <p>AND</p> <p>A05.4 The crossing and associated erosion protection structures are roughened throughout to approximately simulate natural bed conditions.</p> <p>AND</p> <p>A05.5 Design and maintenance measures are in place for the life of the crossing to keep crossings clear of blockages through a regular inspection program in order to retain fish passage through the crossing.</p> <p>AND</p> <p><i>For waterway crossings other than bridges and culverts:</i></p> <p>A05.6 The crossing is built at or below bed level so that the surface of the crossing is no higher than the stream bed at the site.</p> <p>AND</p> <p>A05.7 The lowest point of the crossing is installed at the level of the lowest point of the natural stream</p>

Performance outcomes	Acceptable outcomes
	<p>bed (pre-construction), within the footprint of the proposed crossing.</p> <p>AND</p> <p>AO5.8 There is a height difference between the lowest point of the crossing and the edges of the low flow section of the crossing so that water is channelled into the low flow section of the crossing.</p> <p>AND</p> <p>AO5.9 The level of the remainder of the crossing is no higher than the lowest point of the natural stream bed outside of the low flow channel.</p> <p>AND</p> <p><i>For bridges:</i></p> <p>AO5.10 Bridge support piles are not constructed within the low-flow channel and do not constrict the edges of the low-flow channel, and the number of piles in-stream are minimised.</p> <p>AND</p> <p>AO5.11 Bridge abutments and bank revetment works do not extend into the waterway beyond the toes of the banks.</p> <p>AND</p> <p>AO5.12 Suitable fish habitats are maintained within the low-flow channel.</p> <p>AND</p> <p><i>For culverts:</i></p> <p>AO5.13 Culverts are only installed where the site conditions do not allow for a bridge.</p> <p>AND</p> <p>AO5.14 The combined width of the culvert cell apertures are equal to 100 percent of the main channel width.</p> <p>AND</p> <p>AO5.15 The base of the culvert incorporates a low flow channel consistent with the natural low flow channel and:</p> <ol style="list-style-type: none"> 1. is buried a minimum of 300 millimetres to allow bed material to deposit and reform the natural bed on top of the culvert base; or 2. the base of the culvert is the stream bed; or

Performance outcomes	Acceptable outcomes
	<p>3. the base of the culvert cell and any instream scour protection is roughened throughout to approximately simulate natural bed conditions.</p> <p>AND</p> <p>AO5.16 The outermost culvert cells incorporate roughening elements such as baffles on their bankside sidewalls.</p> <p>AND</p> <p>AO5.17 Roughening elements are installed on the upstream wingwalls on both banks to the height of the upstream obvert or the full height of the wingwall.</p> <p>AND</p> <p>AO5.18 Roughening elements provide a contiguous lower velocity zone (no greater than 0.3 metres/second) for at least 100 millimetres width from the wall through the length of the culvert and wingwalls.</p> <p>AND</p> <p>AO5.19 Culvert alignment to the stream flow minimises water turbulence.</p> <p>AND</p> <p>AO5.20 There is sufficient light at the entrance to and through the culvert so that fish are not discouraged by a sudden darkness.</p> <p>AND</p> <p>AO5.21 The depth of cover above the culvert is as low as structurally possible, except where culverts have an average recurrence interval (ARI) greater than 50 years.</p> <p>AND</p> <p>AO5.22 For culvert crossings designed with a flood immunity ARI greater than 50 years, fish passage is provided up to culvert capacity.</p> <p><i>For all other development no acceptable outcome is prescribed.</i></p>
PO6 Waterway barrier works are designed, constructed, operated and maintained to provide lateral and longitudinal fish passage for all members of the fish community.	<p>No acceptable outcome is prescribed.</p> <p><i>For new dams and weirs, refer to PO23</i></p>
PO7 The development is designed and operated so that all components of waterway barrier works and pathways of potential fish movement provide for	No acceptable outcome is prescribed.

Performance outcomes	Acceptable outcomes
safe fish passage. Stepped spillways are not acceptable.	
PO8 The drownout characteristics of the waterway barrier works are designed and constructed to not result in adverse impacts to fish passage.	No acceptable outcome is prescribed.
PO9 Development does not result in adverse impacts to fisheries resources .	No acceptable outcome is prescribed.
PO10 The design, construction and maintenance of the development does not result in non-essential hardening or unnatural modification of the main channel of the waterway .	No acceptable outcome is prescribed.
PO11 The development retains natural fish habitat and features such as shade, pools, riffles, rock outcrops and boulders, wherever possible.	No acceptable outcome is prescribed.
PO12 The design, construction and maintenance of the development does not result in straightening of meandering waterways .	No acceptable outcome is prescribed.
PO13 Where channels are to be significantly modified, the design and construction of the development replicates natural waterways and habitat features.	No acceptable outcome is prescribed.
PO14 Where waterway barrier works will modify water levels or flow characteristics of the waterway , existing up and downstream structures are upgraded to provide adequate fish passage in accordance with the new levels or flow characteristics.	No acceptable outcome is prescribed.
PO15 The development is designed, constructed and maintained to provide water exchange sufficient to maintain or improve water quality and flow conditions on which fisheries resources depend.	No acceptable outcome is prescribed.
PO16 Development likely to cause drainage or disturbance to acid sulfate soils, prevents the release of contaminants and impacts on fisheries resources and fish habitats .	No acceptable outcome is prescribed.
PO17 The development is designed, constructed and maintained to not result in adverse impacts to beds, banks and vegetation adjacent to the permanent development footprint.	No acceptable outcome is prescribed.
PO18 After completion of in-stream works, disturbed areas of the bed and banks of the waterway outside the permanent development footprint are returned to their original profile and stabilised to promote regeneration of natural fish habitats .	No acceptable outcome is prescribed.
PO19 The development is designed and constructed to maintain or restore the natural substrate of the waterway bed.	No acceptable outcome is prescribed.
PO20 Development does not adversely impact on community access to tidal land and waterways .	No acceptable outcome is prescribed.
PO21 Development does not adversely impact on community access to fisheries resources and fish habitats including recreational and indigenous fishing access.	No acceptable outcome is prescribed.
PO22 Development does not adversely impact on commercial fishing access and linkages between a commercial fishery and infrastructure, services and facilities.	No acceptable outcome is prescribed.

Performance outcomes	Acceptable outcomes
Development involving a new dam or weir	
PO23 The development provides adequate fish passage through bidirectional fish way(s) at the location of impact or through a net benefit to fish passage at other existing barrier location(s). Other existing barrier location(s) must be located within: <ol style="list-style-type: none"> the same river or catchment system; or a nearby catchment system with similar aquatic ecology. 	AO23 Fish passage is provided and maintained through bidirectional fish way(s) where economically feasible and where it provides environmental benefit
Development involving fish ways	
PO24 Having regard to the hydrology of the site and fish movement characteristics, the fish way is capable of operating, and will operate: <ol style="list-style-type: none"> for as long as the waterway barrier work is in position; and whenever there are inflows into the impoundment or waterway, release out of the impoundment and during overtopping events; and when the impoundment is above dead storage level. 	No acceptable outcome is prescribed.
PO25 The development is designed, constructed and maintained to ensure the hydrology allows for fish movement for the life of the waterway barrier works .	No acceptable outcome is prescribed.
PO26 Fish ways are designed, constructed and maintained to not adversely impact on fish and fish movement.	No acceptable outcome is prescribed.
PO27 Fish ways are designed, constructed and operated to direct release water through the fish way as a priority over the outlet works.	No acceptable outcome is prescribed.
PO28 Fish ways are designed, constructed and operated to ensure flows and releases of water do not result in adverse impacts to fish or fish passage .	No acceptable outcome is prescribed.
PO29 The development is designed, constructed and operated to ensure fishway operational issues are promptly rectified for the life of the fishway including: <ol style="list-style-type: none"> all components are designed to be durable, reliable and adequately protected from damage during high flow and flood events all components can be replaced; and a contingency plan ensures provision of alternate adequate fish passage during the fish way re-instatement process. 	No acceptable outcome is prescribed.
PO30 The development is designed to allow for installation of monitoring equipment and to allow access for monitoring and maintenance.	No acceptable outcome is prescribed.
PO31 Fish ways are designed, constructed and operated to source water supply from surface water or equivalent water quality.	No acceptable outcome is prescribed.

Performance outcomes	Acceptable outcomes
PO32 Tailwater control structures are designed, constructed and maintained to allow for fish passage .	No acceptable outcome is prescribed.
Development involving floodgates	
PO33 The design, construction and operation of a floodgate does not result in adverse impacts on fish, fish passage or fish habitat .	No acceptable outcome is prescribed.
PO34 Floodgates are designed, constructed and maintained to ensure the invert is at bed level.	No acceptable outcome is prescribed.
Temporary waterway barrier works	
PO35 The temporary waterway barrier works will exist only for a specified temporary period.	No acceptable outcome is prescribed.
PO36 The temporary waterway barrier works provides adequate fish movement	No acceptable outcome is prescribed.
PO37 The development is designed, constructed and maintained to ensure temporary barriers are removed and the bed and banks are returned to their original profile and stability.	No acceptable outcome is prescribed.
PO38 Temporary waterway barrier works are designed, constructed and maintained to allow for downstream movement during works, where required by species present.	No acceptable outcome is prescribed.
PO39 The condition and value of aquatic macrophytes and other fish habitats is maintained.	No acceptable outcome is prescribed.

18.3 Reference documents

Department of Agriculture and Fisheries website, [What is a waterway?](#)

Department of Agriculture and Fisheries website, [What is a waterway barrier work?](#)

Department of Agriculture and Fisheries website, [What is not a waterway barrier work?](#)

Department of Environment and Science 2018, [Queensland environmental offsets framework documents](#)

Department of Environment and Science 2018, [Fish habitat area code of practice: The lawful use of physical, pesticide and biological controls in a declared fish habitat area.](#)

Department of Primary Industries 1998, [Restoration of fish habitats: Fisheries guidelines for marine areas FHG 002](#)

Department of Primary Industries 2000, [Fisheries guidelines for fish habitat buffer zones FHG 003](#)

Department of Primary Industries and Fisheries 2006, [Fisheries guidelines for fish-friendly structures FHG 006](#)

Department of State Development, Infrastructure and Planning 2014, [Significant residual impact guideline](#)

Local Government Association of Queensland 2012, [Mosquito management code of practice](#)

Policies

Department of National Parks, Sport and Racing 2015, [Marine management: Fish habitat Area selection, assessment, declaration and review](#)

Department of National Parks, Sport and Racing 2015, [Marine management: Management of declared fish habitat areas](#)

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Department of Primary Industries 1998, Departmental procedures for provision of fisheries comments: Dredging, Extraction and Spoil Disposal Activities (FHMOP 004)

Department of Primary Industries and Fisheries 2007, Management and protection of marine plants and other tidal fish habitats (FHMOP001)

Department of Primary Industries and Fisheries 2007, Tidal fish habitats, erosion control and beach replenishment (FHMOP010)

Department of Agriculture and Fisheries 2015, Oyster industry plan for Moreton Bay Marine Park

Ministerial Council on Forestry, Fisheries and Aquaculture 1999, National Policy for the Translocation of Live Aquatic Organisms – Issues, Principles and Guidelines for Implementation

Queensland Department of Primary Industries 1996, Departmental Procedures for Permit Applications Assessment and Approvals for Insect Pest Control in Coastal Wetlands (FHMOP 003)

Accepted Development

Department of Agriculture and Fisheries 2017, Accepted development requirements for operational work that is constructing or raising waterway barrier works

Other references

Department of Agriculture, Fisheries and Forestry 2012, Declared Fish Habitat Area Network Assessment Report 2012

Department of Agriculture, Fisheries and Forestry 2013, Guideline on fisheries adjustment as a result of development (available on request from DAF)

Department of National Parks, Sport and Racing 2015, Declared fish habitat area network strategy 2015-2020: Planning for the future of Queensland's declared fish habitat area network

Department of Environment and Resource Management 2011, Queensland Wetland Buffer Planning Guideline

Department of Environment and Science 2018, Declared fish habitat area network assessment report – 2017

Department of Environment and Science website, Declared fish habitat area plans

Department of Science, Information Technology, Innovation and the Arts 2014 , Queensland Acid Sulfate Soil Technical Manual: Soil Management Guidelines

International Ecohydraulics Symposium 2012, From Sea to Source: International guidance for the restoration of fish migration highways

International Erosion Control Association Australasia 2008, Best practice erosion and sediment control document

SEQ Catchments website

Glossary of terms

Drownout means when the tailwater and headwater levels across a weir are essentially equal, velocities are sufficiently low at, or close to, the edge of the spillway crest and the weir is fully submerged to a sufficient depth to allow for **fish** passage and for the species and size-classes of **fish** moving through the site to cross the weir.

Fish see section 5 of the *Fisheries Act 1994*.

Note: **Fish**:

1. means an animal (whether living or dead) of a species that throughout its life cycle usually lives:
 - a. in water (whether freshwater or saltwater); or
 - b. in or on **foreshores**; or

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- c. in or on **land** under water
- 2. includes:
 - a. prawns, crayfish, rock lobsters, crabs and other crustaceans
 - b. scallops, oysters, pearl oysters and other molluscs
 - c. sponges, annelid worms, beche-de-mer and other holothurians
 - d. trochus and green snails
- 3. does not include:
 - a. crocodiles; or
 - b. protected animals under the *Nature Conservation Act 1992*; or
 - c. pests under the *Pest Management Act 2001*; or
 - d. animals prescribed under a regulation not to be **fish**
- 4. also includes:
 - a. the spat, spawn and eggs of **fish**
 - b. any part of **fish** or spat, spawn or eggs of **fish**
 - c. treated **fish**, including treated spat, spawn and eggs of **fish**
 - d. coral, coral limestone, shell grit or star sand
 - e. freshwater or saltwater products declared under a regulation to be **fish**.

Fish habitat see the *Fisheries Act 1994*.

Note: **Fish habitat** includes land, waters and plants associated with the life cycle of **fish**, and includes land and waters not presently occupied by **fisheries resources**.

Fish way see the *Fisheries Act 1994*.

Note: **Fish way** means a **fish** ladder or another structure or device by which **fish** can pass through, by or over **waterway barrier works**.

Fisheries resources see the *Fisheries Act 1994*.

Note: **Fisheries resources** includes **fish** and **marine plants**.

Fishery see section 7 of the *Fisheries Act 1994*.

Note: **Fishery** means activity by way of **fishing**, for example, activities specified by reference to all or any of the following:

- 1. a species of **fish**
- 2. a type of **fish** by reference to sex, size or age or another characteristic
- 3. an area
- 4. a way of **fishing**
- 5. a type of boat
- 6. a class of person
- 7. the purpose of an activity
- 8. the effect of the activity on a **fish habitat**, whether or not the activity involves **fishing**
- 9. anything else prescribed under a regulation.

Fishing see the *Fisheries Act 1994*.

Note: **Fishing** includes:

- 1. searching for, or taking, **fish**
- 2. attempting to search for, or take, **fish**
- 3. engaging in other activities that can reasonably be expected to result in the locating, or taking, of **fish**
- 4. landing **fish** (from a boat or in another way), bringing **fish** ashore or transshipping **fish**.

Foreshore see the *Fisheries Act 1994*.

Note: **Foreshore** means parts of the banks, beds, reefs, shoals, shore and other land between high water and low water.

Legally secured offset area see the *Environmental Offsets Act 2014*.

Note: An area of land is a **legally secured offset area** if:

- 1. the area is:
 - a. an environmental **offset** protection area; or
 - b. an area declared as an area of high nature conservation value under section 19F of the *Vegetation Management Act 1999*; or
 - c. another area prescribed under a regulation; and
- 2. under the *Environmental Offsets Act 2014* or another Act, the area is subject to a delivery or management plan or agreement (however described in this Act or the other Act) to achieve a conservation outcome for a **prescribed environmental matter**.

Main channel means the active component of the flow channel of a **waterway** characterised by a distinct change in appearance or structure at the upper limit of the channel (refer to accepted development requirements for examples).

Fish passage means the ability for fish to move both upstream and downstream through waterways and to connected wetlands.

Marine plant see section 8 of the *Fisheries Act 1994*.

Note: **Marine plant** includes the following:

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1. a plant (a tidal plant) that usually grows on, or adjacent to, **tidal land**, whether it is living, dead, standing or fallen
2. material of a tidal plant, or other plant material on **tidal land**
3. a plant, or material of a plant, prescribed under a regulation or management plan to be a **marine plant**.

A **marine plant** does not include a plant that is a prohibited matter or restricted matter under the *Biosecurity Act 2014*.

Matters of state environmental significance see schedule 2 of the Environmental Offsets Regulation 2014.

Note: **Matters of state environmental significance** are **prescribed environmental matters** under the Environmental Offsets Regulation 2014 that require an **offset** when a prescribed activity will have a **significant residual impact** on the matter. A **matter of state environmental significance** is any of the following matters:

1. regional ecosystems under the *Vegetation Management Act 1999* that:
 - a. are endangered regional ecosystems
 - b. are of concern regional ecosystems
 - c. intersect with a wetland shown on the vegetation management wetlands map
 - d. contain areas of essential habitat shown on the essential habitat map for an animal that is endangered wildlife or vulnerable wildlife or a plant that is endangered wildlife or vulnerable wildlife
 - e. are located within the defined distances stated in the Environmental Offsets Policy 2014 from the defining banks of a relevant watercourse or drainage feature as shown on the vegetation management watercourse and drainage feature map
 - f. contain remnant vegetation and are areas of land determined to be required for ecosystem functioning ('connectivity areas')
2. wetlands in a wetland protection area or wetlands of high ecological significance shown on the Map of Queensland Wetland Environmental Values under the Environmental Protection Policy 2019
3. wetlands and watercourses in high ecological value waters as defined in schedule 2 of the Environmental Protection (Water and Wetland Biodiversity) Policy 2019
4. designated precincts in strategic environmental areas under the Regional Planning Interests Regulation 2014
5. threatened wildlife (plants and animals) under the *Nature Conservation Act 1992* and special least concern animals under the Nature Conservation (Wildlife) Regulation 2006
6. protected areas under the *Nature Conservation Act 1992* excluding coordinated conservation areas
7. highly protected zones of state marine parks under the *Marine Parks Act 2004*
8. declared fish habitat areas under the *Fisheries Act 1994*
9. waterways that provide for fish passage under the *Fisheries Act 1994* if the construction, installation or modification of waterway barrier works carried out under an authority will limit the passage of fish along the waterway
10. marine plants under the *Fisheries Act 1994*
11. legally secured **offset** areas.

Offset means environmental **offset** under the *Environmental Offsets Act 2014*.

Note: Environmental **offset** means an activity undertaken to counterbalance a **significant residual impact** of a prescribed activity on a **prescribed environmental matter**, delivered in accordance with the Environmental offsets framework. The **prescribed environmental matters** assessed under the State Development Assessment Provisions are **matters of state environmental significance**.

Prescribed environmental matters see the *Environmental Offsets Act 2014*.

Note: A **prescribed environmental matter** is any species, ecosystem or other similar matter protected under Queensland legislation for which an **offset** may be provided. A **prescribed environmental matter** may be a matter of national, state or local environmental significance, however, assessment criteria in the State Development Assessment Provisions only relate to **matters of state environmental significance**. Each of the **prescribed environmental matters** are listed under the Environmental Offsets Regulation 2014.

Significant residual impact see the *Environmental offsets Act 2014*.

Note: **Significant residual impact** is an impact, whether direct or indirect, of a prescribed activity on all or part of a **prescribed environmental matter** that:

1. remains, or will or is likely to remain, (whether temporarily or permanently) despite on-site mitigation measures for the prescribed activity
2. is, or will, or is likely to be, significant.

Guidance for determining if a prescribed activity will have a **significant residual impact** on a **matter of state environmental significance** is provided in the Significant Residual Impact Guideline, Department State Development, Infrastructure and Planning, 2014.

Strategic environmental area see the *Regional Planning Interests Act 2014*.

Note: A **strategic environmental area** is an area that:

1. contains one or more environmental attributes for the area
2. is either:
 - a. shown on a map in a regional plan as a **strategic environmental area**; or
 - b. prescribed under a regulation.

Tidal land see the *Fisheries Act 1994*.

Note: **Tidal land** includes reefs, shoals and other land permanently or periodically submerged by waters subject to tidal influence.

Waterway see the *Fisheries Act 1994*.

Note: **Waterway** includes a river, creek, stream, watercourse, drainage feature or inlet of the sea. For further guidance see the fact sheet Maintaining Fish Passage in Queensland: What is a waterway? Department of Agriculture, Fisheries and Forestry, 2014.

Waterway barrier works see the *Fisheries Act 1994*.

Note: **Waterway barrier works** means a dam, weir, or other barrier across a **waterway** if the barrier limits **fish** stock access and movement along a **waterway**. For further guidance see the factsheets Maintaining Fish Passage in Queensland: What is a waterway barrier work?,

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18.5 Abbreviations

ARI – Average Recurrence Interval

