

Batemans Bay Bridge replacement

Piling Fact Sheet



Temporary jetty required for river-based piling work. Grafton Bridge, 2017.

Roads and Maritime Services will use piles (in-ground concrete columns) to form the bridge's solid foundation for the structure of the Batemans Bay Bridge replacement. The piles connect the piers and the main structure with the rock below ground. Land piling and piling for a temporary construction jetty will start in May 2019 and river piling will start in June 2019. All piling is expected to be completed by the end of 2019, weather permitting.

What is piling?

Piles create a strong foundation to support a structure and its loads (such as self-weight, traffic, wind and flooding) by connecting to a strong layer of soil or rock. Piles are commonly used when the soil closer to the surface does not have the strength to support a structure. The method used to install the piles depends on the type of pile and factors such as soil type and the size of the load that each pile must support.

What are some types of piling?

There are two types of piles in bridge construction: driven piles and bored piles.

Bored piles are constructed by drilling into the ground and then filling the hole with steel reinforcing cages and concrete. Depending on the geology of the site, temporary or permanent steel liners are often inserted into the ground (using a vibration method). The liner is the same shape as the finished pile and, once in place, the soil and rock inside the liner is removed using a drilling rig to create a circular hole. A steel reinforcing cage is placed into the drilled hole and concrete is poured to create the pile. The temporary liner is then removed, or the permanent liner left in place, depending on the soil type and pile design.

Driven piles are constructed by driving pre-manufactured piles (usually concrete or steel) into the ground using a large impact hammer on a piling rig. This method of piling is generally noisier, with a constant banging sound, as the piles are driven into place, and typically creates more vibration.

The Batemans Bay Bridge replacement project has chosen to use bored piles for the bridge. This helps mitigate noise associated with piling as bored piles do not require large hammers to impact liners into rock. Instead, the permanent or temporary liners will be vibrated into the ground.

Driven piles will be used for some of the smaller structures, other than the bridge, such as the temporary jetties. These piles are smaller than the bridge piles so will be faster to install and have a lower impact than larger driven bridge piles.

Are there any impacts to residents during piling?

Piling can create increased levels of construction noise and vibration. Bored piles, which are the type being constructed on the Batemans Bay Bridge replacement project, generate less noise and vibration impacts than driven piles.

The project will carry out a number of measures to reduce noise and vibration impacts from piling. These will include:

- Where possible, only piling during the approved construction hours
- Selection of best available technologies which generate lower noise and vibration levels
- Using appropriate machinery to reduce the duration of work
- Switching off machinery when not in use

- Placing temporary acoustic barriers around the noise source
- Orienting equipment so that the noise source is directed away from receivers.

These measures are set out in the Noise and Vibration Monitoring Plan which is part of the Construction Environment Management Plan approved by the Department of Planning and Environment. The plan is available on the project website.

Will there be out of hours work?

We are committed to minimising disruptions during this activity and have not planned for out of hours work. However, work outside standard construction hours may occur when unforeseen circumstances result in a concrete pour not finishing within standard working hours.

Potential out of hours work could extend construction activity from **6pm to 10pm between Monday and Friday**, and from **1pm to 5pm on Saturday**.

This is because concrete pours must be continuous to ensure the quality and strength of the foundation. Night work cannot be confirmed until the day the work is being carried out.

What is ground vibration?

Ground vibration is the energy transmitted through the ground caused by work. The level of ground vibration will vary according to the local terrain, geology, groundwater, weather and the distance to the receiver. Ground vibration will generally move faster and at a higher frequency in rock compared to soil and reduces in strength as the distance increases from the work. Ground vibration is measured by Peak Particle Velocity (PPV) in millimetres per second (mm/s). Ground vibration is generally considered with respect to two aspects:

- Property impact – either structural or cosmetic
- Human comfort.

A common concern is that ground vibration will cause damage to property and structures. Cosmetic damage, such as small hairline cracks, can occur to residential properties or light commercial-type buildings, when the level reaches about 20mm/s. Depending on the structure type and condition, structural damage is not expected until vibration levels exceed 50mm/s. Prior to the start of construction, property condition reports were prepared for all properties expected to

receive vibration from the project. These reports will be used to assist in considering whether property damage has occurred.

While everyone's perception and tolerance levels are different, a person can generally feel vibration levels in excess of 1mm/s.

Is there any monitoring of noise and vibration?

Noise monitoring is carried out to assess the impact of construction activities against existing noise levels. This is carried out monthly and for specific activities. Vibration monitoring is carried out when new work starts and throughout the duration of any work that creates vibration. Both noise and vibration monitoring will be carried out for all piling work.

How does the project team know if noise or vibration levels are exceeded?

An automatic alert system has been set up on our vibration monitor to alert members of the project team if vibration exceeds a set trigger value. This trigger value is below that at which structural damage can occur and alerts a member of the project team to closely monitor the activities onsite.

Noise and vibration is monitored to ensure that piling work is done in accordance with the Conditions of Approval for the project, NSW Environment Protection Authority and Roads and Maritime procedures and guidelines.

If there is an exceedance of noise or vibration, the following measures will be implemented:

- Additional noise monitoring may be carried out at sensitive receivers to determine if the actual construction noise generated exceeds the predicted 'worst case' construction noise levels identified in the plan
- Noise monitoring may be carried out for the purpose of refining construction methods or techniques to minimise noise
- Ongoing spot checks of noise intensive equipment will be undertaken throughout construction to ensure compliance with manufacturer's specifications
- Where actual noise levels are found to exceed the predicted worst case levels by more than 2(dB)A, the source of excessive noise generations will be identified and any reasonable and feasible measures available will be implemented to either reduce noise emissions or reduce impacts on residents. The project has chosen to use the lowest impact piling method possible.

How will I be informed about piling and noisy activities?

The project informs the community about piling or noisy activities in a number of ways. These include:

- Regular project updates
- Updates on the project website
- Notifications
- One-on-one consultation

What happens once piling is complete?

Once the piling activity is complete, building on the piers will start in order to carry the bridge segments. The piers will be built from steel reinforcement and concrete using temporary platforms and formwork.

Pre-cast concrete segments will be used to build the new bridge. 168 segments are being manufactured in a temporary facility south of Mogo and will be transported to the work site. The pre-cast concrete segments will be installed over the Clyde River from a barge, in a sequence alternating between each side of the bridge piers to balance the load on the pier. The segments will be tied together using multiple steel bars and then stressing cables between adjoining sections.

Once the main structure has been built, the finishing works for the bridge can begin such as lighting, barriers and guard rail.



A piling hammer vibrating a steel casing into place.



A piling rig boring a pile into the Clarence River on another Roads and Maritime project.