

Transport for NSW

Nelligen Bridge Replacement project

Fact sheet – construction piling work



Artist impression of the new bridge across the Clyde River, looking west.

The Nelligen Bridge Replacement project will require piling work on land and in the river. Land-based piling for ground improvement started in late April 2021, and river piling for the new bridge foundation will start in late June 2021. Piling is expected to be completed by early 2022, weather permitting.

Piling methods

On the Nelligen Bridge Replacement project, we will be using three types of piling methods:

- Concrete Injected Columns (CIC) for ground improvement
- Bored piles with steel casings filled with concrete for the new bridge foundation
- Temporary steel sheet piles driven into the ground for the working platform.

Concrete Injected Columns

Concrete Injected Columns are a ground improvement technique which will be used to make the ground firmer at the eastern approach to the new bridge.

The columns will be installed in a grid pattern by pushing a piling rig mandrel into the ground. The soft soil will be dispersed sideways making it denser. As the drill is removed the void will be filled with concrete.

About 228 Concrete Injected Columns will be installed into the ground.

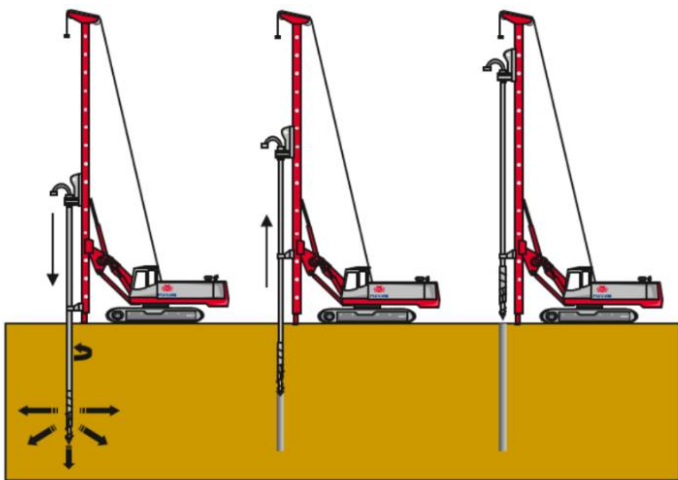


Illustration of CIC construction method

Bored piles

Piles create a foundation for the bridge by connecting the piers of the bridge to a layer of solid rock below.

Piling for all 10 piers and both abutments on the new Nelligen Bridge will be constructed using the bored pile method.

Bored piles are constructed by driving a steel casing through the softer foundation materials until it reaches the firm rock layers below. The soil and rock within the casing will be removed and the casing is then filled with reinforced concrete to provide the load capacity for the bridge.

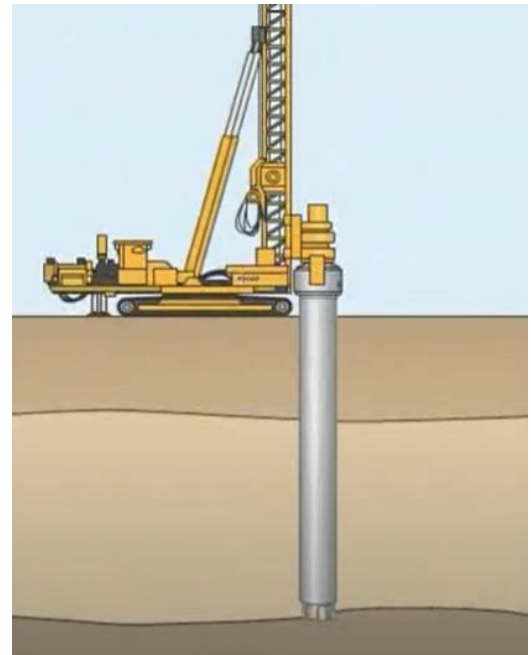


Illustration of bored piling construction method

Sheet piles

Sheet piles will be used to construct a temporary jetty on the eastern side of the river. The sheet pile wall will stop any construction material from falling in the river while we build a piling platform.

Sheet piles are constructed by pushing and vibrating overlapping sheets of steel into the ground to create a wall. This wall helps to retain and support the ground while we are working.

When the project is finished, the sheet piles will be removed.



A typical example of sheet piling

Noise and vibration impacts

Some piling activities, particularly during the vibrating of the pile casings into rock, may generate high noise levels which may be heard in the surrounding area. The boring method for piling has been chosen as it is quieter than driven piling.

Vibration in the surrounding area may be felt from the bored piles during the casing installations. The level of ground vibration will vary depending on local terrain, geology, groundwater, weather and the distance from the work.

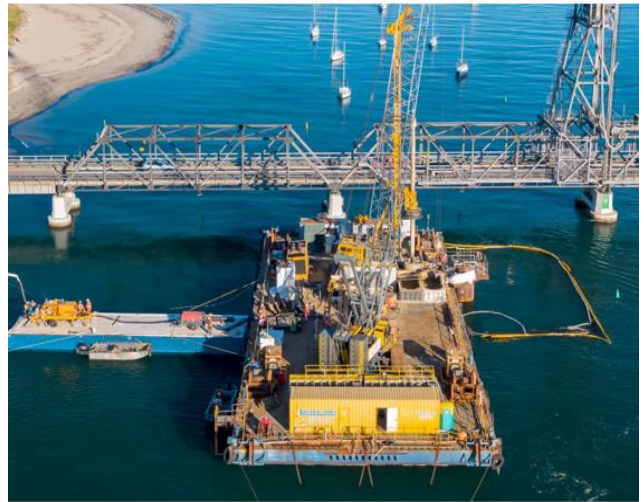
How will we reduce noise and vibration impacts?

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

- Carrying out work during approved construction hours
- Using the best available methods and performance monitoring
- Using appropriate machinery to reduce the duration of work.



Example of a piling hammer vibrating a steel casing into place



Typical set up for piling rig over water

Ground vibration

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:

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

While everyone's perception and tolerance levels are different, the human body is sensitive to small levels of vibration, with most people able to feel vibration levels under 0.5mm/sec.

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 50mm/s. Depending on the structure type and condition, structural damage is not expected until vibration levels exceed 100mm/s.

Before the start of construction, property condition reports have been prepared for all properties expected to receive vibration from the project. These reports are used to assist in considering whether property damage has occurred.

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 regularly and for specific activities. Vibration monitoring is carried out when new vibration-intensive work starts and as required throughout the duration of that work. Noise and vibration monitoring will be carried out for piling work.

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

The project team will monitor noise and vibration levels as required during the piling works. This ensures that piling is carried out in accordance with NSW Environmental Protection Authority and Transport for NSW procedures and guidelines.

Monitoring allows the project to determine if any noise or vibration levels exceed project trigger values. These trigger values are well below those at which damage can occur and alerts the project team to more closely monitor the activities onsite.

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

- Additional noise or vibration monitoring may be carried out near sensitive receivers, to determine if the actual construction noise or vibration generated exceeds the predicted 'worst case' construction noise or vibration levels identified in the plan
- Noise or vibration monitoring may be carried out to refine construction methods or techniques to minimise noise or vibration
- Ongoing spot checks of noise intensive equipment will be carried out throughout construction to ensure compliance with manufacturer's specifications
- Where actual noise levels are found to exceed the predicted worst case levels, the source of excessive noise will be identified and any reasonable and feasible measures available will be implemented to either reduce noise emissions from the source or reduce impacts to residents.

Marine exclusion zones

For the safety of workers and river users, there will be marine exclusion zones that will be marked by safety buoys and signage during piling work and pier construction. Access along the Clyde River will be maintained, with at least one navigation span open at all times during river work.

How you can stay informed about piling and noisy activities?

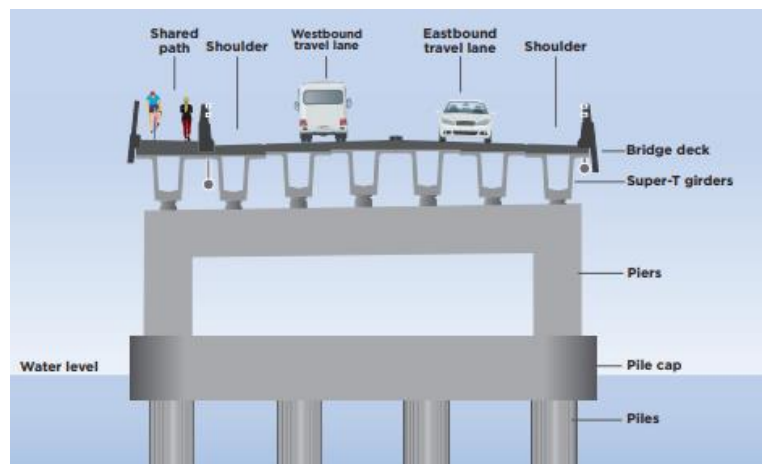
The project will keep the community informed about piling and noisy activities in a number of ways. These include:

- Project updates and notification letters
- Emails to registered stakeholders
- One-on-one contact.

Working hours

Piling activities will occur during our standard working hours:

- **Monday to Friday** between **7am** and **6pm**
- **Saturday** between **8am** and **1pm**



Cross section of the new bridge