

5 Learmonth Street

5.1 Background

The Learmonth street area extends from Bob Bell Park in the south up to a bend on the South Pine River (Reach 'I'). At this bend the river turns east and flows away from private dwellings along the river front on Learmonth Street (see Figure 5-3). There has been little movement in the river alignment along this reach in recent history.

Bob Bell Park is located along a relatively straight section of river, and therefore is exposed to relatively low erosive forcing on the bank. Much of the river bank along Bob Bell Park is lined with vegetation, which shelters the bank from erosion. The bank vegetation is cleared at a concrete boat ramp (see Figure 5-1).



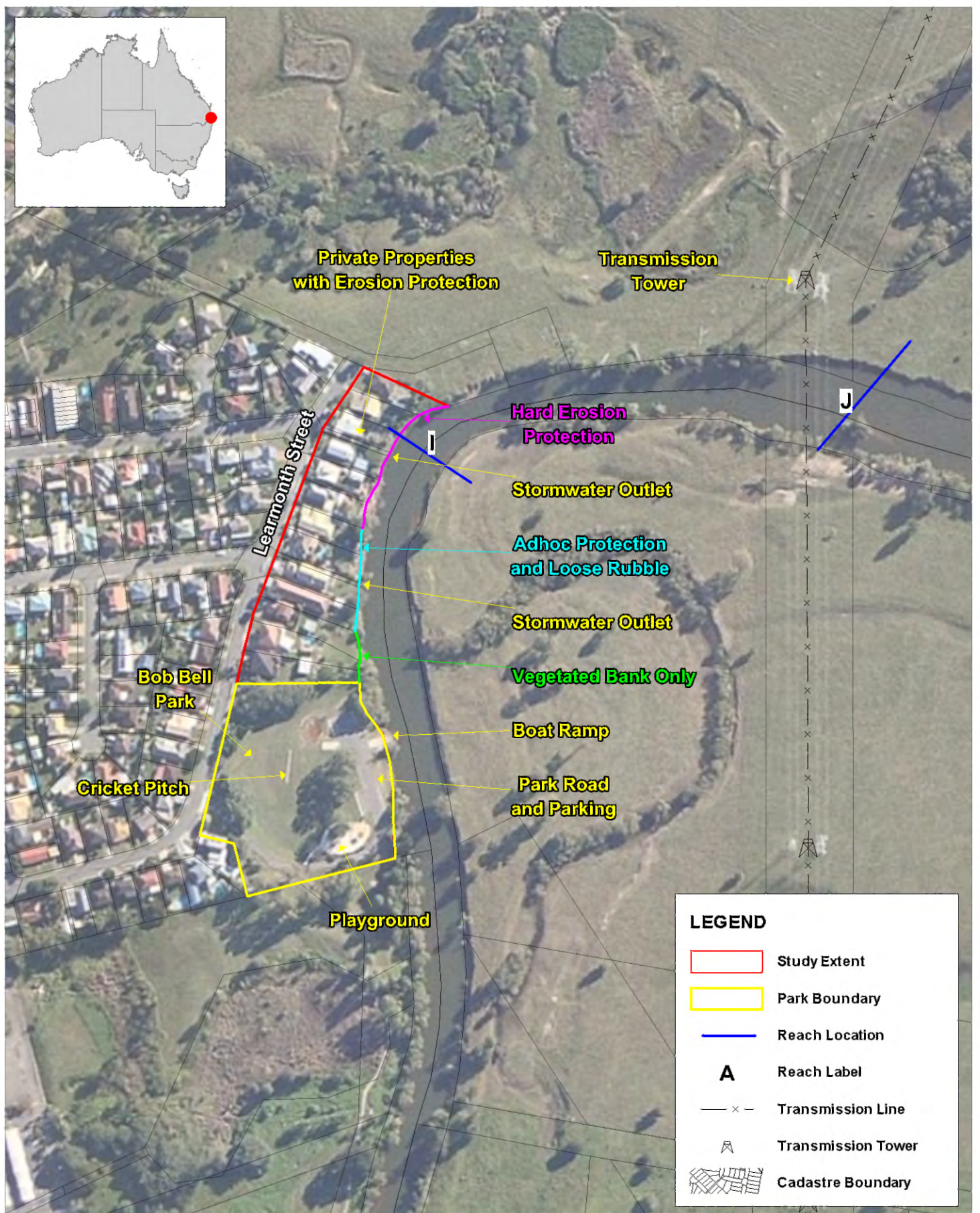
Figure 5-1 Boat Ramp at Bob Bell Park

Further downstream, the river passes private dwellings on Learmonth Street. Towards the northern end of Learmonth Street the river bends at Reach 'I'. The private dwellings are on the outside bank of this bend. Thus, it is expected that erosive forces are exerted on the river bank in front of the dwellings. Private erosion protection systems have been installed by the owners of dwellings situated in close proximity to the river bend (northern portion along Learmonth Street (see Figure 5-2 and Figure 5-3). The private erosion protection appears to have functioned successfully, with little evidence of bank migration.

A transmission tower is located on the northern bank of the river approximately 240m further downstream.



Figure 5-2 Example Private Erosion Protection (Rock Lining)



Title:
Learmonth Street Layout

Figure:
5-3

Rev:
A

BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 100 200m
Approx. Scale



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5.2 Site Issues

At Bob Bell Park there is a short pocket (approximately 20m) of exposed bare earth along the bank where vegetation has been cleared (see Figure 5-4). The park road passes relatively close to this area – approximately 10m from the river bank. As such, there is little buffer sheltering the road from potential damage through bank scour.



Figure 5-4 Exposed Bank at Bob Bell Park

The private erosion protection terminates at the northern most dwelling on the river bend. Past this point the river bank is bare. Here bank erosion is apparent in the photographic survey (see Figure 5-5). There is a risk that, in time, bank erosion in this area will undermine the adjacent private erosion protection system.

The river bank in the vicinity of the transmission tower further downstream has undergone significant bank erosion. The bank is now approximately 50m from the tower. The tower could become undermined in future if the river bank continues to migrate towards it.



Figure 5-5 Downstream End of Learmonth Street Private Erosion Protection

5.3 Options Considered

5.3.1 Option A – Do Nothing

If nothing is done to manage bank erosion along the Learmonth Street area, the following adverse effects could occur:

- Erosion in front of Bob Bell Park may go unnoticed and undermine the park road;
- Existing erosion protection in front of private property may deteriorate and become ineffective; and
- Future erosion may damage the transmission tower downstream of Learmonth Street.

5.3.2 Option B – Monitor, Maintain and Defer

This option is the default option under this SEMP – see Section 2 and Figure 2-1-4. This option builds on Option A, whereby no protection works to the river banks is implemented at this stage. However, the river migration is monitored. This option requires a monitoring programme to be put in place along with an action plan for when erosion to the river bank is observed. The river bank migration should be monitored on a regular basis (say before and after every wet season) and subsequent to a large infrequent flood event. This way, a mitigation plan can be put in place if erosion threatens to undermine the road through Bob Bell Park.

This option includes maintenance of the existing private erosion protection. Since this infrastructure is privately owned, responsibility of monitoring and maintaining it is the responsibility of, and at the discretion of, the owner.

Since the 'Hard Erosion Protection Zone' has already been triggered in front of the transmission tower, this option is not suitable in this location.

5.3.3 Option C – Soft Engineering

As can be seen in Figure 5-4, there is one section along Bob Bell Park where erosion has led to minor bank slumping. The river bank slope is relatively shallow. Thus, two soft engineering options are presented below.

5.3.3.1 Revegetate

Given that the erosion threat is minor, and that the channel slope is relatively shallow, promotion of revegetation in isolation from other erosion protection techniques is feasible adjacent to Bob Bell Park. Mangroves neighbour this stretch reach of the river bank. Thus, effective promotion of colonisation by mangroves to the short pocket of bare bank would be a reasonable option for mitigating bank erosion in this area.

The best approach for promoting either natural or assisted mangrove colonisation would be to identify and address the factor(s) that are presently inhibiting this. This could include, for example, managing pedestrian access, bank profile or stability, substrate characteristics, boat wash etc. If mangroves do not colonise naturally following the effective management of relevant environmental factors, it is likely that a sufficient source of mangrove propagules (i.e. seeds) is not locally available. In this instance, mangrove establishment would need to be further assisted by artificially introducing propagules sources from elsewhere (i.e. elsewhere in the South Pine River).

5.3.3.2 Re-profile and Revegetate

Should the erosion worsen, this would present an opportunity to rehabilitate the channel bank by profiling the bank to a stable slope. The exposed re-profiled banks would be covered in a 'soft' erosion protection system. This may be in the form of a geotextile consisting of a woven mat, roll or bag of natural fibre or synthetic material. Additional protection of the toe of the embankment may be required; e.g. using coir rolls or a 'harder' protection such as rock roll if required. It is envisaged that this will provide erosion protection in the short to medium term. The erosion protection would be augmented by vegetation; the re-profiled banks should be seeded/planted with appropriate tidal and non-tidal riparian vegetation to promote vegetation colonisation. This will provide natural, long term erosion protection to the channel bank.

5.3.4 Option D – Hard Engineering

Hard engineering options will effectively halt the erosion of the channel bank through the use of hard erosion protection materials such as rock and concrete. Below are examples of hard engineering options:

- Re-profiling the bank and lining with rock. This approach has been used successfully further downstream along Learmonth Street to protect residential property (see Figure 5-2 and Figure 5-3);
- Re-profiling the bank and lining with rock filled gabion mattress;

- Re-profiling the bank and lining with interlocking concrete blocks; and
- Installing rock filled gabion basket retaining structure. This approach has been employed in a pocket of bank scour at Normanby Way (see Figure 4-3).

5.4 Discussion

A discussion on the advantages and disadvantages of the four options considered above is listed in Table 5-1. Recommendations, which are based on this discussion, are presented in the following section.

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Table 5-1 Learmonth Street Discussion of Options

Option	Advantage	Disadvantage	Compliance Matters
Option A – Do Nothing	Low initial capital investment.	River may encroach toward development, eventually causing damage to development. Existing erosion protection may become dilapidated and ineffective without maintenance.	No immediate approval requirements
Option B – Monitor, Maintain and Defer	Low initial capital investment. Allows natural morphological processes to occur within reasonable limits. Adaptive response avoids implementing redundant works (i.e. if migration trajectory or rates change).	Requires ongoing monitoring. Relies on there being a system in place to instigate an appropriate action at a future point in time. May be loss/damage to undeveloped property in the interim. A deferred response is not appropriate in areas where further action has already been triggered, which includes Bob Bell Park and the private properties along Learmonth Street.	No immediate approval requirements
Option C – Soft Engineering	Low whole life costs and lower long-term maintenance costs compared to hard engineered system. Environmental benefits of enhanced wildlife habitat, water quality improvement and aesthetics. Reduces flow velocities by dissipating energy and encourage sediment to accumulate on channel margins.	Can take some time for vegetation growth to fully establish. Can be washed away when subjected to high flow velocities. Higher day to day maintenance burden than 'hard' engineering option. Shorter design life than 'hard' engineering option. Still an emerging approach for which the limitations of different techniques are not always evident – may require some trial and error approaches to settle on an effective solution.	No approvals required for rehabilitation works as long as compliance is maintained with DAFF fish habitat policies
Option D – Hard Engineering	Robust and reliable approach to hold the bank alignment – limitations are well understood. Longer design life than 'soft' engineering options. Lower day to day maintenance burden than 'soft'	Alters the natural flow and morphological regime. High initial capital investment and maintenance cost (i.e. replacement at end of life). Poor aesthetics – difficult to integrate into the	Requirement for development approval from State and/or local government

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Option	Advantage	Disadvantage	Compliance Matters
	engineering option.	natural environment. Reduces potential habitat for fauna and flora.	

5.5 Recommended Strategy

Recommendations for the Pine Rivers Park area are summarised in Table 5-2.

Table 5-2 Learmonth Street Recommendations

Option	Adopt	Reason
Option A – Do Nothing	✗	There is risk of damage to infrastructure if maintenance of existing erosion protection is not undertaken.
Option B – Monitor, Defer and Maintain	✓	Maintain existing natural erosion protection (mangroves) along Bob Bell Park and private erosion protection along Learmonth Street.
Option C – Soft Engineering	✓	Encourage mangrove rehabilitation along pocket of bare bank at Bob Bell Park.
Option D – Hard Engineering	✓	The river bank is migrating towards a transmission tower. This migration trend should be halted to ensure the integrity of the transmission tower.

The primary recommendation for this reach is Option B; maintenance of the existing natural erosion protection (mangroves) along Bob Bell Park and erosion protection along private properties on Learmonth Street should suffice for this section of the river bank. This option should be augmented with:

- Option C in the form of mangrove rehabilitation at a pocket of bare bank with minor bank slumping at Bob Bell Park. If this option does not prove effective, and the river bank continues to encroach towards the road, it is recommended that a hard engineered option is reverted to.
- Option D to prevent the river bank from encroaching toward the transmission tower, such as a rock filled gabion basket retaining wall structure. Hard engineered systems have a tendency to cause localised accelerations in flow at the edges where they tie into the river bank, which can lead to scour. It will be important that the design mitigates this potential for scour.

Taking no action does not raise any compliance issues while soft and hard engineering works are considered to be consistent with current approval processes. Where soft engineering works comply with DAFF policies, these will be considered minor works and not require any approvals (see Section 5.7).

5.6 Implementation and Cost

Implementation of this strategy would be through development of a maintenance plan for Bob Bell Park. This plan would lay out a programme for condition surveys of the channel bank. The formulation and implementation of the plan would be at minimal cost. Additional costs would be borne if significant rehabilitation of existing mangroves becomes necessary, or if the mangroves become ineffective and an engineered system is required.

For the promotion of further mangrove colonisation and establishment at the pocket of bare bank, a suitably qualified expert should be consulted to prepare an appropriate rehabilitation plan, which can then be used by Council to guide the implementation of revegetation strategies. Such a plan

should include recommendations for site preparation, suitable species for revegetation, planting or seeding, monitoring and maintenance requirements. It is estimated that the costs involved will be in the order of \$20,000 for development of a rehabilitation plan and \$100,000 for implementation of the plan over a period of five years.

The implementation of a hard erosion protection system to protect the transmission tower is expected to be approximately \$270,000 to design and build.

5.7 Approvals

The rehabilitation of mangroves is considered to be self-assessable 'minor works' under the *Fisheries Act 1994* and *SPA* to the extent that it complies with the provisions of DAFF Code number MP06: *Minor impact works in a declared Fish Habitat Area or involving the removal, destruction or damage of marine plants* (January 2013). A project plan for rehabilitation should be provided to DAFF for endorsement before works commence. Owners consent from DNRM may be required for works below the high water mark.

In the event that hard engineering structures are required to protect Council assets (i.e. transmission tower) these works will be considered prescribed tidal works under *SPA*, requiring a development permit. Owners consent will be required for the works. Depending upon the nature and alignment of the development, a waterway barrier works approval and/or operational works permit under the local planning scheme may also be required. A waterway barrier works approval may also be required for the placement of rock rolls.

Any disturbance of marine plants as part of works will require a development permit except where these works are self-assessable in accordance with MP06. If a development permit is required and more than 25m² of marine plants are proposed to be removed, offsets will be required.