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Violet Town Floodplain Management Scheme



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1. THE PROCESS OF THE SCHEME

The Violet Town Floodplain Management Scheme (the Scheme) has been developed over the past five years by Water Technology in association with Michael Cawood and Associates, on behalf of the community of Violet Town. A community reference committee was utilised throughout the course of the development of the Scheme, and was comprised of representatives from the local community, Strathbogie Shire Council, Goulburn Broken CMA, VICSES, Bureau of Meteorology, and Department of Sustainability and Environment. The Scheme has been funded from a variety of local, state and federal funding sources and has followed industry best practice guidelines to ensure the scheme is given the best chance of success when finally it is submitted for funding to design and construct.

A number of separate reports have been completed over the last five years documenting in detail the development of flood modelling tools, the mapping of various historic and design floods, the evaluation of various structural mitigation options and consideration of various non-structural mitigation options. This report provides a condensed summary of the work to date, outlining the preferred Scheme for Violet Town.

The local community has been consulted heavily over the past five years on all aspects of the Scheme to date. This has included public community meetings, brochures, surveys and individual consultations. The Scheme is now progressed to a stage where final comments are sought before finalising the detailed design and construction of mitigation measures as part of the Scheme.

2. THE NEED FOR A SCHEME

Violet Town is a small town situated in the foothills of the Strathbogie Ranges close to the Hume Highway between Benalla and Seymour. Two watercourses flow through the town, Honeysuckle Creek and Long Gully Creek. A number of significant floods have been experienced at Violet Town including the 1916, 1974, 1993 and 1999 floods. During the recent Victorian floods in late 2010 and early 2011 Violet Town was subject to minor flooding with no significant consequences within the town.

It is estimated that during a large flood with a 1% probability of occurring in any year (i.e. 1 in 100 year ARI flood), that a total of 164 properties would be affected within Violet Town, 64 properties flooded above floor and 100 flooded below floor, see Figure 2-1 below. An economic assessment of flood related damages was carried out, estimating that the average annual damage within Violet Town from flooding is approximately \$150,000 per year. This large number of flood affected properties and high flood related average annual damage cost clearly justifies the need for this Scheme.

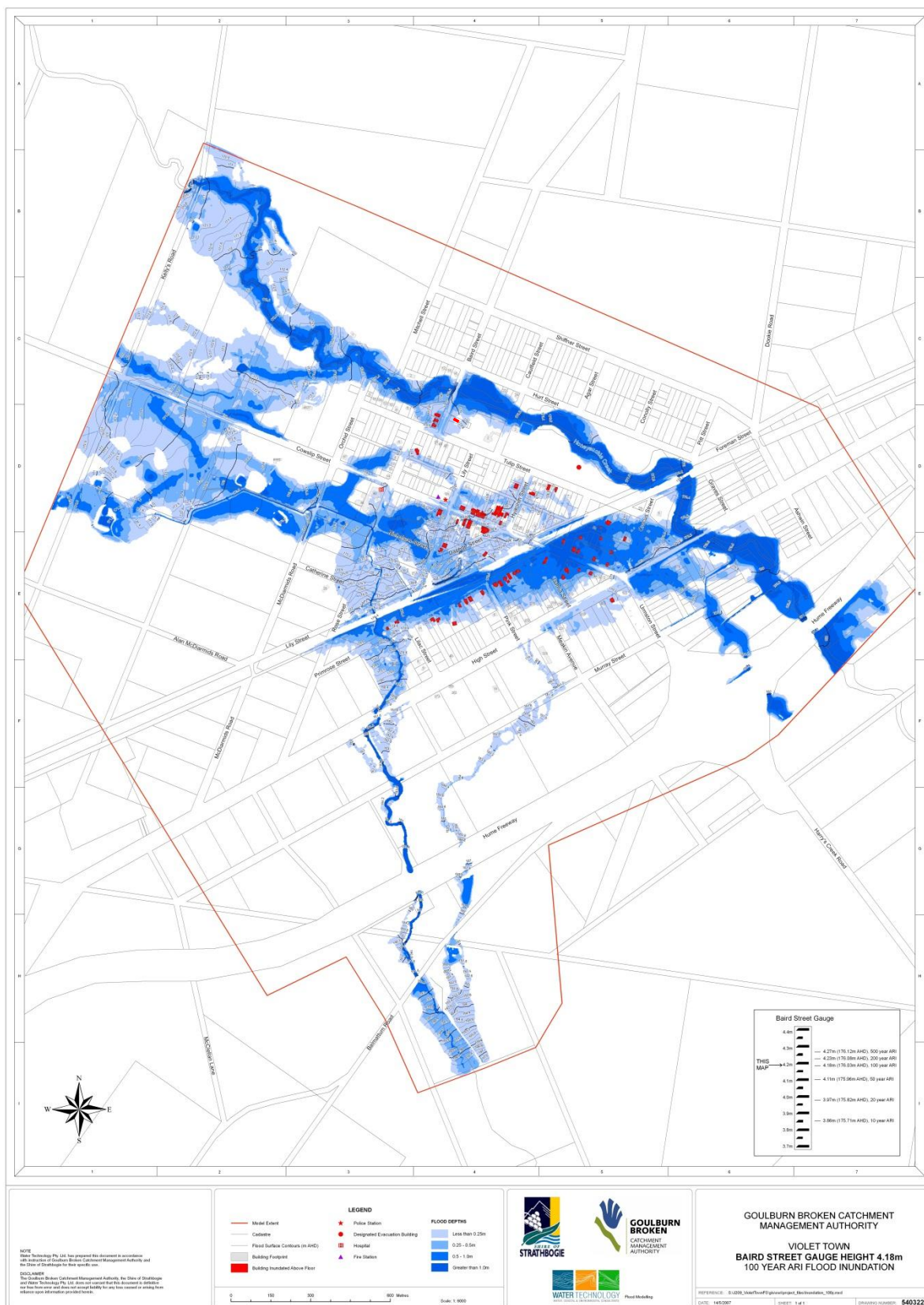


Figure 2-1 Violet Town Flood Affected Properties (1% flood)

3. STRUCTURAL SOLUTIONS CONSIDERED FOR THE SCHEME

A preliminary assessment of various structural mitigation options was conducted. The assessment considered the hydraulic performance, feasibility of construction, public safety, impact on the community and environmental consequences likely to result from each of the mitigation options. The mitigation options considered included options proposed by the local community. The preliminary assessment is summarised below in Table 3-1.

Table 3-1 Preliminary Assessment of Structural Mitigation Options

Mitigation Options	Assessment Comments
Honeysuckle Creek upstream retarding basin	Would require 1,000 ML of storage to reduce peak flow from 100 to 10 year ARI. Would require purchase of private land. Could potentially reduce above floor flooding in a 100 year ARI event from 64 to 21 properties. The area of the retarding basin must be very large (66 to 100 ha) to limit the depth in the basin to a maximum of 1 to 1.5 m when full due to public safety issues surrounding construction of the dam wall adjacent to Harry's Lane.
Honeysuckle Creek levee	Requires a levee to run from the Hume Freeway to the railway line on the left bank of Honeysuckle Creek. Will require some hydraulic structures to allow drainage through the levee to Honeysuckle Creek. Reduces above floor flooding in a 100 year ARI event from 64 to 23 properties. Will increase the water level downstream along Honeysuckle Creek by up to 0.2 m in a 100 year ARI event (less increase further downstream at Baird St). Some native vegetation disturbance required for construction, but will be minimised.
Clean up of Honeysuckle Creek between High St and Mitchell St	Removal of debris and debris traps such as fences would reduce the water level locally but would be minimal and would not prevent flooding of the township. Would require significant ongoing maintenance. Removal of large logs and debris reduces habitat and environmental value of the creek.
Culverts under railway embankment	Likely to reduce flood levels upstream of the railway embankment, the larger the culvert capacity the greater the reduction in water level. Would result in increased water levels downstream of the railway embankment, shifting the flood risk to other properties. The impact on railway services during construction makes this option prohibitively expensive and not feasible.
Mary's Lane floodway between Railway Street to Rose Street	Formalise the overland flow path and increase the capacity by removing high points at road intersections. Is likely to reduce flooding adjacent to Mary's Lane and Cowslip Street. Would have minimal impact on flooding for the majority of the town.
Long Gully Creek enlargement	Downstream of High Street the channel would be enlarged and straightened over 1,200 m, the railway culvert invert would be lowered and Lilly Street crest would be lowered to provide a ford crossing. The water level upstream of the railway line would be lowered by 0.1 to 0.3 m, reducing breakouts along northern bank. The flow through the railway culvert would be increased, with the lowering of Lilly Street and enlargement of the creek would reduce the water level by 0.1 to 0.2 m. This would reduce the number of properties flooded above floor during a 100 year ARI event from 64 to 59, a relatively low reduction in flood damages. There will be a number of properties affected by construction as well as railway services.

A detailed assessment was conducted on six mitigation options as shown below:

- Option 1: Honeysuckle Ck levee between Hume Freeway and railway line
- Option 2: Honeysuckle Ck levee plus upstream retarding basin to reduce peak flow to 85%
- Option 3: Honeysuckle Ck levee plus upstream retarding basin to reduce peak flow to 70%
- Option 4: Honeysuckle Ck levee plus raising of seven floor levels
- Option 5: Mary Lane floodway
- Option 6: Long Gully waterway and railway culvert works

This detailed assessment for option 1 to 4 included hydraulic modelling for a range of design flood events, costing of works, a flood damage assessment and a cost benefit analysis. Option 5 and 6 do not deliver a sufficient reduction in flood damages to warrant a full assessment, so only the 100 year ARI event was modelled.

Based on the detailed assessment option 4 was considered the preferred mitigation option to be considered for the Scheme.

4. PREFERRED STRUCTURAL SOLUTION FOR THE SCHEME

After considering all options the preferred flood mitigation option for the Scheme was decided upon. This is described in detail in this section, including plans of the proposed works in Figure 4-1 and Figure 4-2, and a longitudinal section of the levee in Figure 4-3.

A levee along the left bank of Honeysuckle Creek between the Hume Highway and the railway line is the preferred flood mitigation option for the Scheme. This is proposed in conjunction with drainage infrastructure along the levee at two major drains which drain local runoff to Honeysuckle Creek. Optional floor raising is also recommended to be offered to home owners at seven properties to compensate for raising the flood level downstream of the railway line.

4.1 Honeysuckle Creek Levee

The Honeysuckle Creek levee prevents a number of breakouts occurring between the Hume Highway and the railway line which then floods through town, inundating many properties. The levee has been designed to have a crest level 0.6 m higher than the 100 year ARI flood level, this is often referred to as freeboard, and provides a margin of safety.

Designing for 0.6 m freeboard on top of the 100 year ARI flood level means that the levee is required to be approximately 970 m long, with an average height of 1 m. Generally the levee is between 0.5 to 1 m high, with depths slightly above 2 m through drainage lines where culvert structures will be required.

The proposed crest width of the levee is 3 m with batter slopes of 2.5 to 1 on the water face and 2 to 1 on the outside face. The bottom width of the levee will be dependent on the location and the height of the levee, with an average of 7 m wide and a maximum of 14 m wide through drainage lines. The levee will be constructed out of compacted clay and will be top dressed and vegetated with grass.

The preferred Honeysuckle Creek levee alignment currently has two options between High Street and the railway line. The first alignment follows the walking track between High Street and Crocus Street, then follows Crocus Street to where it ties into the railway embankment. The second alignment leaves the walking track and runs inside private property adjacent to Honeysuckle Creek where it then crosses Crocus Street and ties into the railway embankment. The final alignment will be subject to further discussions with landholders and residents in the vicinity of Crocus Street.

4.2 Levee Structures

Along the levee alignment a number of structures will be required as described below.

Around chainage 200 m (see Figure 4-2), rock armouring will be required to ensure that the levee is not eroded by flow from the drain as it turns at near right angles into the drain toward Honeysuckle Creek.

Around chainage 500 and 700 m the levee crosses two major drains. At these points major structures are proposed with large culverts with flap valves attached to allow water to flow toward Honeysuckle Creek but to prevent back flow when the creek is in flood. Alternatively the structures could be comprised of vertical sluice gates that are left open and manually closed in times of flood.

Where the levee crosses High Street, the current road crest level is very close to the 100 year ARI water level assuming the levee is in place. It is proposed that the road crest be raised approximately 300 mm to allow some freeboard, with the additional 300 mm of freeboard topped up by sandbags if required in time of flood. Alternatively a structure could be built so that aluminium panels could be placed in guide rails either side of the road, these structures are common components of levee systems. The modest raise of 300 mm will be achievable with minor road resurfacing; raising the road by 600 mm would require extensive and costly road resurfacing.

4.3 Floor Raising

The Honeysuckle Creek levee results in a significant reduction in flooding through the township, but due to the concentration of flows along Honeysuckle Creek the water level is raised slightly within the creek. This results in raised flood levels at seven properties that are currently at risk of flooding above floor during a 100 year ARI event. These properties are:

- 4 Tulip St
- 49 Tulip St
- 1 Baird St
- 3 Baird St
- 4 Baird St
- 5 Baird St
- 18 Hurt St

It is proposed that detailed survey be taken at these properties to confirm the floor levels and that the building types be investigated for suitability of floor raising. Although flood levels will be elevated at these properties as a result of the Scheme, floor raising would remove them from above floor flood damage in a 100 year ARI event, reducing their current flood risk. Floor raising will be discussed with each property owner and their consent, or otherwise, sought prior to any works proceeding. If floor raising is not practical due to construction constraints, other appropriate site specific mitigation measures may be discussed with individual landowners.



Figure 4-1 Preferred Structural Mitigation Option for the Scheme – Overview Plan

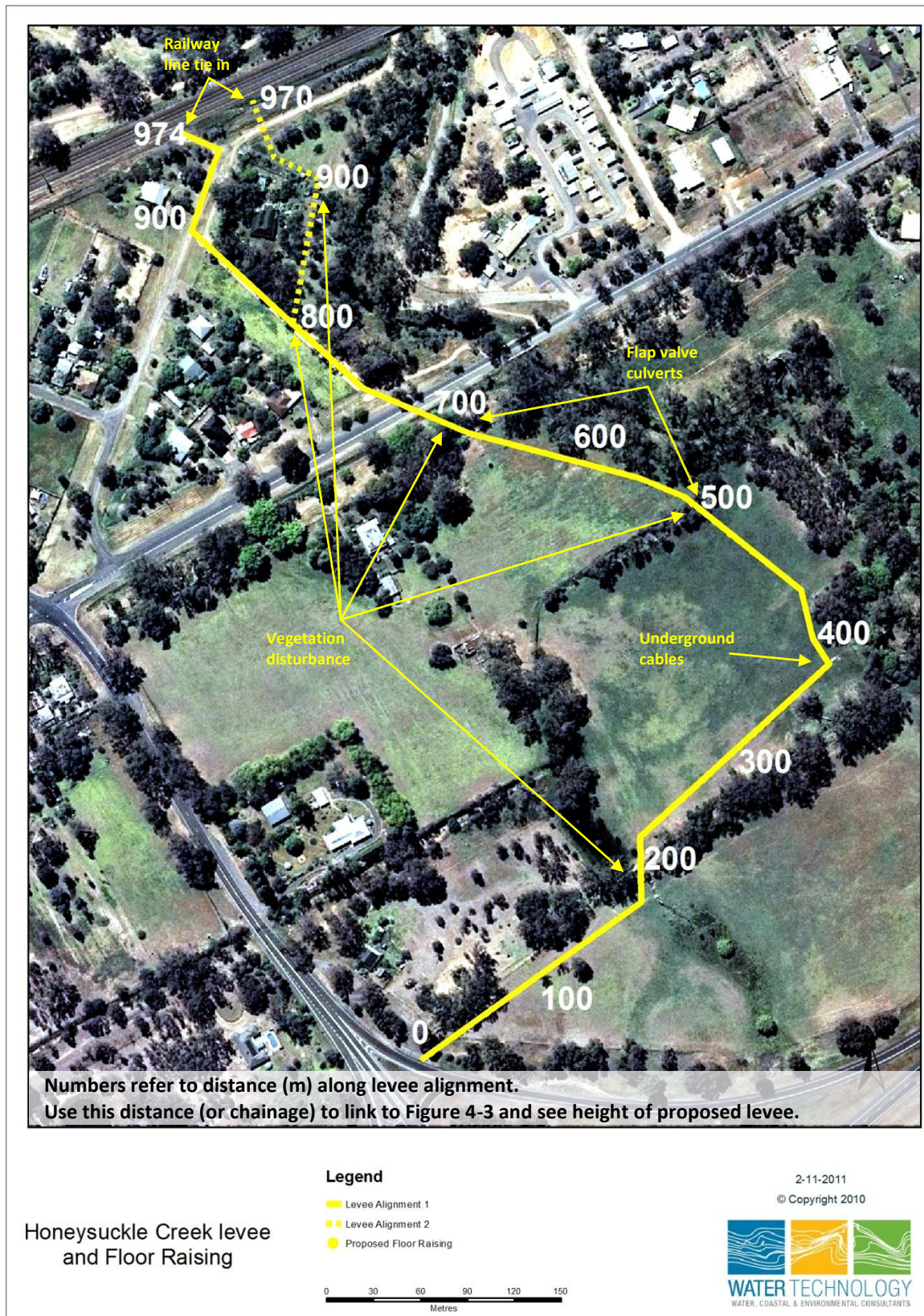


Figure 4-2 Preferred Structural Mitigation Option for the Scheme – Levee Plan

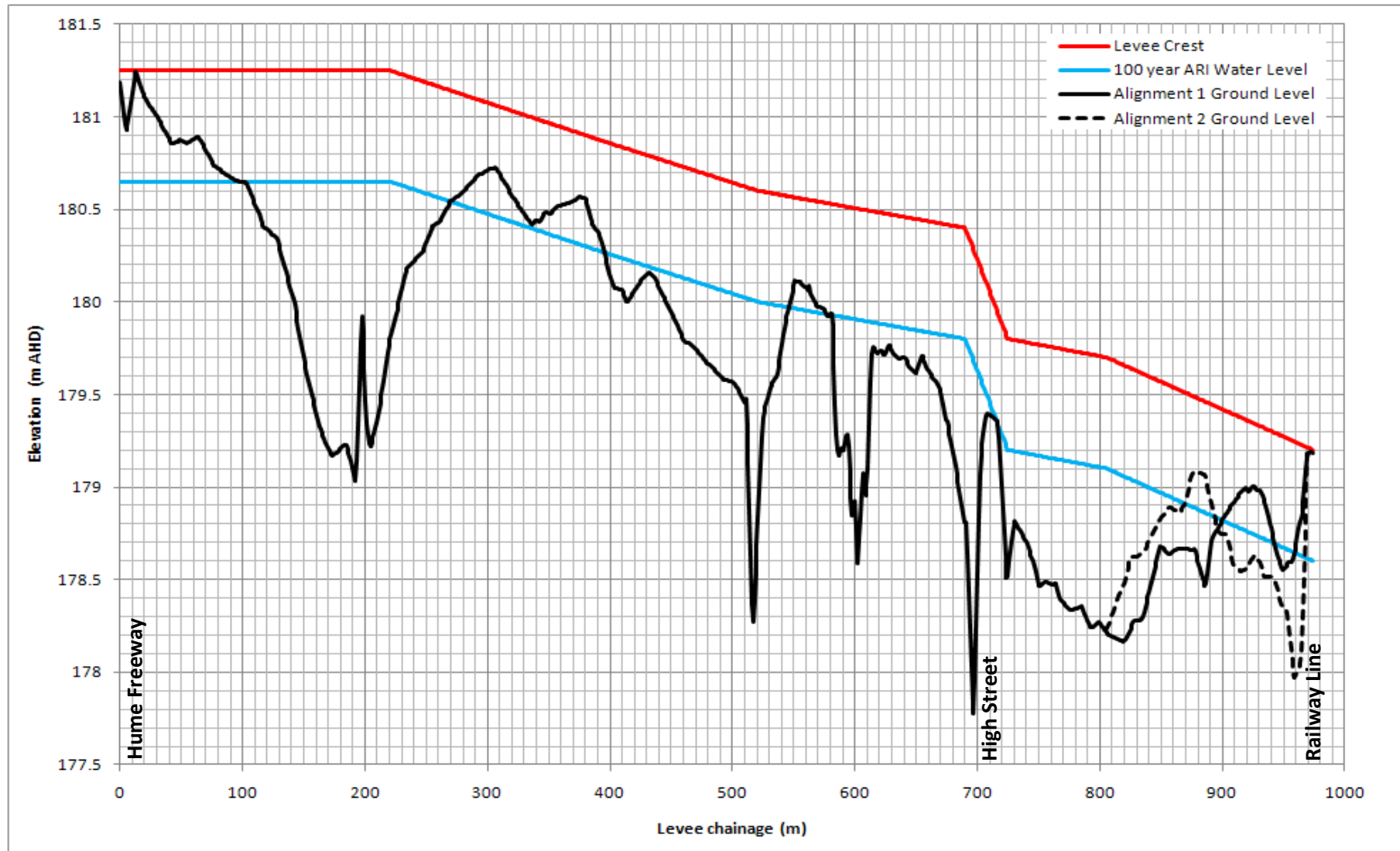


Figure 4-3 Preferred Structural Mitigation Option for the Scheme – Levee Longitudinal Section

5. OTHER NON-STRUCTURAL SOLUTIONS

The Scheme will also provide a number of non-structural solutions that will provide benefit to the Violet Town community. The planning overlays will be updated to ensure appropriate development occurs within the township and that floor levels are set appropriately.

The Scheme will be advertised and the community educated to the benefits of the Scheme. This will ensure that the community is aware of the flood risk and understand what is required of them during a flood. A flood aware community greatly reduces its own flood risk by responding appropriately in a timely manner during a flood.

A Flood Emergency Plan has been prepared which will assist authorities to respond during a flood. This identifies areas of risk and is related to gauge heights in Honeysuckle Creek.

A flash flood warning system has been investigated and will be considered further. This would assist in early detection of imminent floods providing greater warning to the community of Violet Town.

6. COST AND BENEFITS OF THE PREFERRED SCHEME

The preferred Scheme reduces the properties flooded above floor from 64 to 17 during a 100 year ARI event, and from 14 to 1 during a 10 year ARI event. This reduces the flood related average annual damage by 51% to approximately \$74,000. The total cost of construction of the Scheme is estimated at approximately \$670,000. This gives a benefit-cost ratio of 1.5.

Given the strong benefit-cost ratio it is recommended that funding be sought from government for this Scheme and it be progressed to detailed design and construction.

7. CONSTRUCTION AND MAINTENANCE OF THE SCHEME

The Strathbogie Shire Council will be the construction authority for the implementation of the Scheme. Furthermore, Strathbogie Shire Council will carry out routine operation and maintenance of the Scheme at an average annual cost of \$4,800.

8. FURTHER INFORMATION

Further information on the Scheme can be sort from Strathbogie Shire Council.

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Additional technical information is included within the Violet Town Flood Study report (2009), the Violet Town Floodplain Management Plan Study Report (2011) and the Strathbogie Shire Flood Emergency Plan (updated in 2011).