SOUTH NEW BRIGHTON AND SOUTHSHORE FACT SHEET

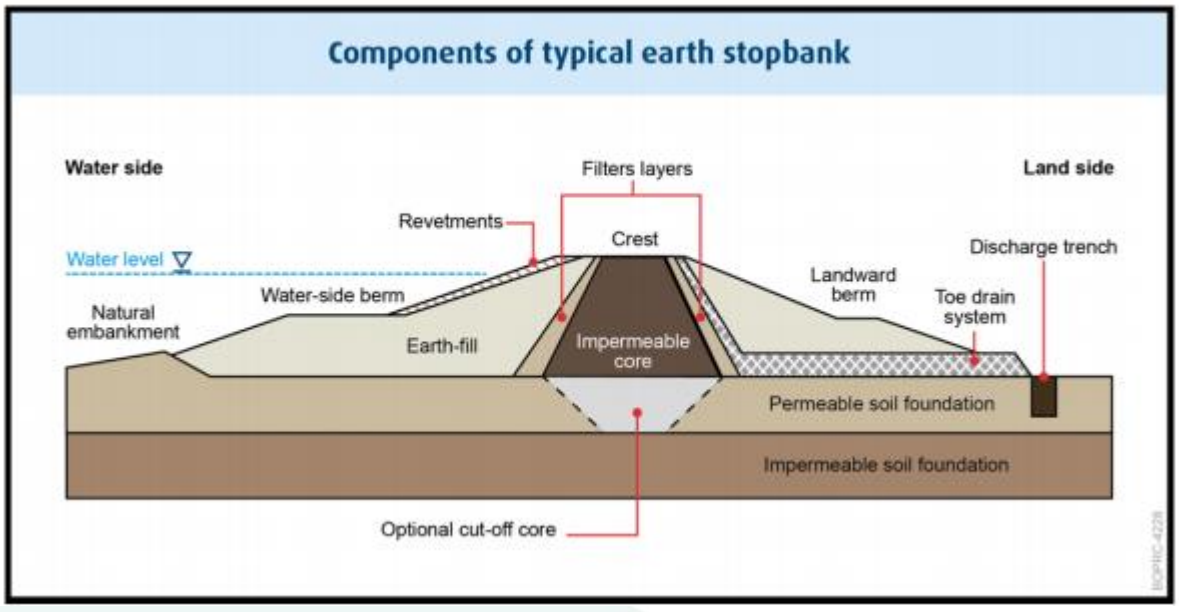
STOPBANKS, BUNDS AND OTHER STRUCTURES

This Fact Sheet is about different types of flood and erosion mitigation structures. It has been produced to provide supporting information for the Southshore and South New Brighton Earthquake Legacy Project.

Stopbanks

A stopbank is a generally continuous elongated embankment or mound of gravel and soil material that stops water from a river or the sea flooding nearby land. They may look like grassy banks but stopbanks today are actually constructed to very specific engineering designs. When the river is in flood or there is a coastal storm event, they need to be able to contain the floodwaters without collapsing.

Stopbanks can consist of many different elements. Not all stopbanks have or need all of these elements.



Stopbanks are constructed with a crest (top surface) level (height) to contain a flood of a specific size. A flood with a level lower than the crest level of the stopbank will generally be contained by the stopbank. However, no form of protection is able to prevent damage in every situation. A larger (and less frequent) flood with a level higher than the crest of the stopbank will flow over the top of the stopbank causing flooding on the landward side.

Stopbanks are designed to remain structurally stable during flood events. However, under some situations the side of the stopbank may be eroded to a point that the stopbank is breached and flooding occurs on the landward side. Breaching of a stopbank may also occur when water flows over the top of the stopbank eroding the stopbank leading to failure of the stopbank and flooding.

In the past, stopbanks were often constructed to less exacting standards than they are today. The importance of the nature and compaction of the soil and gravel material, foundation preparation, seepage control though the stopbank, and armouring (revetment), are now considerably better understood.

Stopbanks are also referred to as levees or dykes.

Bunds

In the context of the eastern part of Ihutai/Avon Heathcote Estuary and post the 2010-11 earthquake sequence, a response was to build 'bunds'. Bunds are different physical structures from stopbanks, but serve a similar purpose as they reduce the risk of flooding.

In response to coastal flooding in July 2017 gravel bunds were constructed under emergency conditions through the Jellicoe Marsh area and into the southern part of South New Brighton Park. Bunds can be built quickly, generally use locally sourced soil or rock material and involve only minor foundation preparation. Overall, a bund is a less-engineered structured than a stopbank, and has a shorter design-life.

Jellicoe Marsh bund

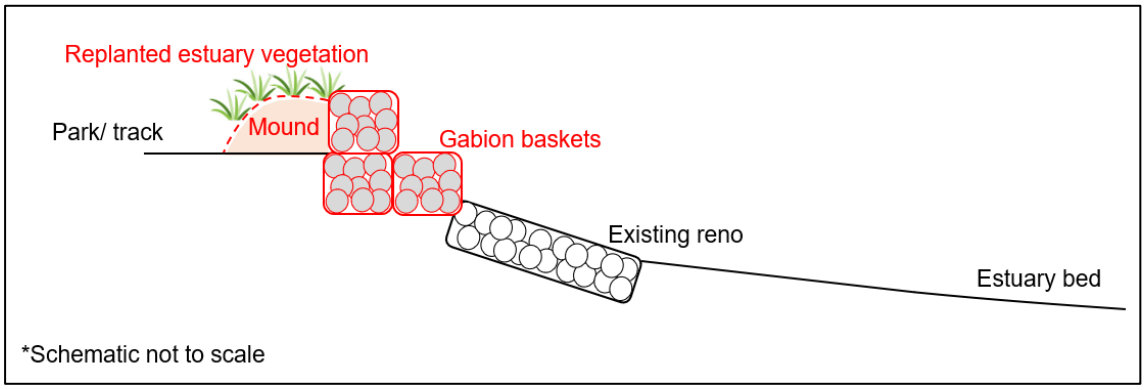
Since 2017 the integrity of the bunds in South Brighton Reserve has been improved through additional compaction, levelling and widening. The bunds have a design-life of about 20 years whereas stopbanks would generally have a design-life greater than 50 years.

The LINZ (Land Information New Zealand) bund in Southshore is a relatively low elongated mound of essentially compacted soil material (Figure 3).

LINZ bund in Southshore

Gabions - gabion baskets and reno mattresses

'Gabions' are mesh-cage structures containing rocks and are used for supporting steep slopes and controlling erosion. The advantage of gabions is that they are less expensive than other forms of hard engineering structures. They are effective at absorbing wave energy and therefore limiting erosion on the seaward side. The disadvantage of gabions is that the mesh cages eventually corrode so have a relatively short design-life of about 30 years.



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In South New Brighton there are two types of gabions, gabion baskets which are cube or rectangular in shape and reno-mattresses which are thinner flexible rectangular mesh-cages. Gabion baskets are used to support the estuary edge scarp (eroded edge) and reno mattresses are positioned in front of the baskets on the estuary floor. Reno mattresses are generally about 6m x 2m with a thickness less than 500mm. Reno mattresses are highly permeable making them well suited for promoting the regeneration of plants.

Reno mattresses

Beach re-nourishment

Re-nourishment is a process where sand or coarser material such as gravel is placed on a beach to protect the shoreline. This is done to build-up the beach and replace beach material that has been eroded away, and to reduce future erosion. Re-nourishment is typically a repetitive process as it does not remove the physical processes that cause erosion but simply mitigates their effects. Re-nourishment can preserve the natural state of a beach creating a 'soft edge', pushing the shoreline seaward to prevent erosion. The beach that is formed can be planted with appropriate species which helps reduce erosion and can provide habitat.

Other Southshore and South New Brighton Fact Sheets

The Southshore and South New Brighton Fact Sheet series cover a range of issues:

Fact Sheet title	What it covers
Flooding	Why the Canterbury earthquakes have led to increased flooding risk in Southshore and South New Brighton.
Groundwater	What groundwater is and why it causes issues in Southshore and South New Brighton.
Stormwater	What stormwater is and why it causes issues in Southshore and South New Brighton.
Planning and approvals	How the planning and approvals process can impact the timing, cost and requirements for options in this area.
Christchurch drainage datum and levels	What the Christchurch drainage datum is, and how we use it and other levels in our planning.
2018 new high tide statistics	Information on the record high tides experienced in Christchurch coastal areas and the 2018 review and update of tidal statistics which has occurred following these events.
Stopbanks, bunds and other structures	Explanations of some of the different structures that can be used for flood and erosion mitigation.
What is a 1 in 100 year flood?	How we describe the probability of flooding.