To: The General Manager Byron Shire Council
Flood Inquiry Submission

As follow up to the community roundtable meeting held on 10 May 2022 (see invitation below), the New Brighton Village Association (NBVA) presents the following brief submission to the BSC for inclusion in the New South Wales Flood Inquiry.

***INVITATION**
Subject:
Community Roundtable - Flood Inquiry

Hi Michael
Following are the details for the community roundtable tomorrow afternoon.

Council is preparing a submission for the NSW Flood Inquiry and to inform our submission we want to gather information from community groups and chambers of commerce.

We are holding a virtual roundtable for community groups and chambers of commerce on Tuesday 10 May from 4pm – 6pm. The meeting will be held via Zoom.

We are hoping to receive information on:

- *Causes and factors contributing to the recent flood events*
- *Location and impact of these floods*
- *Responses and recovery so far*

If your group is interested in providing feedback to Council please nominate one representative to attend.

Flood Inquiry Submission Points from the NBVA

1. **Causes and Factors Contributing to the Recent Flood Event:**

   1a. Causes of Flooding
   Land development, sand mining and sugar cane farms all redirecting or filling in the natural drainage systems and wetland storage capacity that allow a more managed flood flow through the hydrological system. These are a key cause of flooding in the northern part of the Byron Shire LGA.

   Land development in the late 1940s within the coastal areas between Wooyung and New Brighton infilled or redirected many of the original drainage systems. This has resulted in continued and excessive flooding in the New Brighton village and the broader local area including South Golden Beach, Billinudgel, Ocean Shores and beyond.

   Background:
   The New South Wales Government commissioned and built a Digital Terrain Model of these areas compiled from historic aerial photography over a period of almost 60 years dating back to 1947. This model provides a clear and concise record of the changes to land form and drainage systems in this region. (Review Report attached as Appendix One)

These changes have had significant effects on the hydrological flows within the immediate Brunswick Valley catchments of Marshalls Creek, Billinudgel Creek, Yelgun Creek and the Brunswick River and further afield in the Crabbes Creek and Burringbar Creek catchments that feed into Marshalls Creek through the wetlands of the Billinudgel Nature Reserve.

These changes have affected the flooding impacts during significant rain events and in particular during events defined as moderate or major floods.

1b. Contributing Factors

Lack of Maintenance in the local drainage systems and street channel runoffs
Failure of the South Golden Beach pumping station due to power failure
Potential reduced river flow during floods from the Readings Bay rock wall
Lack of information from the long and unprecedented communications failure was a significant factor during and in the rescue and recovery phase and put many lives at risk.

2. Location and Impacts of these Floods:

2a. Location

Flooding in the late February 2022 event was observed to be 600 - 800mm higher than any previously recorded events at New Brighton and reached an RL of ~3m and possibly higher. This impacted approximately 80-90% of buildings in the village (~180 homes) including the local Post Office General Store and Café and the village was cut off for two days.

2b. Impacts

Local road, bike, drainage and pedestrian infrastructure was moderately to severely damaged in places. The river banks have been severely impacted with tree collapse and rubbish still in the river. Contamination from sewerage systems that were inundated is unknown but potentially an ongoing impact. The main thoroughfare and coastal connection access from SGB to Ocean Shores along River Street is now in danger of collapse.

The dune face at New Brighton and SGB has been reduced as the slow moving low pressure system with associated large waves and elevated storm action caused extensive beach and dune erosion over the 2 - 3 day event.

The damage to personal property and housing has been significant and ongoing with all the streets in New Brighton having to deal with the extensive household goods clean up that went on for approximately 2 weeks.

The social and health welfare impacts on many residents have been major as many are now displaced, leaving their home and their village for many months while waiting on repairs.

Impacts to wildlife habitats are not noted in this submission.

3. Response and Recovery So Far:

3a. Response

Various local state and federal government agencies responded to the crisis eventually but in the immediate rescue and early recovery phase it was the local community that were the first responders.

These groups require simple infrastructure support, for example an active boat and boat shed with rescue capacity for volunteers in the village, and UHF radio made available to local volunteers to activate in emergency response.

The size and scale of this weather system has impacted the ability of Insurers to deal with claims and respond in a timely manner and those without Insurance have dealt with the situation as they can. Service NSW established a recovery centre at SGB and Mullumbimby and they also provided a mobile service with pop up locations. To my knowledge, nothing was provided in New Brighton. The overall response could have been more co-ordinated and rapid and there are lessons for agencies at all levels to have strategic planning in place for future events.
The community will work to compile a more comprehensive response for BSC over the coming months.

3b. Recovery
Short term
The flood recovery for the New Brighton community is ongoing. The major clean-up is complete and the rebuilding and repair of houses is underway. Continued funding support for those in dire need is required.
Medium Term
Ongoing assistance at the state and federal level is essential to address future planning to minimise the impact of these major flood events.

Planning instruments that support flood resistant building and design
Federal support for a Reinsurance scheme
Finalisation of designs for flood mitigation to support dewatering options in flood events

Long Term
Capital investment at a state level to implement the capital works required to address the root cause of the flooding.

The New Brighton Village Association is combined with and supports the North Byron District Activation committee, and the submission being prepared by that group. This submission combines all of the communities in the northern part of the Byron Shire. NBVA will be adding and supports that submission as a separate document.

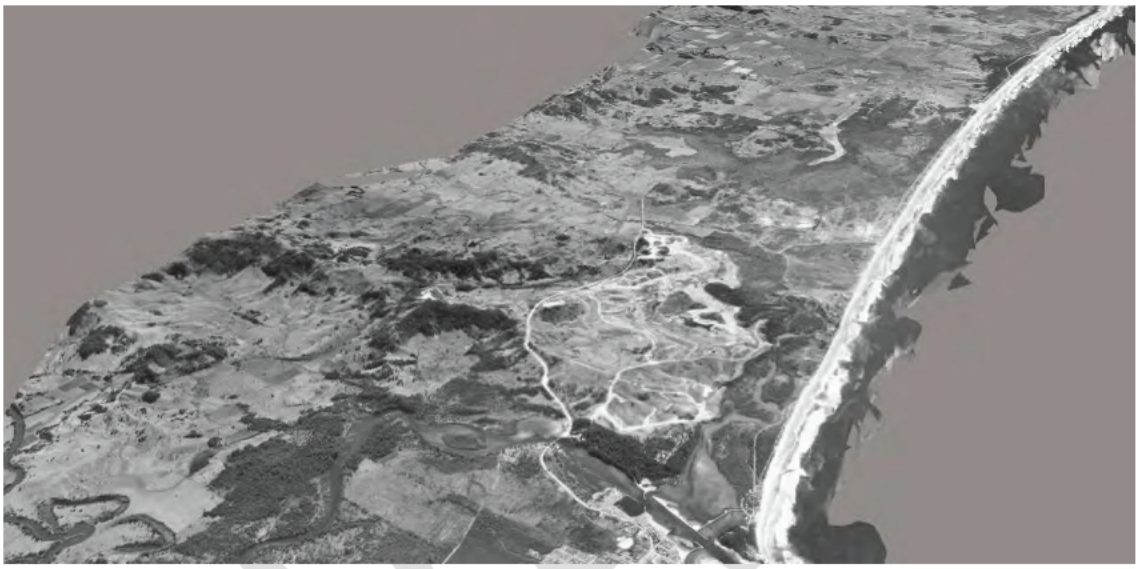
On behalf of the New Brighton Village Association

Michael Sherington
14/5/2022

Appendix One

Review of Historical Changes to the Marshalls Creek Floodplain and Impacts on Flood Flows _ Robert Crossley

Review of Historical Changes to the Marshalls Creek Floodplain and Potential Impacts on Flood Flows



Author: Robert Crossley

Contact:

This document was prepared as a review of various data sources concerning the historical development that may impact flood flows on the Marshalls Creek floodplain.

Acknowledgments and Reference Data

This document is based on personal interpretation of the available aerial imagery since 1947, the stories of the local residents and the reports of scientific studies that have been produced in the past. I do not profess to know all the answers, and am always open to be proven wrong by evidence. This document hopes to progress the conversation in improving the situation.

I would like to acknowledge:

1. the traditional owners of the lands that we live on, the Midgenbul, Bunjalung and Durunbal people, and their elders past, present and emerging. I suspect they would not have got into this mess by thinking that humans could control nature.
2. the government sources of digital data that I heavily rely on in this document, particularly the recently developed historical 3D models of the Marshalls Creek flood plain. These models were produced by the NSW Department of Finance, Services and Innovation by their Spatial Services team, mainly through the vision of Bruce Thompson (RIP).

   Links to these models are provided below.

   1947: https://s3-ap-southeast-2.amazonaws.com/nsw-reality-models/NorthCoast_Historic/1947a/App/index.html

   1971: https://s3-ap-southeast-2.amazonaws.com/nsw-reality-models/NorthCoast_Historic/1971/App/index.html

   1987: https://s3-ap-southeast-2.amazonaws.com/nsw-reality-models/NorthCoast_Historic/1987/App/index.html

   1991: https://s3-ap-southeast-2.amazonaws.com/nsw-reality-models/NorthCoast_Historic/1991/App/index.html

   2004: https://s3-ap-southeast-2.amazonaws.com/nsw-reality-models/NorthCoast_Historic/2004/App/index.html

3. the NSW government historical photo library accessed through https://portal.spatial.nsw.gov.au/portal/apps/webappviewer/index.html?id=f7c215b873864d44bccddda8075238cb#
4. the government sources of the high resolution LIDAR data that has been collected and collated by GeoSciences Australia: https://www.ga.gov.au/scientific-topics/national-location-information/digital-elevation-data
5. The work done by the Floodplain committees over the last decades, and the reports produced.
6. The work done by local citizens in collating historical data and observations. Much of this work is available at:
   a. http://brunswickvalley.com.au/flood-history/index.htm
   b. http://brunswickvalley.com.au/flood-history/flood_story51.pdf

Robert Crossley

New Brighton Resident.

Key Points

This review is aimed at creating a more complete record of the development on the Marshalls Creek floodplain to ensure that the conversation regarding causes of flooding is based on data, not hearsay.

The review relied mainly on aerial photography interpretation, but also through recollections of long term residents. The original flood flows were interpreted from landscape patterns in 1947 and 1958 photography, and 3D models developed from that photography by NSW government.

A timeline of development on the floodplain is provided based on the evidence from the series of aerial photos available from NSW government spatial portal. These can be downloaded through the links provided in the foreword. Comments on the likely influence on the natural flood flows of development are also provided, but these are personal views only and open to discussion.

Billinudgel

The photos clearly show that the natural flow of water in Billinudgel was via an overflow channel that flowed past the school (now pre-school) to the south of the village, then filled a swamp area before flowing back into Marshalls Creek to the east of the village (through the area that would become the industrial estate).

The development of the industrial estate filled this swamp causing the overflows to back up and increase the flood height in the village. This is backed up by anecdotes from the headmaster at Billinudgel school (1958-1984). Substantial drains were constructed to carry the overflow water through the industrial estate, but any retention storage offered by the swamp area was eliminated by fill in the industrial estate.

The worst flood in Billinudgel was in 2017, and it was thought to have been worsened by blocked drains (I worked there at the time, and they were). Works to clear these drains subsequently may have improved the severity of the flood, as flood heights in 2022 were approximately 30cm lower, whereas the flood levels were much higher in other areas.

South Golden Beach (SGB)/ New Brighton (NB)

The natural flood overflows from Marshalls Creek flowed to a major ocean outfall where SGB Hall is now located. This outlet was close by 1958. This outlet was also fed by waters coming south from Billinudgel Nature Reserve, and would have been expected to have considerable volumes of water discharging from it in its natural state.

There were other ocean outflows evident in aerial photography between Wooyung to New Brighton prior to 1958. There is evidence of an ocean outfall at Wooyung in historical records, and the area is heavily disturbed in a photo from1962 (possibly by a sand-mining dredge?).

The most prominent ocean outflow was located where the SGB Hall is located today, and this was supported by a well defined network of drainage lines that would have discharged water from both the nature reserve and flood overflows from Marshalls Creek. This was linked to major flood overflow channels that passed through Kolora Way, and which would have diverted flood water from Marshalls Creek to the ocean, thereby reducing flood flows from reaching New Brighton. It also seemed to accept water from channels to the other outflows in the area south.

Other less prominent outflows were located between SGB and NB. These were fed by overflow channels that exited Marshalls Creek downstream of Kolora Way, where New Brighton Road currently floods.

The ocean outfall and these drainage channels in the SGB area were filled in by the SGB development in the late 1950's through to the early 1970's. A bypass canal was also constructed before 1962 through the SGB area that connected Marshalls Creek to the Billinudgel Nature Reserve, which along with fill in the SBG area effectively removed the major ocean outfalls. This meant that flood waters from Marshalls Creek and Billinudgel Nature Reserve were connected, but cut off from the previous natural flows to the ocean.

A man-made canal was constructed to the north of the SGB development between 1971 and 1987 (no aerial imagery was available between these dates for that area), although its location can be seen in the 1987 imagery. This outlet was originally intended to establish a marina by the developers, and was closed in 1976 (http://brunswickvalley.com.au/). If there was a natural outfall that existed naturally at this location, it was small and was not supported by any significant drainage network.

While this outlet may have impacted flood flooding in the Billinudgel Nature Reserve and SGB area, given the restricted potential for flow from Marshalls Creek to enter Capricornia Canal from Marshalls Creek (historic overflows have been blocked), any outlet would be unlikely to reduce flooding on Marshalls Creek. It may reduce floodwaters coming into SGB from the north however.

A levee was constructed alongside Redgate Road near the SGB Hall, apparently between 1987 and 1991. This levee constructed to protect SBG from flooding (justifiably) prevent overflow water from Marshalls Creek from flowing north, which was its natural course. The water now ponds behind the levee until it reaches a level that then causes the water to flow back over the Village Green in New Brighton, adding significantly to the flooding. Without this additional water, the peak flood flow would be limited to the capacity of the channel upstream and therefore unlikely to flood the village at all.

None is suggesting that the levee be removed as it protects the SGB village.

Given the changes that have occurred, it would seem that a strategy of removing water that would have naturally gone out of the outflow at South Golden Beach Hall would be an obvious strategy. Opening ocean outflows has been modelled as part of floodplain management studies in 1997 and 2017, but the results suggest minimal improvement on flooding. However, it is likely that flood waters would no longer flow strongly towards these outflow as they did in the past due to fill (see LIDAR model of the area between SGB and NB.

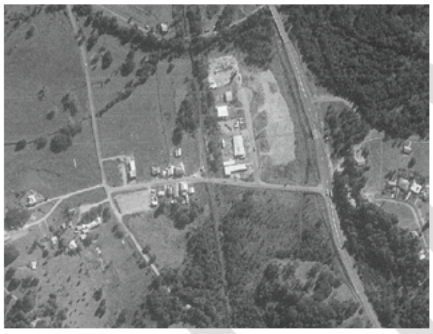
However, it seems that the following strategies would make sense to investigate:

1. Stop pumping water from SGB into the canal, as this will simply recirculate to either Billinudgel Nature Reserve or back in Marshalls Creek, and contribute to the flooding more. This water needs to be pumped out of the system into the ocean, and needs to be supported by well-maintained internal drainage to drain the water to the pumps.
2. Get rid of floodwater that used to flow out of Marshalls Creek into the overflow channels that went into SGB, and take it out the floodplain and into the ocean as it did in the past. This water should not be allowed to pond and flow back to increase the flooding of New Brighton. We need to investigate either (a) the size of the flood pumps that would be

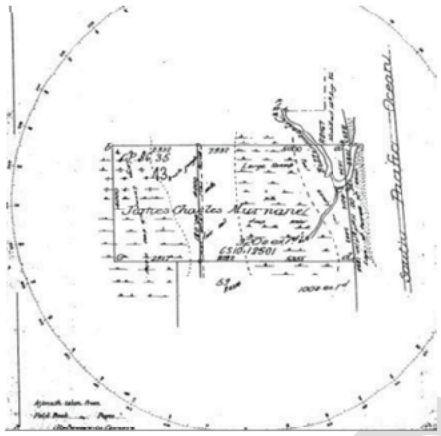
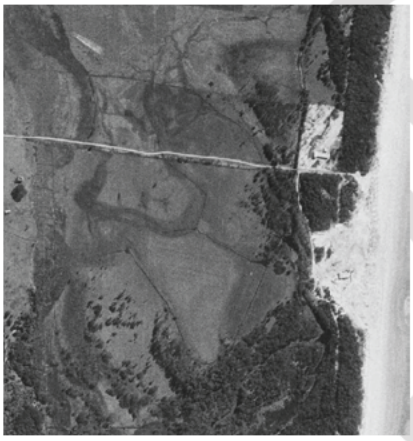
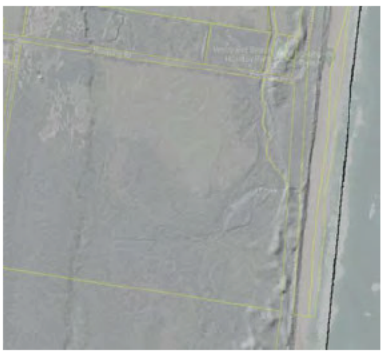
required to reduce flooding, or (b) if drainage channels can be established in the area between SGB and NB to sustain an ocean outfall

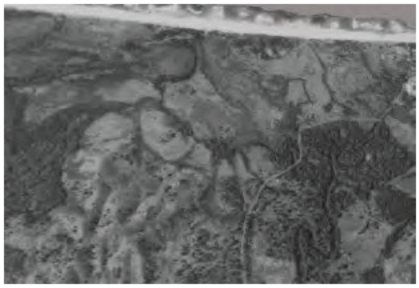
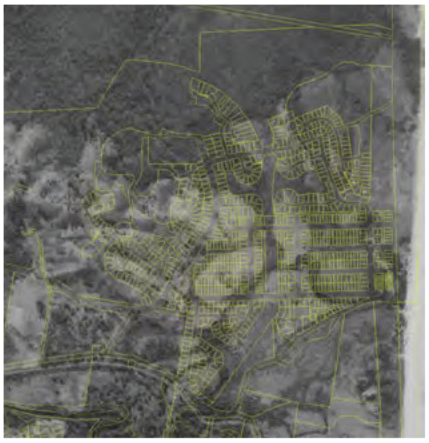
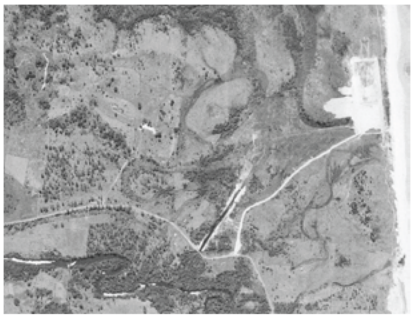
3. Get rid of the floodwater from the Billinudgel Nature Reserve before it overtops the area to the east of Fern Beach and floods SGB. The water needs to be discharged into the ocean and out of the system. Again, what sized flood pump would be required to do this? Could an ocean outfall be constructed to work? There is a call to reinstate the ocean that was created by the developers, but the question remains if the natural drainage channels in the Billinudgel Nature Reserve would deliver sufficient water to this outflow to maintain a natural balance, and whether it would be stable with ocean swells.

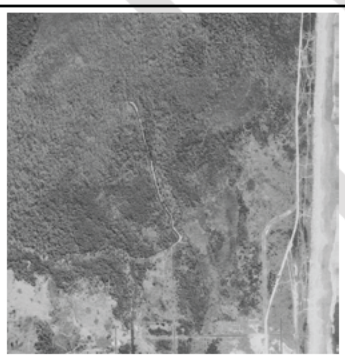
Timeline

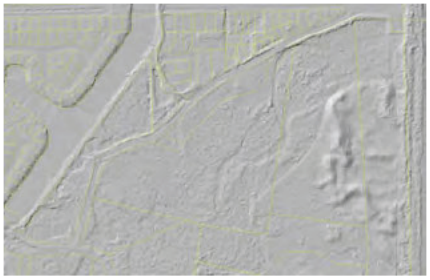
Photo	Event	Impact
BILLINUDGEL		
	Billinudgel 1947	Flood flows in Billinudgel followed a broad overflow channel to the south of the village to a swampy area to the southeast/ east. Water from this swamp then re-joined Marshalls Creek to the east of the old highway.
	Billinudgel 1971	
	Billinudgel 1987	Industrial estate development started to the north of the access road to Billinudgel
	Billinudgel 1997	Bonanza Drive in the Industrial estate developed to a much high level than surrounding areas.

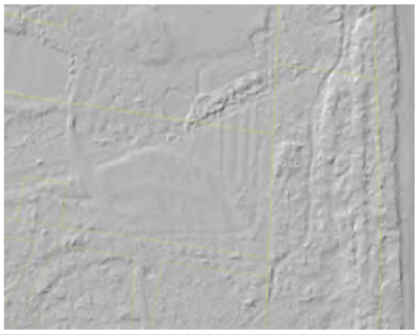
	Modern Terrain Model - Billinudgel	

WOOYUNG		
	Original survey plan 1887	Original survey plan shows an ocean outlet at Wooyung, immediately south of the now caravan park. http://brunswickvalley.com.au/flood-history/flood_map3.pdf
	Wooyung 1962	Location where outflow noted previously heavily altered and apparently closed off from the ocean. Sand dredge still present?
	LIDAR data over Wooyung area overlain by Google imagery	Modern LIDAR data exposes the general underlying drainage patterns. This image shows the creek channels in the Wooyung area, and their pattern suggests that there was an ocean outflow in that vicinity at some point.

SOUTH GOLDEN BEACH (SGB) and NEW BRIGHTON (NB)		
	SGB/ New Brighton 1947	Flood flows from Marshalls Creek left the main channel in a couple of locations to flow into well defined channels that then flowed into the ocean through openings in the dunes. The main outfall is located where the SBG shop and Community Hall are now built (not documented in BV). This outfall was also supplied by a major drainage channel coming from the Billinudgel Nature Reserve. Two smaller outflows existed between SBG and New Brighton.
	1947 photo with modern cadastral overlay to locate features.	The location of the main ocean outflow was located where the SGB hall was built.
	Area north of SGB 1958	There was either no significant ocean outflow to the north of SGB where canal was later established, or it was poorly defined. Drainage patterns clearly showed that the dominant channel flowed to an outfall at SGB hall.
	SGB area 1958	Development of the area of SGB commenced between 1947 and 1958, with the major ocean outfall fill in the area to construct what would later become the SBG blocks closest to the beach. This was probably the area used for an airfield by the American developers at the time. The photo clearly shows the location of the major drainage channel ending at the developed area. Overflow channels are still apparent where Kolora Way is not located.

	Area between SGB and NB 1958	It is unclear if the ocean outfalls between SGB and NB were still open in 1958, but the drainage channels were still well defined. Drainage channels from overflow from Marshalls Creek through Kolora way less week defined, possibly with the construction of the canal?
	SGB area 1962	Further development of the SGB area was evident by 1962, including a motel. A quarry established at Seventh Day Adventist Church site. Channels at SGB filled. Capricornia Canal was extended through the area to link to the Billinudgel Nature Reserve.
	Area between SGB and NB 1971	Drainage channels to ocean outfalls between SGB and NB are less well defined, and do not appear to have a clear channel through the dunes. Similarly for overflow channels through the Kolora Way area.
	Area north of SGB 1971	In 1971, there was no evidence of an ocean outflow to the north of SGB.

	SGB area 1987	The 1987 photos show considerable development of the canal and housing. It is unclear if the levee was constructed at this time.
	Kolora Way 1987	Any evidence of the major overflow channels from Marshalls Creek through the Kolora Way area are no longer evident.
	Area north of SGB 1987	A man-made canal is clearly shown in 1987, although it is not connect to the ocean at this time.
1991		
	SGB Hall area 1991	By 1991, the levee stopping any northward flow of water from Marshalls Creek into SGB was constructed.
	Terrain Model of levee at SGB	A detailed terrain model created by LIDAR shows the levee system that prevents water flowing from Marshalls Creek into the SGB area.

	Terrain Model Kolora Way	Fill in Kolora Way prevents overflow water from Marshalls Creek from flowing north.
	Terrain Model - area between SBG and NB	Ocean outfalls in the area between SGB and NB were fed by distinct drainage channels across the floodplain. These channels and outflows have been altered by sand mining and fill brought in by property owners. The effectiveness of any reconstructed outflow through the dunes would be restricted by the removal of these channels.