

# TRANSCRIPT

## LEGISLATIVE COUNCIL ENVIRONMENT AND PLANNING COMMITTEE

### **Inquiry into Climate Resilience**

Aireys Inlet – Wednesday 23 October 2024

#### **MEMBERS**

Ryan Batchelor – Chair

David Ettershank – Deputy Chair

Melina Bath

Gaelle Broad

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**WITNESS**

David Bills-Thompson, Technical Officer, Port Fairy Coastal Group.

**The CHAIR:** Welcome back to the Legislative Council Environment and Planning Committee's Inquiry into Climate Resilience in Victoria at our hearings here in Aireys Inlet. Welcome to Mr Bills-Thompson from the Port Fairy Coastal Group.

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My name is Ryan Batchelor. I am the Chair of the committee and a Member for Southern Metropolitan Region in the Legislative Council. I might invite my fellow committee members to introduce themselves, starting with the Deputy Chair.

**David ETTERS HANK:** Thank you. David Ettershank from Western Metropolitan Region in Melbourne. Hi.

**Rikkie-Lee TYRRELL:** Hi, I am Rikkie-Lee Tyrrell, Member for the Northern Victoria Region.

**Sarah MANSFIELD:** Sarah Mansfield, Member for Western Victoria.

**John BERGER:** John Berger, Member for Southern Metro.

**Gaelle BROAD:** Hi, I am Gaelle Broad, Member for Northern Victoria.

**Melina BATH:** And hello, good afternoon. Melina Bath, Eastern Victoria Region.

**The CHAIR:** Welcome. For the Hansard record, if I could please ask you to state your full name and the organisation you appear on behalf of, and then I will invite you to make an opening statement.

**David BILLS-THOMPSON:** Good afternoon. I am David Bills-Thompson, and I am here representing the Port Fairy Coastal Group.

**The CHAIR:** Mr Bills-Thompson, if you would like to make an opening statement of around 5 or so minutes, then we can take it from there and we will ask you a series of questions in blocks, so over to you.

**David BILLS-THOMPSON:** Thank you. On behalf of the Port Fairy Coastal Group, I thank you all for this opportunity to share with you some of the data that we have been obtaining from East Beach at Port Fairy. We are an organisation that measures the sand levels on the beach. That is all we do. We share this information with universities and of course with the local government, the Moyne shire.

**Visual presentation.**

**David BILLS-THOMPSON:** We have the first slide up. These are fairly standard objectives of groups that do similar work to what we do. Firstly, we wanted to understand the dynamics of the beach. Where does the sand go? Where does it come from? I might say that members of the Port Fairy Coastal Group came from diverse backgrounds, and none of us had any qualifications in coastal management or civil engineering. We had a physician, a farmer, an electrician, a businessman and an electronics technician, and that was the core group with which we started to measure the beach. We also wanted to gather information so that if any changes were made to the foreshore, we could assess whether there were improvements or whether there were any adverse effects on other parts of the beach due to those constructions. Of course we needed to provide coastal managers with current information about what was happening on the beach, so we were a second set of eyes for the local council.

Okay, this is Port Fairy's East Beach. I have marked in three significant landmarks. Down at the bottom is Charlie's On East cafe, just to give you your bearings. Further up, out in the boondocks, is something called the nightsoil site. Now, for those of you that are very young, you probably do not realise what the nightsoil site was for, but in the days before sewerage, sewage was collected in a can from a little outhouse at the bottom of the backyard and taken out by horse-drawn carriage or truck and dumped into a big hole in the sand dune. That is the nightsoil site. This was closed in the 1970s when the town was sewered. The only really bad thing about that is that when they stopped using all the steel cans, they threw them into the hole too. When eventually the sand dune was breached, these cans rolled out onto the beach, and that was definitely not a good look as far as the townspeople were concerned. That was one of the main causes of the town's interest in the erosion occurring on the sand dunes at East Beach.

Further around, the general tip site: this again was another landfill site that was closed in the 1970s, but it contains all sorts of rubbish – china, glass, metal, old tanks, everything. They are two principal sites that we were very interested in. I started in 2012 taking measurements of the dune recession at the nightsoil site, and the group's activities developed from there.

Next slide, please. Around the beach the council installed a number of reference posts for us. These are survey posts that are simply planted in the sand. We know their position horizontally on a map, and we also know their elevation relative to the Australian height datum. They are what we use as a height reference when we are measuring profiles along the beach.

Here we have a typical scene of a beach in crisis. You can tell that because you have got green vegetation migrating in clumps down to the water's edge. The process here is: we have a relatively flat beach and we have water running up to the toe of the dune, and even if they are very small waves, that water run-up takes away the sand from the base of the dune. The sand then continues to slump down and recess, and eventually it undermines the crest of the dune, which fails in tension at the top. It breaks off and rolls down the dune, and that is eventually washed away as well.

Next slide. We conducted measurements of the dune toe, and we put a line through all of the measurements to make it easier to see.

Next slide. One month later we did another set of measurements, and we found very good conformance with the previous month's measurements in terms of the distance from the post in the beach down to the dune toe. On the end there at post 10 what has happened is there has been a slumping event of the sand. It has come down, and it has shortened the distance to the reference post.

Next slide. The following month we made another measurement, and that pulled us up with a bit of a jerk. At post 8 there was about a 20-centimetre increase in the dune toe distance. This was in fact the third time that we had been out on the beach making measurements, and we did not understand what was going on. I checked with the beach monitoring coordinator, the farmer, and he assured me the measurements were absolutely correct. We believe that.

Next slide. We went on to the next month, and there was not only further erosion of the dune toe at post 8, but it also occurred at post 7. We thought, 'This is erosion. What we're seeing is something actually happening now.'

Next slide. A month later it continued to go. We discussed this at our group meetings, and the chairman Nick Abbott said we had to take this to the council. We did that. We had a meeting with the CEO of Port Fairy shire, their chief engineer and one of the councillors involved in coastal erosion, and they were very surprised at the work that we had done. Straightaway they went and confirmed how much of a buffer of sand was there in front of the mother lode in the landfill site, and they were shocked. There was very little, and the next step would have been the landfill coming out onto the beach.

Next slide. Coastal engineers were involved, finance from the state government was made available and this rock wave energy dissipation structure was designed and constructed and put in front of the landfill tip site just in time for the storm event in late 2014.

Next slide. This is what happens with the wave energy dissipation structure, and you can see the area behind it, the sand behind the wall, has been maintained in height. The rock wall did actually stop the wave energy getting to the dune toe and it stopped further ingress into the landfill site, so it was successful.

Another slide. This is an aerial photo from 5000 feet, and it shows the area of dry sand clearly behind the wall. No water has penetrated up to the dune toe, and therefore you cannot get dune recession. It also shows a little bit of undercutting around the corners of the wall. This is typical for an unprotected wall.

Next slide. The wall was extended, and what are called sand trap fences were added to each end in order to minimise the undercutting. This is actually a clip from the 'Defend Port Fairy' video. There is a link to that in your notes, and if you have not seen it, I do suggest it is well worth having a look at it. It is 7 minutes long, it is a professional production and it gives you a lot of information about the erosion problems at Port Fairy.

Next slide. We were also able to do a correlation between the measurements at posts 7 and 9 with post 8, and we worked out that if the rock wall had not been there, the recession at post 8 during the storm in late 2014 would have been 4 metres. That would have exposed the mother lode in the landfill site to the beach, and it would have made quite a mess.

Next slide. As well as measuring dune recession, we use the post as a height reference.

Next slide. This is a diagram of our beach in crisis, with the reference post installed in front of the dune toe. Surveyors determine something called the Australian height datum, which is a height reference to which all our tide heights are quoted. When you see a tide height of 0.6 quoted, it means the water level is 0.6 metres above the datum. In Port Fairy that datum is roughly 30 centimetres below the low tide level. All our height references are referred to that datum. Surveyors use their magic equipment, and they survey the post so that we know the elevation of the top of the post.

Next slide. If we know the elevation of the post and we measure how much of the post is sticking out of the sand, we can calculate the sand height above the datum, and that is the basic calculation that we use.

Next slide. To draw a profile we simply conduct those same measurements down the beach at regular intervals. The intervals we use at Port Fairy, because it is a relatively flat beach, are 5 metres, and we try to get out to 30 metres in front of the post.

Next slide. This is actually the first beach monitoring we did, back in April 2014. There is the rope laid out in front of the reference post. It has little flag markers on it every 5 metres. Mark is coming down there with the laser staff and the detector, and he is detecting the laser beam, which is parallel but above the Australian height datum. We use the laser beam distance to determine the sand elevation.

Next slide. We also work with the two primary schools. They have activities for year 6s where they come down and they do the same profile measurements on the south beach, and that was a rather innovative solution that the girls worked out when they could not reach the top of the laser staff.

This is a typical beach profile. The bottom dotted line represents the minimum elevation we have ever seen in the sand, the top dotted line represents the maximum elevation and the chain dotted line in the middle is the average of those. The red line is the most recent measurement, and the date of that was 18 February 2018. The blue line is the previous measurement, so we can see what the change has been in the last month, and the purple line in this case is the measurement from about 12 months ago. When we first started off, we just kept adding readings to the graph, and we ended up with about 60 lines drawn on the chart. You could not really understand what was happening, so we made major changes to the spreadsheet and settled on using those three particular parameters, but we can put up any particular date that we have in the file.

Next slide. Okay, this may be something that is really relevant to your coastal adaption. What we have here is a graph of the sand elevation at post 6, which is roughly halfway around Port Fairy Bay, over three or four years. You can see there is a cyclic nature to that. We have minimums and we have maximums, and the maximums are occurring roughly at the same time each year. That is post 6.

Next slide. We have added in the information from post 9, which is some 1100 metres further around the beach, and you can see that there is some coincidence between the peaks of post 9 and post 6, but as you progress in time there is a phase change occurring between the peaks. This gets interesting when we add in post 3 in the next slide. Again the peaks are roughly coincident, but again as you go on in time, the difference between the peaks is changing in time, so keep that in mind. That ended early in 2018.

Next slide. Now, the other day I went in and collected all the data we have to July 2024, and we have this. It is perfectly obvious there with the orange line: there has been a dramatic departure from what has been a cyclic occurrence up until then. As for post 6, the green line, and post 9, the purple line, that has really become quite irrational as well. We believe what we are seeing there are the effects of climate change. Coastal science says that what used to be cyclic weather patterns are now much more random, and that is due to climate change. This is an example of that. This is what we are seeing. This is actual data taken from the beach measurements.

**The CHAIR:** We are just a little pressed for time, Mr Bills-Thompson, so maybe if you can take us to the concluding points, then we will get into any questions.

**David BILLS-THOMPSON:** Yes, right. I did have another slide. Just to summarise: we have 8500 measurements on East Beach. In the last year we made six VCMP drone flights. We integrate that data into our laser-derived data. We have 13 active reference points on East Beach, where we take measurements, and at those 13 points we generate 16 profiles. So we have a pretty good idea of what is happening to the sand on East Beach. On South Beach we have made 24 laser monitorings with the schools, 236 measurements in all. We have three active reference points on South Beach and six profiles. The significant thing about South Beach is that it is a very low area, and we often get wave run-up over the road and even rocks carried over the sand dune onto the road. That is made quite clear if you do have a look at that 'Defend Port Fairy' video. There are some graphic images in that. So that concludes my part of the presentation. Happy to take questions.

**The CHAIR:** Thank you. We do not have an awful lot of time for questions each, so members of the committee might just need to bear that in mind. It is an amazing set of citizen data, citizen science, and a real credit to you and your colleagues for doing that. How has this information been received by relevant authorities? Collecting data is one thing; doing something about it is separate. We saw the rock wall in front of the tip, which is obviously designed to stop quite a big disaster from occurring, which is that tip being breached. But more broadly across the beach and the bay in Port Fairy – firstly, who have you shown this to and what has been their response in terms of taking the data, taking the science and translating it?

**David BILLS-THOMPSON:** Principally, the data goes roughly every six weeks to Moyne shire. They accept the data. They trust us. They know that our methods are scientifically vigorous. We take great care to ensure that the data is accurate, whether it comes from the laser measurements or from the drone measurements. We have a special regime to check the validity of the drone measurements because it is a very complex mathematical process that derives the information. We have had requests from Deakin University and Melbourne University to have access to our raw data. We also often get requests from students, particularly at Swinburne Uni, for our raw data, and we willingly send them that. We did find that there tended to be – well, perhaps 'apathy' is too strong a word, but the townsfolk seemed to be confident in the fact that our group was keeping an eye on the beach and that if anything serious was looming we would know about it and we would inform Moyne shire, as we did in the case of that dune recession when they got galvanised into action and generated the rock wall to protect the tip site. So for those who know and work with the data, our data is always very well received. For assisting the people in the street, we recently came up with the quick summary table, which I think you all have. This can provide you with a quick overview. Obviously the red attracts you to the part of the beach that is currently in distress, and you can see there is quite a bit of green there.

**The CHAIR:** Just on that, just for the benefit of the committee, the red cells are telling us the area where there is the most significant recession of the dune?

**David BILLS-THOMPSON:** Yes.

**The CHAIR:** And the green is telling us where not much has changed?

**David BILLS-THOMPSON:** That is right.

**The CHAIR:** Is that right?

**David BILLS-THOMPSON:** Yes. The break points are listed down at the bottom in the legend. So anything with a percentage height greater than 57 per cent is green, anything less than 5 per cent percentage height is red and anything in between is yellow. So at a glance you can see roughly what the condition of the beach is. The first column is the recent measurements, so they are the current ones. They expire in 42 days, when the next measurement is due and they all turn grey. You have the previous column, so you can compare

what the values were between the current and the previous, and then you can look at what we had 12 months previous. So again, that is further proof that things are not quite cyclic the way they used to be.

**The CHAIR:** Mr Ettershank, do you have any questions?

**David ETTERS HANK:** Yes. Thank you for your presentation. I reckon citizen scientists are the tip of the spear often in terms of getting the sort of raw data you have, so thank you for that. Obviously you are volunteer-driven. I guess for groups that might want to set up similar exercises: was there much of a capital investment in terms of putting together the equipment and in terms of the ongoing costs of this sort of project?

**David BILLS-THOMPSON:** No, there was not when we started, but it took us awhile to work out the best way to measure profiles down the beach. In terms of the dune recession measurements, we actually started off with a tape measure. That is all you need, and a reference post. The council were very obliging in putting in, initially, seven reference posts around the beach, as you can see in the notes. We settled on using a builder's laser level so that we had a reference above the sand parallel to the Australian height datum, and that is key to making quick measurements. There are other groups that use similar equipment, and some groups use slightly different equipment, but they are able to do basically the same job.

**David ETTERS HANK:** Terrific.

**David BILLS-THOMPSON:** A builder's laser level of reasonable quality might cost you \$700.

**David ETTERS HANK:** Fantastic. Have you got a particular advocacy objective now? I mean, there is obviously merit in gathering the data, but having had all this opportunity to analyse it, are there particular initiatives you are seeking from council or from the state government based on those findings?

**David BILLS-THOMPSON:** No, we really do not seek any external support. What we really do need are extra volunteers.

**David ETTERS HANK:** I did not mean so much that. I meant: are there particular things, like replication of the flood wall you had there – particular projects – you would like to see council or the state government resource to address the erosion that you are witnessing on the beach?

**David BILLS-THOMPSON:** No. I think they have it pretty well in hand. The Moyne shire is quite prepared to accept our data as it is; if we are not alarmed, they are not alarmed, and things just continue on. So the answer is no.

**David ETTERS HANK:** So you are alert but not alarmed.

**David BILLS-THOMPSON:** Yes.

**David ETTERS HANK:** Good on you. Thanks. That will do.

**The CHAIR:** Thank you. Ms Broad, do you have any questions?

**Gaelle BROAD:** Yes. Thank you very much. I guess you are spending a lot of volunteer time taking all these measurements and retaining all the data. Is there any particular action that you are looking to see from the authorities as you are sharing that information?

**David BILLS-THOMPSON:** No, I do not think so. The Moyne Shire Council is always very receptive to anything we present to them. They in fact gave us a grant to replace our laser level recently. So the Moyne shire have looked after our group very well. It has been a good working relationship between the citizen scientists and the engineers there.

**Gaelle BROAD:** I am interested too, because when you first started taking this data, there seemed to be a very short amount of time between that and the actual rock wall being established. Is that right? Can you talk about that process and, if you think about today, what would happen? But take us back to that time when you were collecting the data and the rock wall. What happened?

**David BILLS-THOMPSON:** Okay. I guess if you can recall in the presentation where we had the charts of the distance to the dune toe –

**Gaelle BROAD:** Yes.

**David BILLS-THOMPSON:** When we took that to the Moyne shire, we met with the chief executive officer, their senior engineer and a shire councillor. Firstly, they were surprised at the amount of data we had, and secondly, they were a little shocked. The first thing they did was to go and investigate with a backhoe how much margin of sand there was in front of what was in the tip, and that really galvanised everybody into action. They had the evidence in front of them – that there was serious erosion – that we had gathered. The coastal engineers said, ‘Well, you need some sort of protection there to absorb the wave energy,’ so they designed this rock wall. Some of the rocks in there are 5000 kilograms, 5 metric tonnes; some of the smaller ones are 3 metric tonnes. So they are big pieces of stone, but even some of those have been moved around by the power of the sea.

The rock wall – we continue to monitor it in two places using profiling across the rock wall. We know that it is very effective still. It has far exceeded its life expectancy, but it is still absorbing wave energy. We know from the drone aerial photographs, not just the measurements but the photographs, that water is only just making it through the rocks, and the secondary dune that has formed is still largely intact. Now, secondary dunes form in front of primary dunes, and they are your insurance policy, if you like, because they are sacrificial. The waves have to get through the secondary dune before they get to the primary dune and dune recession then starts. So the rock wall has been very effective, and it was the prompt action from the council and the engineers and the state government in providing finance that got it all done. So yes, it was good.

**The CHAIR:** Mrs Tyrrell?

**Rikkie-Lee TYRRELL:** With the beach, I have noticed that to begin with, in the lower numbers – say, 1, 2 and 3 – they are spaced out more than 8 and 9. How come they are spaced out further?

**David BILLS-THOMPSON:** Okay. The original post spacing was designed by a council engineer that is no longer there, but it was done in relation to the two landfill sites. There were two posts put close together around the nightsoil site, and there are three posts around the landfill site. The position of those sites determined, if you like, the density of the reference posts. Also, on that part of the beach around towards Mills Reef, if you look at the aerial photographs, you can see by the colour of the waves that the surf is a lot more intense the further around you go, because it is less shielded by the point where the lighthouse is. At the point where the mouth of the river goes out, the river groynes shield a lot of the Southern Ocean waves coming into the beach. So in short, the parts of the beach closer to the town, where the posts are spaced out, are not subject to the same sort of erosion that the open beach is, further around.

**Rikkie-Lee TYRRELL:** Okay. Thank you.

**The CHAIR:** Dr Mansfield.

**Sarah MANSFIELD:** Thank you. I think you have touched on it a bit in your response to Mrs Broad’s question, but I was wondering: how is the landfill site going? Are you confident that that is still well protected, given what you have exposed. This inquiry is looking at the climate resilience of built infrastructure, but I suppose you could consider a landfill built infrastructure, and the potential damage to that has flow-on environmental effects.

**David BILLS-THOMPSON:** The landfill site is very safe at the moment. One only has to walk along behind the rock wall to see the secondary dune that has formed in front of the primary dune. The pictures of the post that I showed you in front of the sand dune – that post is now buried up to its top in sand, and we have had to fasten a metal post onto the top so that we can continue to take measurements from it. One of the posts, in fact post 4, further down the beach is covered by about a metre of sand. So archaeologists will have a field day when that becomes uncovered.

**Sarah MANSFIELD:** Do you have a sense of how long that will hold up, that seawall, as protection for the landfill site?

**David BILLS-THOMPSON:** Well, it has been 10 years so far. There has been some sinkage at the southern end of the rock wall, and there is some undercutting around behind the edges of the rock wall, but that is past the extremities of the tip and the shire do not consider that is an imminent danger. The rock wall in the centre of it is still protecting the tip very well, and I am confident I think that it could go another 10 years without much repair.

**Sarah MANSFIELD:** Do you have any sense or does the data suggest that that seawall or some of the other measures that have been put in place to protect the landfill might have affected erosion patterns further around the beach?

**David BILLS-THOMPSON:** No, we do not have any evidence. We have been looking for it, because that is one of the objectives of beach monitoring, but we have not seen anything that suggests that. What we do see are what are called the end effects. What happens is you have got a rock wall and the wave action comes in and it is reflected back, but it is also reflected along the sides until it comes to the end of the rock wall and then it races around the back. That is involved in the undercutting process at the ends of the rock wall. So what we really need to do is redesign the ends of the wall. I think they actually need to flare outwards to face the sea, but that is a design problem for the coastal engineers. But the main part of the tip is well protected at the moment. We rigorously monitor the wall in two places, with profiles, and on the spreadsheet we can produce – in fact I think we do have some data here. Yes, here it is. On the back of one of these sheets, post 8.1, you can see the maximum and the minimum lines. Once we get through the rock wall, which is this, you see the envelope widens out. You have a much greater range in front of the wall of sand heights than you do behind the wall. That is the effectiveness of the wall.

**Sarah MANSFIELD:** Thank you.

**The CHAIR:** Mr Berger.

**John BERGER:** Thank you, Chair. Thank you for your presentation. I am very interested to get my head around why post 9, but I think you have answered that by the coastline's – the way it is put together. Then I got to thinking about the wave energy that you were talking about. I am just wondering if there are any studies that have gone into – we know the outcome, the effect of what is happening with the dunes, but what about the cause coming in from the waves? Are we measuring wave energy to see if there are specific tidal things or events that might bring the wave energy up higher at any particular time?

**David BILLS-THOMPSON:** Deakin University have a wave buoy that is situated a kilometre or so off Port Fairy's beach, and that information is available. One of our members does study the wave patterns, but basically it is too much information for us. We did actually undertake wind studies at one stage, but we could not handle the amount of information. Time-wise it was just too much of a burden. So we stick with what we do best, and that is measuring the sand. But that information is available, and somebody will be analysing the wave energy somewhere, yes.

**John BERGER:** Thanks.

**Melina BATH:** Thank you, David, for all your amazing work. This is a huge commitment. I am from the eastern side of the state, and we certainly have our own issues with coastal erosion. You may need to take these on notice. Can you find out for us and get back to us on how much the rock wall cost at the time?

**David BILLS-THOMPSON:** I think you would have to direct that question to Moyne shire.

**Melina BATH:** That is all right; we can do that. My next question is: I wonder what the cost would have been if that was not delivered and not in place – you know, with the falling of the landfill site onto the beach – but that might be a question that I will direct to them. Do you feel that there has been any community pushback to the rock wall? I do not mean that tongue in cheek, but has there been ill sentiment about the rock wall? And if it needs updating now and flaring of the sides to protect that from washing around, do you think that would gain community support?

**David BILLS-THOMPSON:** I am not aware of any community pushback to the rock wall. People are still able to walk up the beach in front of it and you can walk behind it. There is quite a defined track through the spinifex and the marram grass there, so people do walk behind it. So I am not aware. I think considering adding



more rocks to it would probably be beyond the thoughts of most of the townspeople. There certainly would be a downside to flaring it out in terms of access, so we would have to consider that. But the main part of the rock wall is doing its job.

**Melina BATH:** Has the Moyne council had any sort of conversation or done analysis on whether it would ask government for funding to flare?

**David BILLS-THOMPSON:** I am not aware of that, no. That is the sort of recommendation that would probably come from coastal engineers too.

**Melina BATH:** Well, I just want to say thank you so much for your ongoing endeavours.

**David BILLS-THOMPSON:** You are welcome. That is our pleasure.

**The CHAIR:** Mr Bills-Thompson, that brings us to the end of the time we have got allocated for today's hearings. Thanks so much for your presentation today, but also if you could extend the thanks to all the people who have been involved in the collection of this trove of data over the last decade – it is quite remarkable.

**David BILLS-THOMPSON:** I will. It is, yes.

**The CHAIR:** You will be provided with a copy of the transcript of the proceedings from today for your review. With that the committee will take a short break to reset for the next witness.

**Witness withdrew.**