

MEMORANDUM



To: Laura Swan
Consultant Planner Ōpōtiki District Council

From: Rachael Medwin
Engineering Hydrologist BOPRC

Date 1st October 2024

Subject: Inundation Levels at 19A Baird Road, Ōpōtiki

Introduction

The owners of 19A Baird Road wish to use the property for a pre and post residential drug rehabilitation facility. This memo discusses the issue of inundation of the site and quantifies the risk that this poses for the property.

Overview of the Site

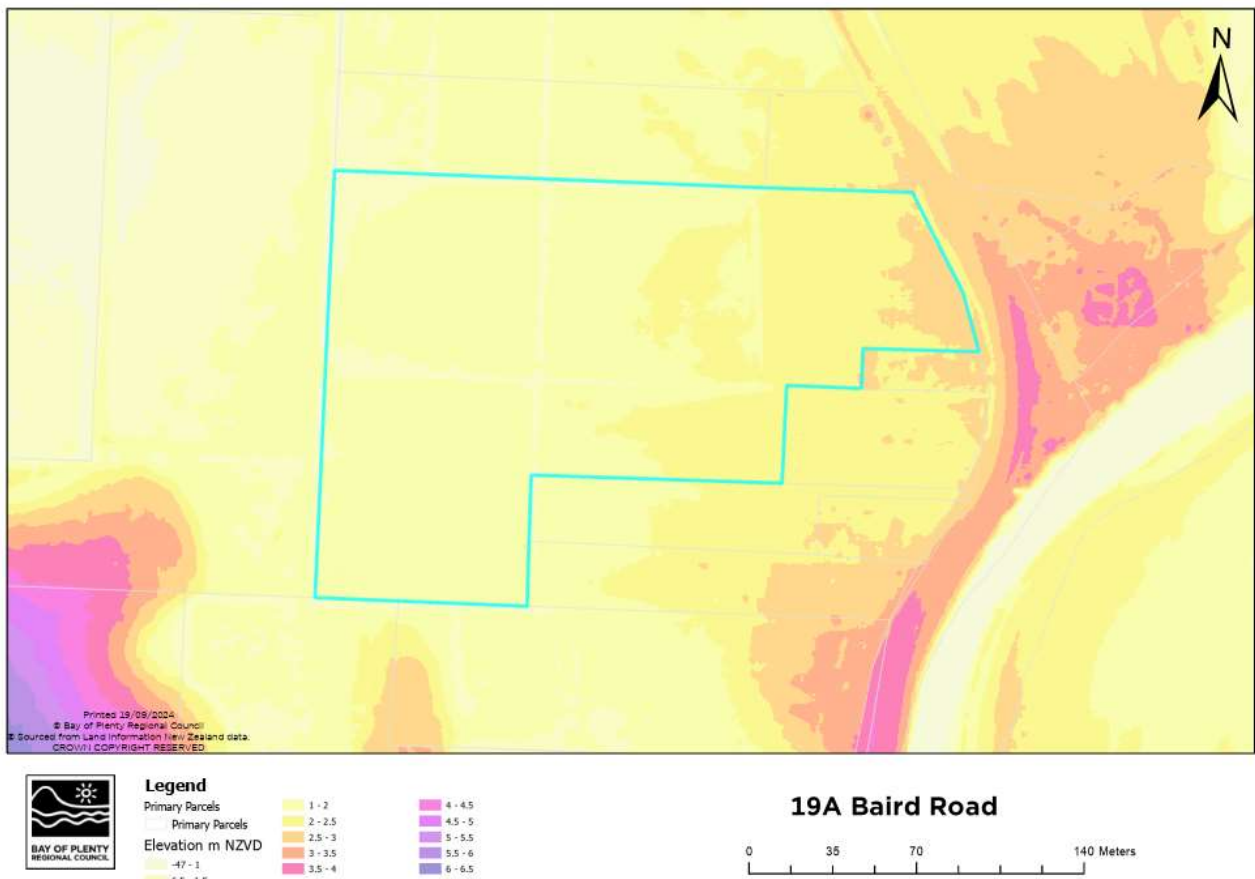


Figure 1: Site location and land elevations (NZVD)

Objective ID: A4781618

The property at 19A Baird Road is situated on a low-lying floodplain (see figures 1 and 2), on a day-to-day basis water flows into the area from two smaller catchments to the south and southwest of the site. This water is channelled through farm drains and past the site and finally is discharged through a culvert to under state Highway 2 where it joins Baird’s Drain and eventually the Waioeka River.

There is also a small catchment to the north of the site (on the opposite side of Baird Road) this catchment drains the surrounding farmland, it flows through farm drains before discharging through a culvert under State Highway 2 where it joins Baird’s Drain and eventually the Waioeka River.

In times of flood these two catchments join over Baird Road and pond while waiting to discharge through the two culverts. Additional to flood risk from upstream catchments, there is also a flood risk from the river and the coast from overflows over the State Highway, see figure 2 below.

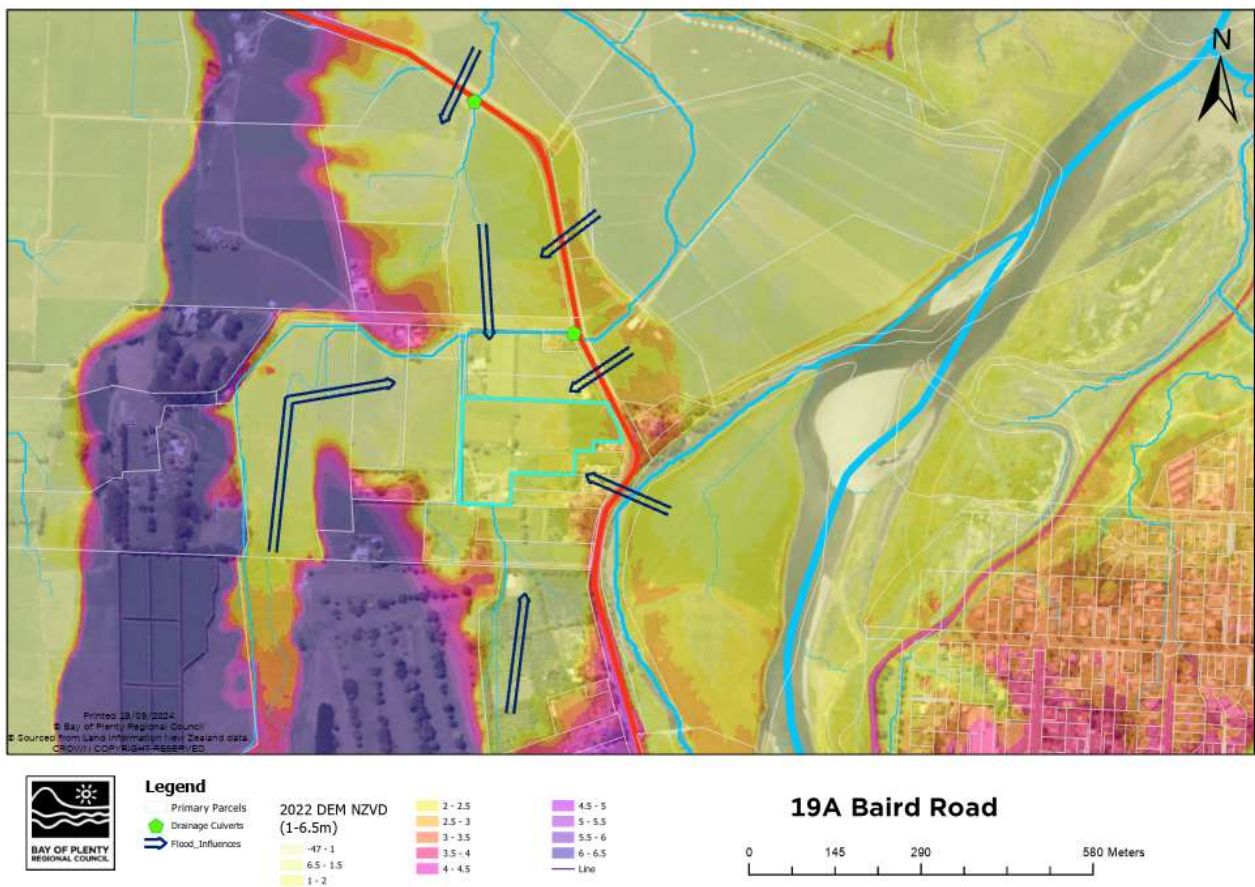


Figure 2: Map showing location of the two drainage culverts and arrows showing the potential direction of water during floods.

Stopbanks

The stopbank design levels for the Waioeka River Urban Right bank and the Otara Urban Left bank that protect the Ōpōtiki township are 1% Annual Exceedance Probability (100 year) + freeboard of 450mm. However, this property is just outside of the Ōpōtiki urban area and so does not have any protection from these banks.

Figure 3 below shows the location of stopbanks in the vicinity of the property. The property is situated close to the left bank of the Waioeka River near BOPRC River cross-section WO1.5. There are 2-year river scheme stopbanks from cross-section WO1.5 northward. This does not provide any protection for the property at 19A Baird Road.

The elevated road adjacent to the property (SH2) provides some protection for the property from river and coastal flooding, this is not to any set level. Flood risk to the property from the river overtopping the road does exist.

BOPRC currently has no plans for construction of stopbanks to protect this area of land in future. See map below for stopbank locations and their design standards.

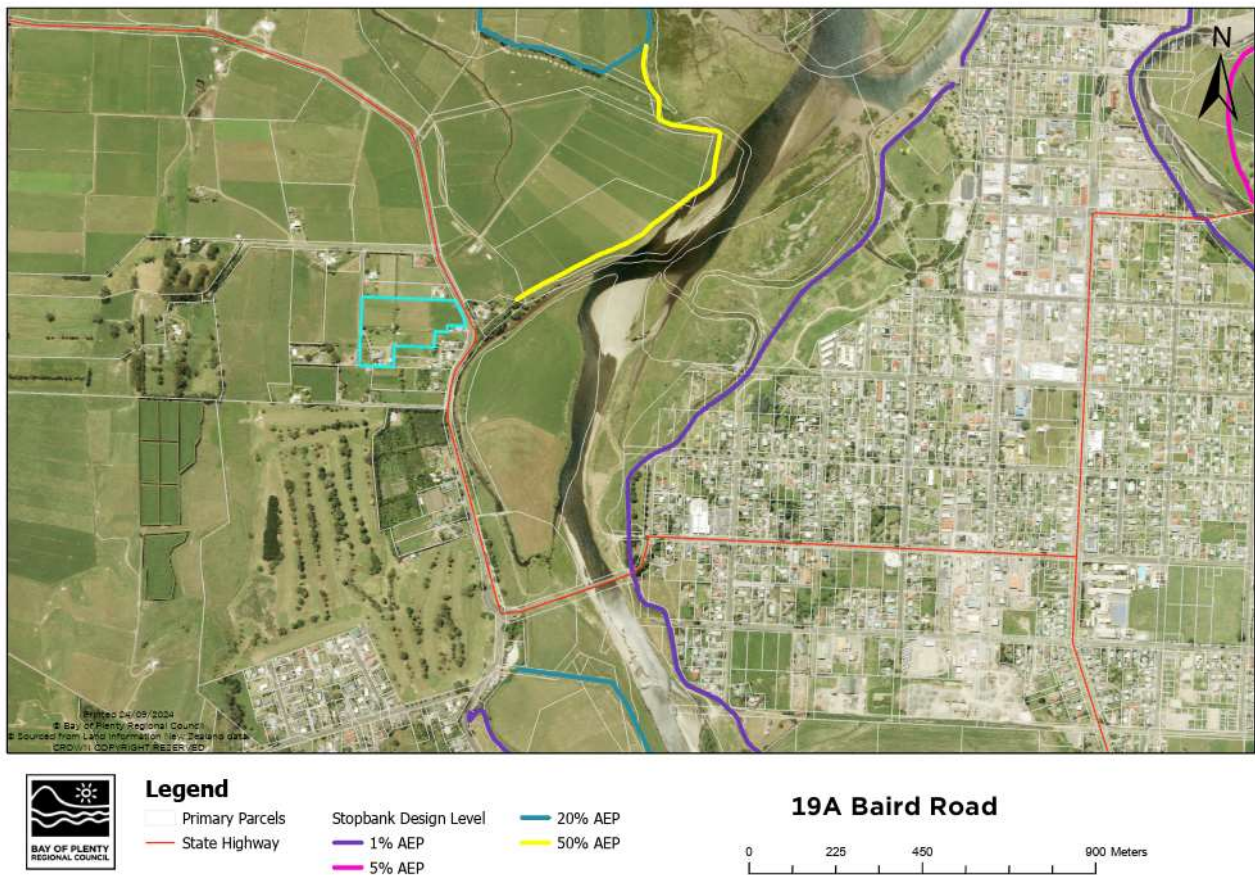


Figure 3: BOPRC owned stopbanks and their associated design levels.

Flood Modelling

The latest River modelling in this area was carried out for Bay of Plenty Regional Council by Cardno and completed in June 2022. Modelling of the Bay of Plenty's major river schemes is conducted at regular intervals, this information is used to help assess stopbank performance, flood plain inundation levels, and inform future planning. A range of scenarios are run, dependant of the needs of the river system and surrounding area.

Models have specific inputs to assess against set design standards, however there is an understanding that this does not fully account for all aspects of the real environment and that a computer model does not have the capacity to do this perfectly. Consequently, a freeboard allowance is added to account for these modelling uncertainties and phenomena not included in the model. For the latest Waioeka and Otara modelling by Cardno the appropriate freeboard allowance to add is 0.5m, this applies to all size events.

The modelling does take into account the new river mouth configuration and has run a range of different climate change and sea level rise scenarios.

Based on the document 'Capacity Review Waioeka and Otara Rivers' (Cardno, 2022) for the property at 19a Baird Road the:

- 1% Annual Exceedance Probability (100yr) is 4.3m RL NZVD (4.6 m RL Moturiki Datum 1953).
- 2% Annual Exceedance Probability (50yr) is 4.0m RL NZVD (4.3 m RL Moturiki Datum 1953).
- 5% Annual Exceedance Probability (20yr) is 3.4m RL NZVD (3.7 m RL Moturiki Datum 1953).

These levels include an allowance for estimate imprecision and phenomena not explicitly included in the calculations. The modelling results above include 1.25m of sea level rise and climate change to 2130 based on RCP 8.5 scenario. The various flood levels are the same across the entire site as essentially it becomes a pond.

Below are two flood depth maps for two different events, 50-year flood in 2130 and the current 20year flood (2030) to give an illustration of the inundation issues for this site.

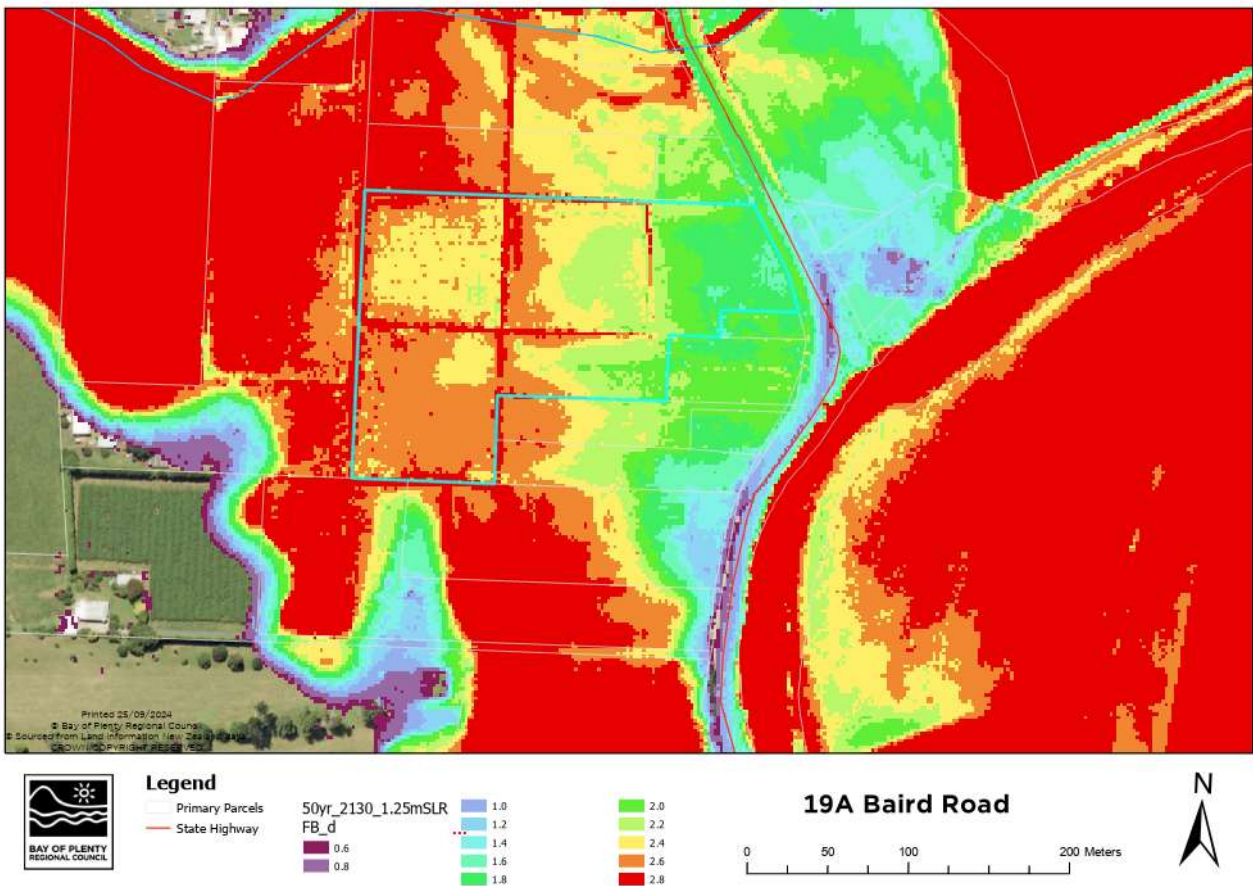


Figure 4: 50-year (2% AEP) Flood Inundation depth map with climate change to 2130 and 1.25m sea level rise, freeboard added.

The above map shows water depths on the property in the 50yr flood (climate change to 2130 and a 1.25m sea level rise component, with a freeboard allowance added). This shows that around the current house site water depths would be around 2.6m, and on the driveway depths of 2.4-2.8m.

The map below (Figure 5) shows water depths on the property in the current climate (2030) 20yr flood (with a freeboard allowance added). **Note:** Freeboard has been added onto the above modelled inundated areas manually, however the area of inundated land has not been increased as would happen in reality, for this reason the extent of inundation on the property would be more than shown in the above map. The map does however accurately show the depth of water around the current house site.

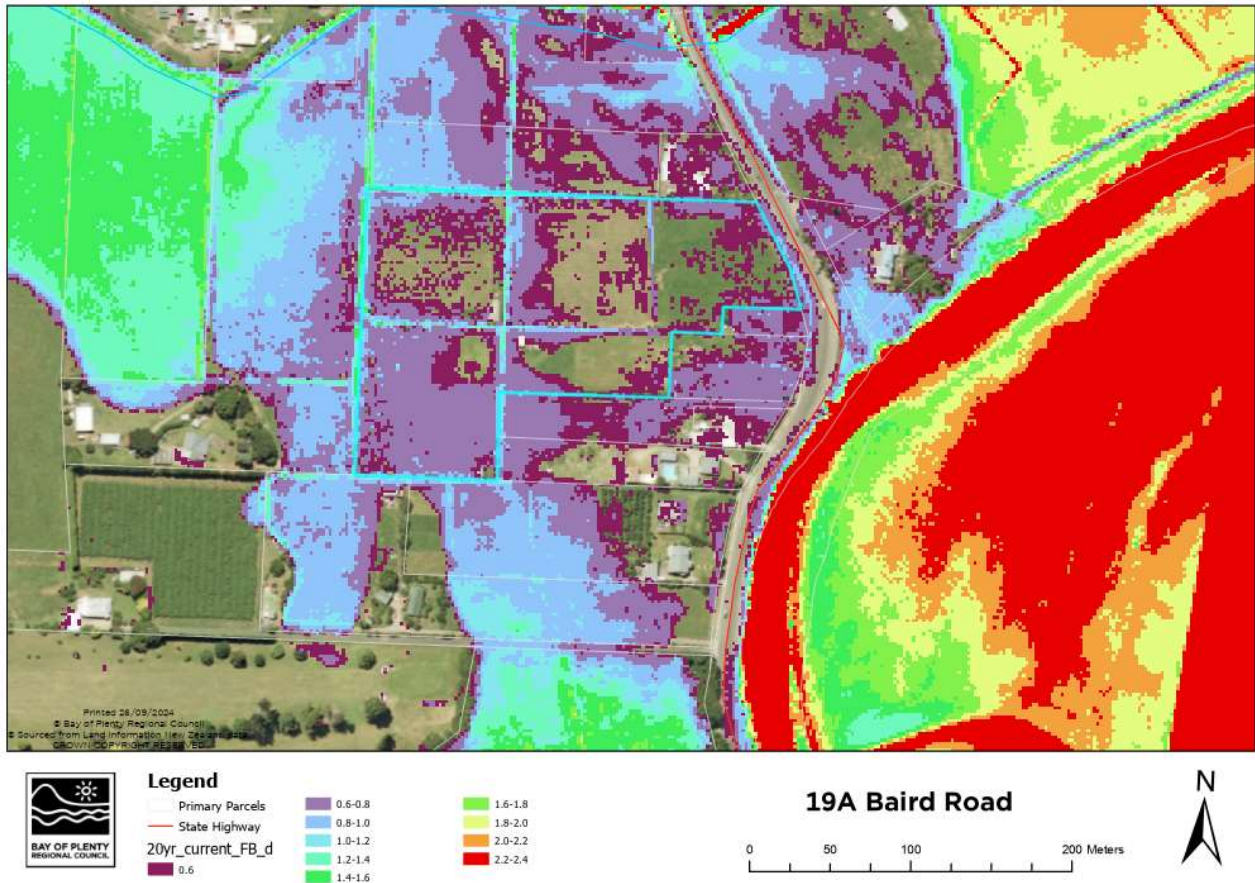


Figure 5: 20-year (5% AEP) Flood Inundation depth map, current climate (2030), freeboard added manually.

Flood Warning System

Bay of Plenty Regional Council does have a robust protocol for managing flood events within the Bay of Plenty, this is mainly focused on the major flood schemes and at-risk urban areas. Within this management protocol is a warning system that sees warnings sent out to at risk groups (mainly farmers on flood prone land) once set levels are reached at related gauge sites, this gives them an indication of when to move stock to higher ground etc. This is not a mechanism that is suitable to use for a warning system for a residential facility.

Bay of Plenty Regional Council does have live river monitoring that is freely available to the general public via the internet. There are three sites that could provide information for the subject property, Waioeka at Cableway, Waioeka at Mouth of Gorge, and Otara at Ōpōtiki Wharf. This data could be used to monitor river levels and gain some insight into coming inundation risk to the property. It would require an understanding of river water travel times and how to interpret how the levels at the gauging site translate to information for the subject property. This is not an exact science, and some skill is required to interpret data.

Bay of Plenty Regional Council does endeavour to have these sites functional at all times, however the risk of gear failure, cell phone coverage or internet connection failure do still exist, especially during storm events.