Appendix 8: Seadown Drain minimum flow alternatives

Science Advice

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Seadown Drain Minimum flow alternatives

As part of the Waitarakao/ Seadown Drain Realignment Project, the current minimum flow monitoring site needs to be moved. This move will occur with Stage 1 of the drain realignment project. We have been asked to provide options for an alternative minimum flow monitoring location with an aim to ensure a similar level of reliability of supply to abstractors, along with ensuring a similar level of instream ecological protection.

Catchment and site description

The Seadown Drain catchment is part of the wider Levels Plain and Seadown catchment, where flows in the drain primarily arise from emerging groundwater close to the coast. Bywash from Levels Plain Irrigation Scheme to a lateral drain also contributes to flows at Aorangi Road.

To prepare for the realignment of the drain and removal of the original Seadown Drain flow recorder (downstream of Aorangi Road), a second flow recorder site is to be installed near Seaforth Settlement Road, upstream of the proposed Stage 1 realignment works (refer Figure 1). Note an earlier attempt at establishing a second flow recorder site above Aorangi Road (near the northern end of the Wastewater attenuation ponds) will be abandoned in favour of the site further upstream near Seaforth Settlement Road.

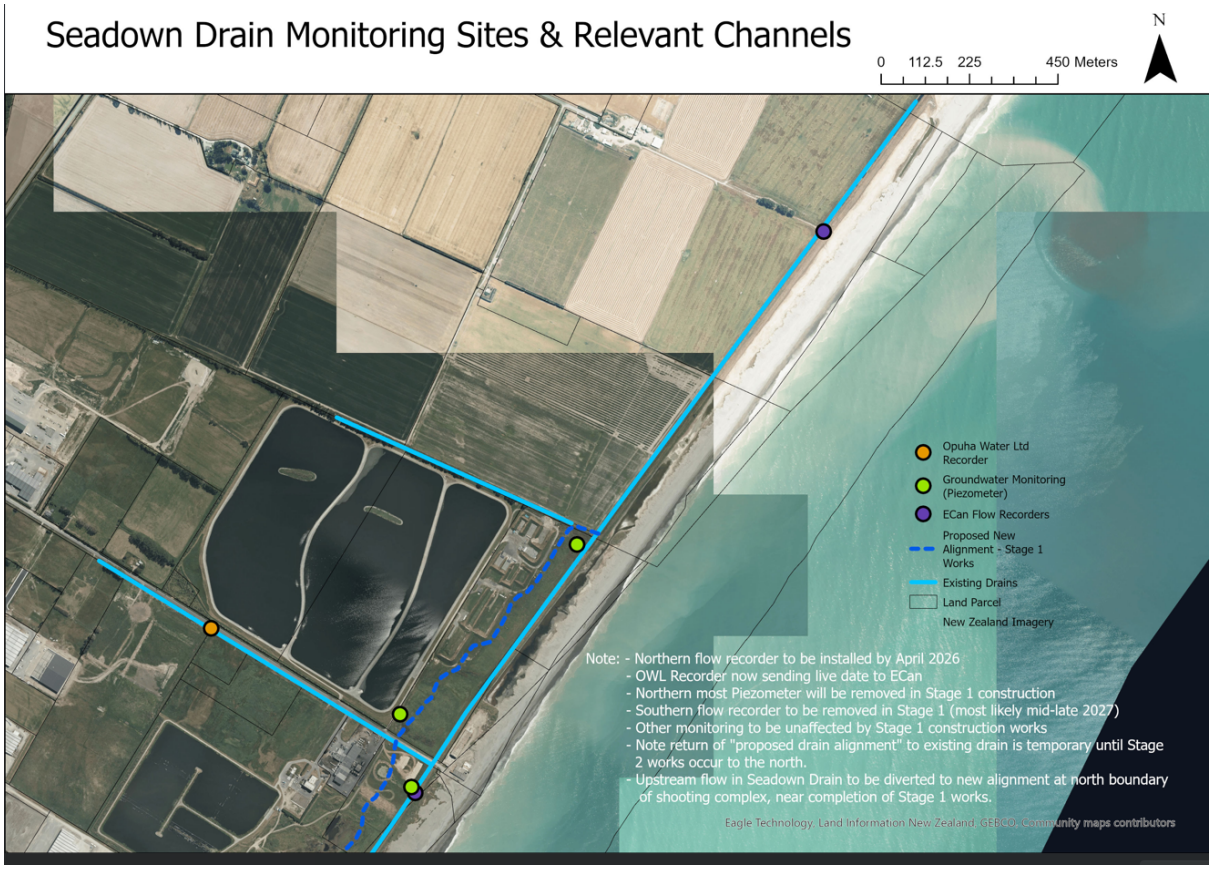

Figure 1: Seadown Drain monitoring sites and relevant channels

Several challenges exist in maintaining a stage – flow relationship at recorder sites in Seadown Drain, due to the flat contour of the land, slow velocities and continual weed build up. The original recorder site was installed below Aorangi Road in August 2015, for the purpose of measuring/monitoring flows into Waitarakao and providing instantaneous monitoring of the minimum flow conditions applied on abstraction consents in the catchment.

An additional flow site, further upstream near Seaforth Settlement Road, is to be installed and will be regularly visited and maintained. This will likely mean that more frequent visits are required than most other sites in the network due to high rates of weed growth/regrowth. Monitoring staff have spent many additional hours in effort to control the impact of the weed at the original flow site, and similar work will be required with the new site install/establishment/ongoing maintenance.

Aim of minimum flow alternatives

The intended realignment of Seadown Drain and removal of the original flow recorder (below Aorangi Road) necessitates the need for an alternative compliance monitoring method for relevant consents. This alternative method will need to be used from the time that the original recorder is removed (most likely in mid-late 2027) until such time as a fully constructed new Seadown Drain channel inland of the

current location is completed, and a new permanent flow site installed in the new channel near Aorangi Road (Stage 1 of the broader project) - likely a period of several years,

Ideally the alternative minimum flow will:

- Ensure that instream values and water quality will continue to be protected to the same level as provided by the current minimum flow

- Ensure that consent holder reliability is not impacted by this change, and preferably without the need to change consent conditions.

Options for alternative monitoring location

There are limited options for alternate methods for estimating flow at the current minimum flow site and confidently ensuring any restrictions faced by abstraction are similar to current. Options being considered are:

- Find a relationship between the two Environment Canterbury flow records and/or concurrent gauged flows from the two flow recorders on the drain, including consideration of Opuha Water Ltd (OWL) discharges at Aorangi Road, that can replicate or replace the current monitoring regime
    - Currently difficult due to weed and various by-wash inflows as discussed above but made more likely with the data we now receive live from OWL
    - Ideally the two recorders to be run concurrently for at least 12 months, before the existing recorder is to be removed (subject to consent and construction timelines).
    - This is the preferred option if an accurate relationship can be formed.

- Find a relationship between flows in the drain and levels in one of the three nearby piezometer (temporary) wells installed by Groundwater field technicians (~6ish months of record)

    - These sites are now telemetered, but were not originally intended to be a permanent arrangement
    - The northern most of these recorders will be removed in stage 1 construction though the other two are likely to be unaffected by those works.
    - If this is the chosen method, more permanent infrastructure and budget would be required.
    - These monitoring wells provide other functionality in terms of monitoring to support broader construction aims and consents.

- A third option could be required if the new upstream site does not provide a reliable stage – flow relationship; where minimum flows are based on gauged only flows. While it is possible to

achieve a more reliable gauging on that day, it would mean that flow is fixed at that flow until it is re-measured. This method is cheaper and easier as a minimum flow monitoring technique, but doesn't capture the rise and fall of the drain flow, that a flow recorder picks up. This method is used in numerous other Canterbury minimum flow locations that do not have rated flow recorders.

Data collection underway to inform alternative

Environmental Monitoring Field staff are undertaking monitoring to provide the best available information to inform this process going forward. This includes:

- Fortnightly site visits, for weed maintenance, recorder checks and gaugings at both recorder sites and most recently added a gauging on the OWL Levels Plain bywash at Aorangi Road
- Three piezometer wells have been upgraded with telemetry so we can test the relationship with flows in Seadown Drain
- Exploring installation of a dissolved oxygen (DO) sensor within Seadown Drain, upstream of Seaforth Road recorder (i.e. upstream of Stage 1 realignment) to support understanding of flow – DO relationships and support decision on alternative interim compliance monitoring method.

Summary

Environment Canterbury are committed to installing a workable interim solution to monitoring consents and managing minimum flow restrictions in the Seadown Drain. The installation of the secondary flow recorder upstream of Stage 1 works, receipt of OWL discharge data, and ability to run these recorders alongside the original Seadown Drain flow recorder over a period of time before change occurs gives us the best opportunity of finding an equivalent monitoring solution. Installation of a dissolved oxygen/temperature sensor will assist in assessing ecological risks.