# NRSBU Network Overflow Consent Application Engineering Review

| Rev. No. | Date | Description | Prepared By | Checked By | Reviewed By | Approved By |
|---|---|---|---|---|---|---|
| **1** | 17 May 16 | | SB | | | |
| | | | | | | |

# 1 Purpose

Respond to the following questions surrounding the engineering components contained within the NRSBU Network Overflow Consent Application. These questions are:

**Mitigation Measures:**
*"Are the measures that the applicant has taken to reduce the risks of overflows at each of the pump stations and leakage/accidental discharges from the rest of the network considered to be best practice and have been undertaken to an appropriate level to avoid overflows as far as practicable"*

and,

**Climate Change:**
*"How should the applicant have taken into account the potential effects of sea level rise when considering the management of the infrastructure to avoid or mitigate effects of the discharges, considering that they are seeking a 20 year consent to discharge to the coastal marine area (with particular reference to how they should determine or consider the potential increase in frequency and magnitude of further overflow events, and the effects of predicted sea level rise on the functioning of pump stations and the risk of their failure)"*

# 2 General Comments

Under a review of this nature we would typically request that the applicant provide evidence of proactive asset management, proving good understanding of their entire network and therefore be able to implement holistic solutions. This may take the form of a network model or a similar asset management system approach. Through the modelling scenarios can be run to review the implications of improvements and ascertain the potential location of bottlenecks that may result in overflows.

In this instance the applicant does not own the gravity network nor control the measures that are taken within the catchment. The comments below are therefore limited to review on the basis of an "end of line collection system" scheme, as it has been established.

# 3 Review Comments – Mitigation Measures

Where possible we have listed the associated paragraph reference within the application.

| Item | | |
|---|---|---|
| Appendix D | Emergency Response Plan for overflows requirement in O&M manual for contractor. | Good practice approach |
| 1.7.3-4 | Mitigation measures for power outage appropriate with fixed generators in place for the three main pumping stations (PS) and a mobile point for the fourth (Wakatu). However contingency scenario in Figure Two does not reflect this for Wakatu. Would expect to see definition of volume used at the PS and in the catchment sewerage system in terms of 'times ADWF' (ideally 6-8 hrs ADWF as a minimum) to reflect the time it would take to mobilise a generator. In each PS case, the evidence could be improved by noting how many hours of continued use for the generators before they need to be refuelled.<br><br>*(Paragraph 1.9.2: Wakatu generator to be deployed within 60mins. Good response time if achieved.)* | Good practice approach.<br><br>Update Fig2<br><br>Define storage at Wakatu |
| 1.7.5-10 | Mitigation measures for Mechanical outage appropriate, with duty/ (duty assist) / standby approach employed to provide redundancy. Maintenance appropriate. | Good practice approach. |
| 1.7.11-13 | The application has noted the excessive wet weather inflow and infiltration entering the scheme from the council networks. From Figure 3 this looks like a significant response to inflow (high intensity, short duration events), with a 2-4 day tail of slow response.<br><br>There is a risk that changing climate conditions may result in more events of this nature, with longer periods of dry flows. The frequency of peak day flows may therefore increase and result in further OF's from the scheme. The counter to this is that these potential overflows will be significantly diluted by the events, discharging into waterways that will also be experiencing increased flows. Ultimately this will need to be considered when looking at the effects on the receiving environment. | *Comment Only* |
| 1.7.14-17 | Pipeline / rising main alarms to indicate pressure drops/breakages and initiate repair procedures appropriate. Best practice would also suggest a proactive asset plan in place to assess risk of failure and for proactive condition assessment. Referenced renewal programme in 1.8.10-12 for AC pipe suggests this is in place but implicitly. | Confirm Asset Management planning process. |
| 1.8 | Noted that the overflows recorded are primarily for wet weather overflows in the last 10 years and primarily at Saxton PS. Figure 6 should be broken down to volume for each site. These comments reflect in 1.8.3-6. Table 1; upgrades completed reflect good practice with redundancy in mechanical and measurement plant items, as well as improvement to electrical supply with site generators. | Provide volume at each site. |
| 1.8.10-12 | Noted the infrequent nature of the events from pipeline/joint failures and that the programme of pipeline renewals for AC pipelines has been completed. Statement in 1.8.12 needs to be reviewed as a blanket statement "are of significantly lower volumes" is misleading as the likelihood is any overflows from breakages would be more concentrated if not during wet weather events. Discharge would potentially be the volume associated with the section of the rising main in question before valves are closed to limit the draining. | Good practice approach with AC renewal.<br><br>Define significantly lower volumes |

| | | |
|---|---|---|
| 1.9.13-15 | Good references and structure to ongoing reviews, with continual (yearly) consideration on the incoming flows from the council catchments. | Good practice approach. |
| General | All PS overflow pipelines have tide gates reducing the risk of inundation | Good practice approach. |

What is not clear from the information within the application is whether there are other measures employed to mitigate the environmental effects of overflows. There are different levels, but the most common step up from a High Level weir/pipeline to outfall would be a racked screen or similar to keep the floatable and solids within the waste stream. This approach has been used in Auckland and Westport, either as a vertical or horizontally racked structure, mitigating aesthetic issues/cleanup, and reduces coarse contaminants entering the environment. This could be developed in conjunction with overflow detention using storm tanks to at least capture the first flush. Decisions would be a function of cost, frequency and environmental benefits.

An alternative to this is reducing the areas exposed. Discharges, with the exception of the Airport site, appear to be directly to estuary by pipeline or by short drain. The cleanup areas and the potential effects are there likely to be more spread. Has the applicant considered ways to isolate or capture a first flush to minimise the effects on the environment and minimise the area required for cleanup.

The application would benefit from making it clear what the current spare capacity is within the network at each site (ADWF, PWWF etc from the catchments, pump capacity and spare rising main capacity). There are only broad statements (not quantitative) within the application, while there are more details in the Cawthron document in Appendix G.

# 4 Review Comments – Climate Change

Climate change would impact on the NRSBU scheme more indirectly through the contributing catchments. There may be more frequent, high intensity events due to changing climate patterns therefore the overall catchment needs to be brought into consideration with wet weather flows currently being conveyed. The NRSBU does not control the activities within the catchment therefore would need to deal with ‘what arrives’. A view should be taken to manage flows within the catchment.

More directly, the discharges from the PS overflows are to estuary/harbour. Consideration should be given to sea level rise and the coincidence of higher king tides and therefore ability/inability to discharge. Depending on the scenario, the hydraulic head in the system may not be able to drive through the tide gates (water level on the outside being higher than the head/level/drive inside the system). In this situation a manhole overflow within the network would be more likely rather than at a controlled point forming part of this application.

With the locations adjacent to the estuary, and the possibility of sea level rise, the applicant should acknowledge the effects of climate change to manage, review levels at the sites and define the free board between predicted ocean levels, the height of the discharge level and the lid level of the PS site (potential for future inundation).