MEMO	
ATTENTION	Sven Exeter (Mott MacDonald)
FROM:	Shane Kelly
CC	Malcolm Miller (HBRC)
DATE:	25 February 2022
REGARDING	Ravensdown consent application

COAST & CATCHMENT
ENVIRONMENTAL CONSULTANTS

BACKGROUND AND SCOPE

Ravensdown Limited ("Ravensdown") have applied for a resource consent to, among other things:

- discharge treated stormwater/process water from their Napier Works site to land and to water within Waitangi Estuary;
- clear vegetation and disturb soil in the Coastal Margin associated with:
  - the erection, reconstruction, placement, alteration, extension, removal, or demolition of stormwater and process water treatment and discharge structures;
  - wetland restoration activities.

I have been asked to review the application, and technical assessments and plans associated with those activities, including:

Anderson, A. (2021) Ravensdown Limited, Napier works sustainable site project: Resource consent applications and assessment of environmental effects. Client report for Ravensdown Napier, Mitchell Daysh Limited, Tauranga. 103 pp., plus appendices.

McCarthy, H. (2021) Ravensdown Napier Works: Habitat abundance restoration project plan. Ravensdown, Napier. 6 pp., plus Appendices.

Phillips, N., De Luca, S., Stewart, M. (2021) Ravensdown Napier discharge consent: Assessment of estuarine ecological effects. Client report for Ravensdown Napier, RVD2101, Streamlined Environmental, Hamilton. 55 pp.

Phillips, N., De Luca, S., Stewart, M., Leitch, K., McDermott, K., Eivers, R. (2021) Ravensdown Napier: Baseline technical investigations. Client report for Ravensdown Napier, RVD1901, Streamlined Environmental, Hamilton. 147 pp.

Torrens, A. (2021) Napier works sustainable site project: Water discharge strategy 2021. Ravensdown, Napier. 16 pp.

Torrens, A., Caley, H. (2021) Ravensdown Napier Works: Water discharge adaptive management plan. Ravensdown Napier, Napier. 6 pp.

Torrens, A., Caley, H. (2021) Ravensdown Napier Works: Source control management plan. Ravensdown, Napier. 8 pp.

Ravensdown are also applying for a consent to discharge contaminants into the air. During the site visit it was apparent that stored and dry, tracked materials may also be blown by wind beyond the site and potentially enter waterways. The potential effects of those materials on waterways are not assessed in this review, but I note that elevated concentrations of some contaminants in waterways above the Hawkes Bay Regional Council (HBRC) pumpstation could

potentially be caused by wind-blown material. It would therefore seem prudent to obtain further information on that matter.

For clarity, neither have I assessed the suitability, design or stated performance of the proposed measures for source control, or stormwater and process water treatment.

ASSESSMENT OF ENVIRONMENTAL EFFECTS (AEE)

The AEE provides a detailed description of the Applicant's manufacturing process and outlines existing and proposed methods of managing the discharge of contaminants to receiving environments. Of particular relevance to this review are:

- Proposed source control measures and upgrades to the water treatment and discharge systems (as noted above those measures are being reviewed by others and are not considered in detail here).
- The proposed adoption of the most conservative discharge standards of those proposed for Plan Change 9 TANK[1] catchments, from the National Policy Statement for Freshwater Management ("NPS-FW") and Hawke's Bay Regional Coastal Environment Plan ("RCEP"). The standards are applied to the discharge after adjusting for reasonable mixing (4.9 times dilution at high tide, 2.8 times dilution at low tide).
- A commitment to achieve the TANK Plan Change standards within 6 years of commencement of the new consent[2], through a staged and adaptive approach to managing discharge water quality.
- A proposal to preferentially discharge in the following order:
    1. Discharging to land via spray irrigation as the primary means.
    2. Discharging to the estuary around high tide (three hours before and after) as a secondary means when conditions are not appropriate for a discharge to land.
    3. Discharging to Ravensdown Drain or Habitat Abundance Restoration Area (HARP) with no time restrictions.

  The direction of discharge will be controlled by a programmable logic controller (PLC).
- No change is proposed to the current extent of the discharge mixing zone.
- A proposal to enhance a degraded natural wetland area adjoining the site to improve its natural character and indigenous biodiversity values, and provide for mahinga kai opportunities. The wetland will also become part of the Applicant's proposed water quality treatment train.

Overall, the AEE highlights that:

- The Ravensdown discharge is contributing towards exceedances of guideline values for some contaminants, but notes that inputs from other land users are also likely to be a contributing factor.
- Limited mixing occurs within the Awatoto Channel.
- The introduction of treatment devices and other actions will lead to a significant improvement in water quality, but aluminium and ammoniacal nitrogen are predicted to continue to exceed guideline values in the receiving environment.

[1] Tūtaekurī, Ahuriri, Ngaruroro and Karamū

[2] AEE pg. 3

The AEE concludes that the evidence provided demonstrates that the discharge is having no more than a minor effect on ecological values beyond the mixing zone, and that the improvement in water quality *[arising from the proposed interventions]* is likely to have a positive effect on the low ecological values that currently exist. In addition, it indicates that the application is underpinned by a comprehensive sampling and monitoring programme, stating:

Ravensdown Napier has an established monitoring programme which is designed to characterise ambient and rainfall-affected receiving environment quality. In addition, 5-yearly ecological assessments are undertaken to determine potential changes in benthic communities, sediment composition and quality, as well as ecotoxicity associated with the Ravensdown Napier discharge. A robust data set has been compiled since this monitoring was initiated, providing a valuable resource for assessing trends. It is recommended that this monitoring continue for the duration of the consent. Based on our assessment of the relevant regulatory standards, the following changes to the monitoring programme are recommended:

- *Chlorophyll a determination – use an appropriate analytical method with a reduced detection limit to 0.001 mg/L to allow comparison with the relevant guideline.*
- *Add clarity measurements to the monitoring programme.*
- *If it is considered necessary to calculate Fish IBI, then fish monitoring would need to be added to the 5-yearly monitoring programme.*
- *It is also recommended that the timing of the receiving environment monitoring be linked to the staging of the implementation of the treatment devices and the overall water discharge strategy.*

I note that, those recommendations have not been incorporated into the proposed monitoring conditions.

Finally, the source of the ammonia-N standard in the Table 5 of the AEE (and Table 1, Condition 15) is not provided but is assumed to be from the Surface Water Quality Standards, in Schedule D (2) of the RECP. If so, the standard applies to the ionised form of ammonia (NH_4^+-N) at a pH of 8 and 20 °C, In contrast, the AEE indicates that the ammonia-N standard is to be applied to the un-ionised form (i.e., NH_3-N). Clarification on this matter should be sought. To avoid confusion, it may be preferable to apply the standard to total ammonia-N (NH_3-NH_4^+-N), which is effectively what analytical laboratories report on, and is likely to be the form currently monitored. This would have little effect on compliance, as Table 8.3.6 of ANZECC (2000) indicates that un-ionised ammonia only makes up 3.82% of total ammonia-N. Information should also be sought on how reported results are to be standardised to the stated pH and temperature values.

TECHNICAL ASSESSMENTS: BASELINE CONDITIONS FOR THE RECEIVING ENVIRONMENT AND ECOLOGICAL EFFECTS

Effects on the receiving environment were assessed by Phillips et al. (2021a) and Phillips et al. (2021b).

Phillips et al. (2021b):

- describes the site drainage and pond system, and general characteristics of the receiving environment;
- summarises:
    - available data on receiving water quality and trends;

- the results of dilution studies carried out in the mixing zone below the discharge point;
- findings from an assessment of risks associated with process chemicals; and,
- findings from ecological monitoring of discharge effects.

Phillips et al. (2021a) recaps information provided in the baseline report and:

- assesses potential ecological effects from the existing discharge using methods developed in accordance with EIANZ guidelines;
- assesses ecological effects with proposed improved treatment, and considers whether improved treatment would achieve compliance with various standards;
- provides recommendations on monitoring.

Overall, both reports are well written and cover key issues of concern. I have identified the following matters of particular relevance to the consideration of this application:

- **Past water quality data indicates that water quality in the waterways has been degraded by multiple activities, including (but not only) discharges from the Ravensdown plant.** Water quality data obtained under ambient sampling conditions, showed that nickel, copper and aluminium have been more elevated in the mixing zone and some sites further downstream, compared with upstream sites. However, similar or higher concentrations of cadmium, zinc, and fluoride have been recorded from sites above the discharge. Apart from nitrate, upstream and downstream nutrient concentrations have been comparable under ambient conditions, but guidelines had been exceeded at all sites. Under rainfall conditions, cadmium, fluoride and sulphur and nutrients concentrations have been higher in the mixing zone than at upstream sites, with nutrient guidelines being exceeded at all sites.

  As noted earlier, the potential influence of wind-blown dust on waterways adjoining the site does not appear to have been considered but could affect the interpretation of monitoring results. I therefore recommend that further information on this matter be sought.

- **Some process chemicals used by Ravensdown have the potential to cause adverse effects beyond the mixing zone with the current water treatment and discharge system, particularly if discharges occur at low tide.** In most cases the effects of individual contaminants were assessed as being no more than minor, but effects of the water-based formulation used for control of deposits in the cooling system (Spectrus BD1500) could potentially be more than minor. The assessment goes on to note that a highly conservative approach was taken, and consequently, the actual effects of Spectrus BD1500 were expected to be minor. The combined effects of process chemicals (and other contaminants) in the discharge increases the potential for adverse effects. That matter is not directly assessed, but Whole Effluent Toxicity (WET) testing has been carried out (see below).
- **Limited dilution occurs through the mixing zone.** The low tide dilution study found a 2.8-fold dilution at the downstream margin of the mixing zone after 62 minutes of continuous discharge, with the discharge plume considered to be well mixed vertically. A high tide dilution study found a 4.9-fold dilution at the downstream margin of the mixing zone after 109 minutes of continuous discharge, with little evidence of vertical mixing. In my experience, these dilutions are very low for a discharge of this type. Furthermore, dilution

rates lower than those recorded are possible because variability in dilution rates has not been determined. Alternatives to the

- **Whole Effluent Toxicity (WET) testing indicates that measured dilution rates through the mixing zone were not sufficient to prevent toxicity beyond the mixing zone**. WET testing allows the combined toxicological effects of multiple discharge contaminants to be assessed. Results indicated that dilutions of 13 and 25 times were necessary to avoid toxicity.
- **Existing macrofaunal ecological values in Ravensdown and Awatoto drains were assessed as low.** The assessment characterises ecological values as "*having low invertebrate species richness, diversity and abundance and being dominated by organic enrichment tolerant and mud tolerant organisms, with no sensitive or Threatened/At Risk taxa present*". However, there are some discrepancies between the ecological plots presented in the Phillips *et al.* reports and earlier monitoring reports. I have discussed those discrepancies with Dr Sharon De Luca at Boffa Miskell, and understand that errors have been picked up and are being addressed. Macrofaunal matters will therefore need to be reviewed again once the corrections are made.
- **The existing discharge adversely affects sediment quality, but sediment quality is also degraded in surrounding areas**. 2020 sampling showed clear contaminant gradients down Ravensdown and Awatoto drains. Concentrations tended to level out in the Tūtaekurī Blind Arm. Cadmium, nickel, and zinc were all above ANZG (2018) Default Trigger Values (DTV) at the upper Ravensdown drain site (RAV1), and zinc exceeded its DTV at the uppermost Awatoto drain site (both within the mixing zone). Contaminant concentrations at the remote Ngaruroro River reference site were amongst the highest recorded. This indicates that the site was unsuitable as a reference.
- **Existing effects on marine ecological values were assessed as very low based on criteria adapted from the EIANZ guidelines for environmental assessments.** I have reservations about this assessment because:
    - departure from existing baseline conditions is a key-criteria used for determining the magnitude of effect. Baseline condition is not defined, but there is potential for bias if the activity being assessed has contributed to a departure from the baseline condition. This seems to be implied from the statement that "*Currently, the ecological values of the receiving environment are assessed as being low. This is due to the cumulative effect of a number of historical and ongoing activities in the catchment (including discharges from Ravensdown*" (pg. 53, Phillips et al. 2021a).
    - The criteria used for ecological values make it very difficult for tidal creeks to score highly, despite: their sensitivity to land-based effects; being important components of coastal wetlands; and, their limited spatial extent (c.f. open coastal areas). For instance, the key criteria used for determining ecological values includes the proportion of mud in sediments and the sensitivity of biota to mud. I note that tidal creeks are typically muddy and contain mud tolerant species (tidal river mouth estuaries, also tend to have muddy sediments except in areas of high tidal flows (Hume et al. 2016). Consequently, I believe the assessment has potentially underrated the level of existing effect.
- **The staged implementation of treatment devices in conjunction with the overall discharge management strategy is predicted to significantly reduce the loads and concentrations of most contaminants.** Despite that, the concentrations of some contaminants are predicted to exceed proposed standards after reasonable mixing. Those contaminants

include: median concentrations of dissolve reactive phosphorus (DRP), ammonia-N (NH_4^+-N), nitrate-N, total nitrogen, aluminium and copper during Stages 1 and/or 90th percentile concentrations during Stage 2. Median ammonia-N and aluminium concentrations are predicted to still exceed guideline targets after Stage 3. Nevertheless, the assessment concludes that the discharge is not having a more than a minor effect on ecological values beyond the mixing zone, and the improvement in water quality is likely to have a positive effect on existing low ecological values. I agree with the latter conclusion and would expect future effects to be relatively minor if full compliance with the revised standards can be achieved.

- **It is recommended that existing monitoring requirements for the receiving environment are maintained**, with the addition of:
    - chlorophyll a with a detection limit of 0.001 mg/L;
    - water clarity; and
    - if necessary, the fish Index of Biotic Integrity (IBI).

  Few of the existing monitoring requirements have been incorporated into the proposed consent conditions.

WATER DISCHARGE STRATEGY (WDS)

The WDS is a high level, strategic document that provides the overall framework for managing the effects of stormwater and process water discharges from the Ravensdown site. Further details are provided in specific plans sitting below the WDS.

The WDS recognises that community and regulatory expectations around water quality have shifted, and that improvements to discharge quality are needed. The proposed strategy for achieving that outcome includes:

- Addressing water quality management though an adaptive management approach that incrementally and sustainably reduces the discharge of contaminants from the site.
- Source control measures to prevent product or other contaminants from entering stormwater and building up within the conveyance system.
- Planning and establishing a Habitat Abundance Restoration Project (HARP) within an identified area of the Waitangi Regional Park.
- Minimising the routine discharge of contaminated process water to the stormwater system.
- The staged implementation of a multi-step stormwater treatment train.
- Adding land disposal and discharging via a proposed HARP wetland as discharge options.
- Sampling and monitoring to inform the adaptive management process, assess the efficacy of actions taken, check compliance with consent conditions, and to prompt action before adverse effects become overly damaging or irreversible.
- Setting conservative discharge standards through consent conditions.

Overall, the WDS seems to provide a sensible, high-level strategic framework for reducing the effects of water discharges from the site. However, there are some issues with consistency among the application documents, as outlined below for the adaptive management plan (and which also apply to the WDS).

WATER DISCHARGE ADAPTIVE MANAGEMENT PLAN (WDAMP)

The objective of the WDAMP is stated as *"To stage and implement an engineered series of storm and process water treatment devices to meet the long-term water quality conditions volunteered by Ravensdown in the most effective, efficient and timely way"*. Accordingly, it:

- provides a three-stage timeline for planning and implementing measures to improve water quality outcomes;
- proposes monitoring and reporting of associated outcomes; and
- proposes annual reviews and updates to the plan.

Monitoring and reporting requirements are provided in Section 5 of the WDAMP. They include the monitoring of discharge water quality and the wetland created through the HARP Plan. However, the continuation of previous receiving environment monitoring, as recommended by the environmental assessment of Phillips et al. (2021a) and which the AEE indicates will continue, is not included in the WDAMP. It is therefore recommended that details of that monitoring be inserted.

Section 6 of the WDAMP goes on to state:

This plan is a living document and should respond to changes on the site. It will be reviewed annually and updated as necessary <u>as set out in the resource consent conditions</u> [underlined for emphasis].

I could not find consent conditions that provided for annual reviews or amendments to the plan. As the WDAMP is a core element of the application (proposed Appendix 1, Condition 2 states "*The discharge shall be undertaken in accordance with the Ravensdown Napier Works: Water Discharge Adaptive Management Plan, November 2021*"). I recommend that any provision that allows for the review of the plan, also include a Council review and certification process.

HABITAT ABUNDANCE RESTORATION PROJECT PLAN (HARPP)

As part of the consent application, the Applicant has proposed partnering with HBRC in the restoration of a wetland area on Council land, south of the Ravensdown site. A Habitat Abundance Restoration Project (HARP) team has been established with several representatives from the Technical Focus Group (TFG). Project objectives have been developed through that group, and the Applicant has engaged with local wetland, mana whenua and HBRC experts to assist with the wetland design and to provide construction oversight/consultation.

The HARP outlines the background to the proposed project, project objectives, proposed delivery mechanisms (including design requirements, proposed implementation timeframes and maintenance approach, performance targets and projected costs). Overall, the HARP appears to provide a mutually beneficial framework for improving the values of a degraded wetland and providing additional water quality treatment prior to discharge.

CONSENT CONDITIONS

The following comments are provided on the proposed conditions of consent.

HBRC CONSENT - DISCHARGE TO AIR

Condition 3: *Notwithstanding any other condition of this consent, there shall be no discharge to air from the site of gases, airborne liquid or other airborne contaminants beyond the site, that causes adverse effects on human health, ecosystems or property.*

This condition addresses potential effects of wind-blown contaminants on waterways. However, as this issue has not been adequately assessed, it will be difficult to determine whether such discharges have been contributed to the degradation of waterways adjoining the site. Further information should be provided on this matter, and if necessary, how future compliance with this condition will be assessed.

APPENDIX 1, GENERAL CONDITIONS RELATING TO BOTH LAND AND WATER DISCHARGE PERMITS

Water Discharge Hierarchy

Condition 1:

The proposed discharge hierarchy does not appear to provide for the proposed changes to the discharge regime, as outlined in the Water Discharge Adaptive Management Plan (WDAMP). For instance, Table 1 of the WDAMP has a year five action of "Redirection of discharge water outfall to the HARP Wetland", and in year six, the "Disestablishment of the "Ravensdown Drain". Those actions would eliminate the potential for second tier discharges. It is therefore recommended that the proposed condition be reviewed and amended to better reflect the actions proposed in the WDAMP, and associated implications for discharges.

Adaptive Management Plan Process

Condition 2: Sentence at the end of Condition 2 is incomplete.

Condition 3: Stage One requirements do not appear to reconcile with those of Condition 18, which only applies at the completion of Stage Two.

Table 1 – Discharge water quality analytes and parameters: see earlier comment on ammonia-N limit.

RECOMMENDATIONS

Further information should be sought on:

- The effects of wind-blown material from the site on water quality in surrounding waterways, particularly those above the pump station.
- The implications for the assessment of water quality and ecological effects below the pump station, if wind-blown material is adversely affecting upstream waterways (noting that the assessment highlights that it is difficult to determine the relative contribution of the discharge to downstream effects when significant upstream sources are also evident).
- The potential for, and significance of, adverse ecological effects arising from the combined effects of multiple contaminants.
- Whether conclusions about ecological effects would change, if it was confirmed that Spectrus BD1500 does bioaccumulate.

- Potential exceedances of proposed water quality standards were derived from predictions of discharge quality at Stages 1 to 3, and dilution estimates for high and low tides. Is it reasonable to assume that for those parameters predicted to exceed proposed standards at each Stage, that the exceedances will occur every time the discharge occurs? If not, how frequent are exceedances expected to be?
- Correcting the macrofaunal results presented in the Phillips et al. reports.
- The absence of recommended conditions that require the continuation of existing receiving environment monitoring, with the addition of chlorophyll *a* and water clarity measurements, and potentially, including the evaluation of the fish IBI.
- The basis for the proposed unionised ammonia-N standard, including how it is going to be measured and how measurements are going to be standardised to pH 8 and 20 °C. Consideration should be given to whether it would be preferable to base the standard on total ammoniacal-N (NH_3-NH_4^+-N), which is typically measured and easily interpreted.
- Proposed consent conditions that provide for an annual review and amendment of the WDAMP. I recommend that any conditions providing for plan reviews should also include a Council review and certification process for the revised plan.

REFERENCES

ANZECC (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Environment & Conservation Council, and Agriculture and Resource Management Councils of Australia & New Zealand. , Canberra, Australia. 316 pp.

Hume, T., Gerbeaux, P., Hart, D., Kettles, H., Neale, D. (2016) A classification of New Zealand's coastal hydrosystems. NIWA Client Report for Ministry of the Environment HAM2016-062, NIWA, Hamilton. 120 pp.

Phillips, N., De Luca, S., Stewart, M. (2021a) Ravensdown Napier discharge consent: Assessment of estuarine ecological effects. Client report for Ravensdown Napier RVD2101, Streamlined Environmental, Hamilton. 55 pp.

Phillips, N., De Luca, S., Stewart, M., Leitch, K., McDermott, K., Eivers, R. (2021b) Ravensdown Napier: Baseline technical investigations. Client report for Ravensdown Napier RVD1901, Streamlined Environmental, Hamilton. 147 pp.