21 Pitt Street
PO Box 6345, Auckland 1141, New Zealand
T: +64 9 300 9000 // **F:** +64 9 300 9300
E: info@beca.com // **www.beca.com**

Auckland Council
Private Bag 92 300
Victoria Street West
Auckland 1142

16 July 2018

Attention: Elizabeth Wells / Raul Galimidi [by email]

Dear Elizabeth / Raul

RE: REQUEST FOR FURTHER INFORMATION PURSUANT TO SECTION 92 OF THE RESOURCE MANAGEMENT ACT 1991 FOR RESOURCE CONSENT APPLICATION FOR ST MARYS BAY AND MASEFIELD BEACH WATER QUALITY IMPROVEMENT PROJECT

Council reference BUN60319388

In response to your Section 92 letter dated 5 July 2018, the following sets out our response to the further information requested.

This response has been jointly prepared by members of the project team[1] including the relevant technical experts where relevant. We would be pleased to make our team available for verbal discussions, should this assist further with understanding.

1. Traffic

(a) Submission 10 notes that "Figure 5.3 – Indicative construction area on the corner of New Street/London Street (refer Drawing 255303-0000- DRG-CC-1207 in Appendix A) shows the road being closed and fenced off with trucks being directed along London Street". This arises because DRG-CC-1207 shows an arrow indicating truck direction from the site westbound on London Street. Yet page 23 of the ITS advises that "there are no available points for a truck to turn on London Street in close proximity to the site. Therefore, trucks should approach from the south via New Street, turn at Dunedin Street or Waitemata Street, and reverse the remaining distance with direction from an STMS". Could you please clarify this information and if necessary correct DRG-CC-1207.

There are expected to be the occasional uses of London Street for delivery of key plant (such as the mobile crane) and small deliveries to the western area of the site. This will be required once excavation of the receiving shaft has commenced and access to the west is restricted. All heavy vehicles using London Street should be under the control of the STMS.

[1] from Auckland Council, Beca, Aurecon and technical specialist advisors

(b) Submissions raise issues with the steepness of St Marys Bay Rd north of Hackett St / London St and advise that there have been instances in the past of concrete and wood chip trucks losing their loads while driving south up this hill. Can you please advise if you have measured the gradient on St Marys Bay Rd north of Hackett St / London St and if you are sure that construction trucks will not lose part of their loads when driving up the hill from the St Marys Park construction site, as other trucks have apparently done in the past?

The gradient of the road is 17.6%, 9.97°, 1m in 5.68m. Whilst this is a steep street, it is within the grades used regularly by construction traffic around Auckland City.

A contractor will be responsible for making sure all trucks are appropriately loaded and secured for the route that they are to take to and from the site. Contract documents can be developed to include specific requirements for the contractor to address steep street grades in the vicinity of the site. Examples of measures that could be taken include reduced loads by weight and/or volume, and greater awareness of load placement on the trucks.

It also noted that concrete trucks would generally come to the site full, and depart after depositing the load, thus minimising risk of loss of concrete on the return journey. Similarly, deliveries of pipes and general materials into the site would be unloaded and (for the most part) trucks would leave the site empty.

(c) Those same submissions suggest it would be preferable for construction traffic to access the St Marys Park construction site directly from the motorway – see sketch below. Has this been considered as an option for construction traffic and why is the St Marys Bay Road preferred?

It would be difficult to provide access to and exit from St Marys Park from State Highway 1. There are a number of reasons for this. These include:

- this is a busy and complex part of the State Highway network with the proximity of the Fanshawe Street on-ramp, merging lanes from the tunnel, and the curvature of the motorway lanes;
- attenuator vehicles[2] would have to approach the site from Fanshawe Street on-ramp on the south side of SH1 to prevent weaving issues and warn drivers of the approaching risk while vehicles entered the site. Attenuators would also be required for vehicle exits from the site and would have to escort the vehicles until they reach a safe speed, at which point the attenuators would have to continue to Onewa Road to turn around and return towards the works site; and
- whilst it may be theoretically possible to allow trucks to enter the works site from St Marys Bay Road and exit via the motorway with the same protection in place for vehicles exiting the site described above it would take 320m for a truck to accelerate from rest to 60km/h (refer to Austroads Part 4A Table 5.7).

In addition to this, the existing clear barriers and concrete supports would need to be removed for the entry and exit points and a site investigation would need to be conducted to determine if there is space to complete the acceleration space, as there are both steep embankments and native trees in the area that may be affected. There would likely be significant impact on the park and walkway from taking this approach.

Regardless, access directly from State Highway 1 during construction is considered to be a significant safety risk even with traffic control in place.

[2] Access would require a rolling closure, with safety vehicles on each side of any entering and exiting vehicles to meet conditions set for works by the NZ Transport Agency (NZTA). These safety vehicles are commonly referred to as Attenuators and are trucks equipped with warning lights, signs and crash cushions.

As set out in the response to Question 1(b) above, trucks will be able to safely exit the site via St Marys Bay Road to the south, although they will be required to do so slowly.

2. Engineering and Vibration

(a) Please provide comment on the anticipated effects of prolonged vibration and include as context any anticipated damage to dwellings/foundations/retaining structures etc as a result of the anticipated 0.8 mm/s predicted. It is noted that this level of vibration exceedances could be sustained for up to 17 days/nights. Refer Aurecon Report, Appendix M Page 6.

The predicted tunnelling vibration level of 0.8 mm/s is notably below the level where any damage to structures is expected, regardless of duration. For reference, the German standard DIN4150-3:1999 gives guidelines for acceptable vibration levels on structures. This standard is considered to be conservative and is designed to avoid cosmetic damage to buildings (e.g. cracking of plaster). The standard notes that exceeding the recommended values does not necessarily lead to damage. The long-term criteria from this standard for dwellings is a vibration level of 5 mm/s. While vibration may be perceptible, the predicted level of 0.8 mm/s is notably lower than the vibration level where there is a risk of structural damage to properties.

(b) A number of submissions refer to and include local evidence of historic and ongoing slope instability. Please provide a monitoring programme in relation to potential effects on instability caused by vibration as a result of the tunnelling and proposed remedial construction works should instability be encountered.

Construction vibration will be generated by tunnelling and shaft works. Our work to date suggests that the vibration will have a negligible effect on slope stability, and that the most important factor for clifftop stability is the potential for perched groundwater to develop during extreme wet weather events. We are monitoring groundwater in some of the holes already drilled along the alignment and plan to install additional stations near shafts and along the tunnel alignment. Similarly, vibration monitoring will be installed at each of the shafts and at selected locations along the pipeline route. The vibration monitoring will provide a check on our assumptions about vibration levels. Having both sets of data available will allow us to assess any effects of vibration during normal conditions and also the combined effect of groundwater and vibration during extreme wet weather. Construction can be discontinued if there is risk of instability.

If the pipeline construction does cause instability in spite of these precautions then the project will be responsible for remediation (but it is not possible to specify in advance what those works might be).

(c) In terms of the rock strength testing undertaken can you please advise the relevance of BH01 that was done outside 10 London Street, in relation to the cliff top properties such as 17 London Street.

Rock strength testing was carried out in BH01 as part of the sampling process that allows us to build up a model of rock strength across the whole alignment. BH01 was one of eight holes in our GI programme that was sampled for rock strength testing. In most holes several samples were tested from different depths. A pattern of rock strength distribution has been interpreted both vertically (associated primarily with the weathering profile) and laterally across the project alignment. Similar work has been done for many other projects across Auckland, and our data together with the historic data from other projects with similar geology allows a model of rock strength to be built with a good degree of confidence. The rock strength and other investigation data is incorporated into an interpretation of Engineering Geology Units, that each have an interpreted geometry and range of material properties (developed as a 3D model, and then cut to provide the 2D sections that you see in our various technical documents).

The ground model extends throughout the project area, including under 17 London Street. Model reliability is a key consideration during the design process, as it is understood that there is natural variability in the ground, and only a limited number of sampling locations. The satisfactory number of GI stations, well

distributed across the project area, and the accompanying parameter testing, give us a high degree of confidence in our ground model and the results have all been in line with our expectations.

During the detailed design process we will carry out additional inspections and the data gathered will be incorporated into an updated ground model. If we notice anything that potentially represents significantly different ground conditions to our model we will carry out additional investigation.

3. Appearance of Air Ventilation Poles

A number of submission raise concerns around the impact of the air ventilation poles on the character and amenity values of the area. Can you please provide some additional comment as to why they are appropriate in the proposed locations and what possible design and location alternatives there may be to ameliorate concerns around their appearance. Whilst they would be located on road reserve that is not within the Special Character Overlay, the application is a discretionary activity and as such all potential effects including effects on neighbourhood character and amenity should be addressed.

The applicant advises that it acknowledges submitter concerns regarding these poles. The Council (Healthy Waters – as applicant) has been working with Auckland Transport to progress the design such that they can be integrated with street light poles, thus reducing visual impact on the streetscape. The pole locations will be selected to replace existing street light poles and will consider the ease of installation and proximity to boundary fences. The reasons why the poles are required in the proposed locations is discussed in more detail below in the response to Question 5.

Whilst it is acknowledged that the proposal is a discretionary activity, it is also relevant to consider what could reasonably be expected to be able to occur in the road reserve (by the Unitary Plan provisions). As is noted, the special character overlay does not apply to the road, and this is an important point, particularly insofar as that it is normal for there to be a range of visible infrastructure and related items located in roads and road reserves. This naturally includes a range of types of street furniture, lighting posts and poles, road safety and information signage, and various cabinets. These are all features that are a part of the neighbourhood already. With that context, and having regard to the range of permitted activities for infrastructure in roads (including in Activity Table E26.2.3.1) and other relevant provisions in Chapter E26, the following points are noted:

- A wide range of above ground infrastructure is provided for as a permitted activity including (for example) antennae and aerials, air quality and meteorological monitoring equipment – which are examples that could potentially be similar in scale.
- Whilst the Special Character Overlay does not apply to the roads – if the poles were in that overlay, then under Table E26.9.3.1 and permitted standards in E26.9.5.1 the scope of what could reasonably be expected as a permitted activity.

Regardless, the visual appearance is not expected to markedly different to other above-ground infrastructure already present in the surrounding residential area, particularly if integrated with streetlight infrastructure. Photographs are included (**Attachment A)** providing an indicative impression of how the poles could appear.

4. Coastal

Drafting note – the response to this question has been split into topics

Council's Coastal Specialist, Dr Kala Sivaguru has raised concerns about the potential adverse effects of sedimentation resulting from the trenching for the marine outfall, particularly as it is intended that this is placed alongside the trench for a period of time waiting to be used as backfill rather than being removed from the CMA prior to it being replaced in the trench. No clear percentage of the excavated material that is mud/sediment rather than rock is provided along with the amount of material that will eventually need to be removed from the site. Dr Sivaguru has estimated the excess material to be around 2340m^3 and it is unknown how much of this will be mud which would be readily transportable and may be redeposited on nearby beaches.

The marine pipeline is approximately 440m long. The trench will be roughly 2.2m wide by 3m deep. Therefore, total excavation is 2900m^3. The pipe will be bedded in sand and surrounded by sand and then the top metre will be filled with excavated material. This is around 1000m^3. The excess 1900m^3 of material will be spread/levelled over the trench and side-cast area which will result in a 0.5m local raising of this area (assuming no material is lost to erosion). This method was used successfully on the buried marine pipeline section of the Rosedale Outfall that was constructed in 2010.

No material is proposed to be removed from the CMA for marine ecology reasons (nor is it necessary for sediment transport reasons) refer to further comments below.

Can you please provide information as to the amount of excavated material that will not be able to be placed back in the trench and what that material is likely to be composed of.

As noted above the excess material is estimated to be around 1900m^3 and will be spread over the trench and side-cast area. Assuming no loss of material due to erosion, the increase in levels will be around 0.5m. The excavated material will consist of East Coast Bays sandstone/siltstone material (very weak to extremely weak rock). Marine mud and alluvial deposits will also be excavated. The percentage of materials is estimated to be as follows:

- EU/EW: weak rock 150m (mostly generating gravel and cobbles 80%, sand 10%, fines 10%),
- ER/TA: firm to stiff cohesive fine soils 125m (clay and silt 90%, but mostly cohesive, and probably only a small proportion will become suspended; 10% sand)
- TL: soft mud (with sand layers) 125m clay/silt 80% is relatively easily disturbed into suspension, sand 20% will settle out

Any mud transported away from the site of side-cast material alongside the trench will only have local, short term and minor effects on water clarity because: (1) Tidal currents at the site are only strong enough (>0.3m/s) to erode seabed sediment for part of the tidal cycle, 2) The finer material is cohesive and a lag will of coarser sediment will develop on the surface of the side-cast material and protect it from further erosion and 3) The dilution effect by the ebb and flood tide flow over the 450-m length of the proposed outfall is very large. DHI model simulations (reported in Hume 2018) show that the tidal prism (the total volume of water flowing over the pipeline) for all of the incoming or outgoing tide ranges from 2.1 M m^3 (neap incoming tide) through to 4.7 M m^3 (spring outgoing tide), with mean tidal prism is 3.2 M m^3.[3]

[3] Hume, T. M. (2018). St Marys Bay - Masefield Beach Water Quality Improvement Project – Coastal physical processes. Hume Consulting Ltd Report for Auckland Council. 15pp.

Mud will not accumulate on the beaches as breaking wave action in the nearshore will re-suspend mud and winnow it away, in the same way that waves deal with mud in the water column after storm inputs at present (which is the reason why beaches like Masefield are sandy). Furthermore, it is worthwhile noting that the residual (or nett) current modelled for the NW wind scenario shows an anticlockwise gyre. The gyre runs west to east through the Masefield Beach embayment, and then north along the flank of the road embankment (and away from Masefield Beach) and then into the main channel where it is directed to the northwest. In other words the effect of the net transport is to move sediment in suspension to the east and away from Masefield Beach.

Could you also advise whether or not removal of the excavated material (as much as practicable) rather than side-casting was considered and the reasons why this was discounted and side-casting proposed.

Side-casting rather than removal of material was proposed because ecological sampling indicated that side-cast material may contain unwanted organisms, including Mediterranean fan worm. The removal of this material therefore has the potential to promote the spread of this species, and it is unlikely that a permit for the transfer and disposal of this material at a remote, marine disposal site would be granted under Section 52 of the Biosecurity Act (1993).

Disposal to land is not a reasonably practicable option, particularly given the relevant environmental effects are assessed as being able to be appropriately managed, minor and short term. Disposal to land would likely incur significant additional costs (including through programme duration increasing and transportation costs), and would potentially change (increase) other construction-related environmental effects such as truck movements.

5. Odour

A number of submissions raise concerns about the lack of information in relation to the odour control methods including the size of filters. In section 5.8.5.3 of the AEE it is stated that the proposed carbon filter's will be appropriately sized and maintained. Can you please provide details of the design of the proposed filters, and the required maintenance? This can be in the form of manufacturers specifications and maintenance recommendations if necessary.

There are three odour control filters proposed for this system, at Pt Erin, St Marys Bay and at London St. Each will be designed and sized appropriate for the duty it needs to perform. This type of infrastructure is very commonly and successfully used to manage potential odour emissions from sewers and design parameters are well understood.

At Pt Erin, the carbon filters will be contained in the proposed stacks. In the St Marys Road Park the carbon filters are proposed to be Amatec Green Dome GD72 which site approximately 800mm above ground and is 1800mm in diameter. The lid is made of fibreglass and is vandal resistant. At London Street/New Street, the filter will be installed below ground with access through a manhole lid installed in the roadway.

Maintenance of the filters involves checking the state of the carbon degradation with a dipstick and the carbon is typically replaced every 2 to 5 years depending on the hydrogen sulphide concentration of the air that flows through the unit. Replacing the carbon in the filter is a routine exercise and does not require any specialist equipment.

The final sizing and specification of all filters will be undertaken as part of the detailed design process. Installation of filters at all of these locations is considered a conservative design approach as the new infrastructure is not a sewer pipeline, rather an overflow collector, with intrinsically low odour potential.

The applicant (Healthy Waters) will maintain the equipment as required by the manufacturers specifications. Healthy Waters has a very strong asset management, operation and maintenance record, achieving

excellence in its recent international benchmarking exercise carried out by the Water Services Association of Australia.

Section 4.1.1 states the passive ventilation poles at London/New Streets will be 8-10 m in height. Can you please advise if the final design, height and locations has been decided on?

The applicant is continuing to work with Auckland Transport to confirm final design, height and locations. At this stage, it is anticipated there will be four air exchange poles that will be integrated with streetlight infrastructure as part of the air exchange system at London Street/New Street. It is likely that these will be in the order of 10 metres high, though this will need to be finally confirmed with Auckland Transport, and during detailed design. The pole locations will be selected to replace existing street light poles and considerations include the ease of installation and proximity to boundary fences. Other locations would compromise the ventilation performance and could require extensive large diameter in ground pipework to be effective.

The primary purpose of the air exchange system at London Street/New Street is to allow fresh air entry to the pipeline. Fresh air will be pulled through the pipeline continuously during normal operations by the fans at Pt Erin and will be passed through the stacks installed at that location.

Passive ventilation of the shaft will occur under some filling situations. As the storage tunnel fills, the sucked in air will be to displaced back up the shaft and passed through the underground carbon filter at London St and passed through the air exchange poles. The system is not designed to be a discharge point for stale air.

The proposed height of the exchange poles will facilitate the rapid dispersion and dilution of any residual odour which is emitted with all air having been discharged through carbon filters prior to discharge. The height of the poles will extend above the rooflines that are located close to the air exchange points. The carbon filters, combined with the height of the air exchange poles provides a high level of confidence that if any odour is discharged, it would not be easily discernible at ground level or in houses, and thus is unlikely to have an adverse nuisance effect.

Attached are photos of street light poles that would be similar to the arrangement proposed (refer to **Attachment A**).

6. Discharge Consent

A number of submissions have queried as to whether the proposal requires a discharge consent or assert that the proposal is not covered by the existing discharge consent held by Watercare Services Limited, R/REG/.2013/3743 (Overflows to land and water) and R/REG/2013/3755 (Overflows to the CMA). Please provide a copy of the Managers Certification that authorises the discharge from the proposed new location.

Watercare Services Limited has completed the compliance requirements for the discharge consent and therefore holds the Managers Certification rather than Healthy Waters. As this certification was undertaken by the Auckland Council compliance team, the requested information will be available through this team.

Please contact Caroline Crosby in the first instance (mobile 021 884 336 or email caroline.crosby@aucklandcouncil.govt.nz) if you have any additional questions.

Yours sincerely

Jenny Vince / Andrea Rickard
Senior Associate - Planning / Senior Technical Director - Planning

on behalf of
Beca Limited
Direct Dial: +64-9-301 3768
Email: jenny.vince@beca.com

Copy
Caroline Crosby, Auckland Council Healthy Waters

Attachment A
Street light pole example (Indicative only)