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21 May 2024

Sharon Li
Auckland Council

Sent via email: sharon.li@aucklandcouncil.govt.nz

Section 92 response to further information request for consent application BUN60425924 (WAT60425925, DIS60425927 & LUC60425926)

Dear Sharon,

We have received your Section 92 RMA Request for Further Information (RFI) on December 20th, 2023. Each of the 30 questions included within the RFI have been outlined in table below and are responded to accordingly.

Please note that minor design changes have occurred since the original application was lodged. The alignment of the wastewater tunnel and temporary shaft to be constructed within 329 Queen Street have been moved a short distance to the south to respond to feedback from Eke Panuku, who are responsible for managing the Greys Avenue carpark site. In addition, the temporary shaft will now be reinstated upon completion of the Mayoral Drive Alignment construction works, instead of becoming a manhole.

These minor changes have been captured in the updated reporting listed below. The AEE, Plans and Design and Construction Statement are Appended as Attachment A, B and C along with the relevant specialist assessments.

As part of this response, we have also included a suite of proposed conditions of consent as Attachment I for your consideration.

Please see enclosed the following updated reports and plans:

- Attachment A – Updated AEE
- Attachment B – Updated Plans
- Attachment C – Updated Design and Construction Statement
- Attachment D – Updated DSI addendum and SMP
- Attachment E – Updated CNVA and CNVMP
- Attachment F – Updated ESCP
- Attachment G – Updated Dewatering Assessment
- Attachment H – Updated Permitted Activity Assessment
- Attachment I – Proposed Conditions

I trust that the information supplied is sufficient to cover the queries included below.

Yours faithfully,

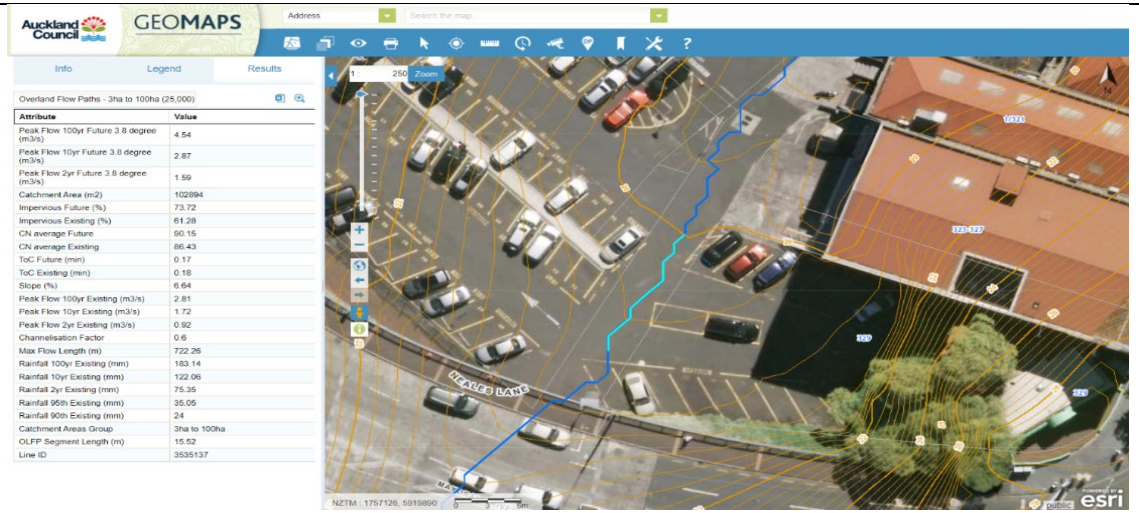
William Hung
Senior Planner, Strategy and Planning
Watercare Services Limited

Item	S92 Request for Further Information Requests	Response
Planning		
1.	I note that diesel generators are to be used if a connection cannot be attained to the power grid and for dewatering. I also note that generators are sought for under the Part 3 consent (BUN60422974) and page 9 of Appendix E states that "Storage of the diesel is covered under consent application for Part 3 works, BUN60422974. Spill containment procedures are outlined within the CMP for the Part 3 works as part of BUN60422974, noting that these procedures will also apply to the works sought under this consent". As the Part 3 application and P3-P4 Connector tunnel are two separate applications, the scope of the works are different, therefore, we need to ensure that the use of the generator (including the storage of hazardous substances) covers the scope of works under this consent. As such, please identify if there are any reasons for consent relating to the use of the generators and assess their effects e.g. E14 Air discharge, E25 Noise and Vibration.	The only generator to be used for the P3-P4 Connector works is a 60 kVA / 50kW diesel Generator. The generator is under threshold limit under E14.4.1 (A52) and does not trigger any other rules in Chapter E14 or E25 of the AUP. As such, use of this generator at the Greys Avenue CSA site is a permitted activity under Chapter E14 and E25 of the AUP.
2.	Please provide comment in relation to subsection (2D) of section 104 of the RMA as the proposal relates to a wastewater network as defined in section 5 of the Water Services Act 2021.	There are no wastewater network environmental performance standards currently in place under Section 5 of the Water Services Act 2021, and as such subsection (2D) of section 104 of the RMA is not applicable.
Air Discharge *I note that there were s92 requests relating to air discharge under the Part 3 application, given the lack of information relating to the generators which form part of this application, the same questions have been repeated in anticipation for any questions the specialist may have*.		

3.	Please provide further detail regarding the proposed air discharge activity arising from the potential use of the generator at the Greys Avenue Construction Support Area. Particularly, please provide details of: a. The generator type, including the maximum continuous power output and fuel consumption (max and typical). b. The location, height and dimensions of the generator exhaust, assessing compliance with AUP(OP) controlled activity Standards E14.6.2.1 (2) and (3). c. The likely duration of operation of the generator.	As in (1) above, use of this generator at the Greys Avenue CSA site is a permitted activity under Chapter E14 and E25 of the AUP. For clarity, the generator to be used for the P3-P4 Connector Tunnel works is smaller than the Generator to be used for the tunnelling works of Part 3 (800kW generator proposed for Part 3, compared to a 50kW generator proposed for this application), as it is being used to power a pilot bore tunnelling machine, rather than a micro-TBM. As such, there are no adverse effects generated by the use of the generator, nor is there a need for specific management measures to monitor and minimise the air discharge.
4.	Please further assess the actual and potential air quality effects arising from the generator air discharges. Particularly, please detail: a. The likely rates of harmful air pollutants (nitrogen oxides and fine particulate matter) from the generator. b. At least a qualitative assessment of the likely off-site ambient concentrations of harmful air pollutants at locations where people are likely to be exposed and resulting risks to human health. This assessment must be provided by a suitably experienced air quality practitioner, detailing the comparative information sources or experience to support any qualitative assessment provided. c. An assessment of visual amenity effects from the generator exhaust emissions.	
5.	Please provide further detail regarding management measures to monitor and minimise air discharges from all generators to be used for the proposal.	
Contamination		

6.	Please provide the information in Attachment A and Attachment B.	Please see enclosed the DSI appendices in **Attachment D**.
7.	The DSI addendum shows that no test results exceed the permitted activity soil acceptance criteria specified in Table E30.6.1.4.1 or E30.6.1.4.2. Therefore, no consent is likely required under Chapter E30. Please confirm if you agree with this, otherwise please provide justification.	We agree that no consent under Chapter E30 required. However, NES-CS still applies to the works given results above Auckland background concentrations (lead, mercury, TPH, PAH and asbestos).
8.	Please provide a Contamination Site Management Plan (CSMP) for review and certification. The CSMP should include clear earthwork procedures and control measures appropriate to the levels and extent of contamination identified within the project areas. This should include the removal of demolition waste containing asbestos containing material (ACM). I noted that the requirement for a Contamination Site Management Plan was included as a s92 request for the Part 3 consent application (BUN60422974). Preparation of a single CSMP to cover both project areas is acceptable.	A combined SMP has been prepared for both the Part 3 and Part 3-Part 4 Connector Tunnel projects, please see **Attachment D**.
9.	Since the demolition waste contains asbestos containing material that require class A/class B asbestos removal control, a restricted discretionary NESCS consent pursuant to regulation 10 is likely required. Please confirm if you agree with this and provide an assessment.	The DSI addendum letter has been updated to identify consent requirements for the removal of Class A / Class B asbestos materials, see **Attachment D**. Consent is therefore sought as a restricted discretionary activity pursuant to Regulation 10 of the NES-CS. The Part 3 / Part 3 – Part 4 SMP provides appropriate controls to manage the effects of the proposed asbestos removal.
Engineering		
10.	Please provide a clear isopath earthworks plan illustrating the extent of cut and fill.	All excavations for this project are temporary, and the site will be backfilled to the existing ground level once works have completed. An isopath plan is therefore considered unnecessary as we are not permanently altering the contours of the site. This approach has been supported by Council on similar Watercare applications (such as the Herne Bay Trunk Sewer project).
11.	Please provide pre vs post flood analysis model.	In preparing the response, Watercare have opted not to utilise a conventional computer-based hydraulic model, because, according to GeoMaps: i. The only available Council hydraulic model is 13 years old

		ii. The software version it uses is now outdated; iii. It does not account for climate change; iv. It does not comply with Council's current modelling specification; v. It is based on old LiDAR with limited structure surveys. In short, we consider that upgrading the existing model would require considerable effort, as would the creation of a new hydraulic model, and would not enable a better understanding of the potential effects. Meantime, the problem in hand can be assessed fairly simply with a few hand calculations, which is what is presented below. Our response consists of two main calculations used in the design of the "clean water corridor" through the Mayoral Drive CSA site. The first calculation involves estimating the required height of the upstream barriers subjected to the full force of the overland flow, using a velocity head calculation. The second calculation estimates the normal flow depth, which is the expected depth of flow through the 5m flow corridor during a 20-year storm. We've used the 20 year storm flow as recommended by GD05. To calculate the flow generated by a 20 year-storm, the rational method used ($Q = 2.78CiA$). The runoff coefficient (C) used was 0.9 due to the being mostly urban and impervious. Rainfall intensity (i) was 105mm/hr. Catchment area was 10.29 hectares. Rainfall intensity was found on HIRDS using the time of concentration gathered from GeoMaps. The channel dimensions, slope, catchment area and other important parameters relating to flow were also gathered from GeoMaps, as seen below:



Upstream concrete barrier sizing

In a major storm, overland flow arriving under the Mayoral Drive bridge will impact against the proposed concrete barrier around the MSA site, and flow will be forced to constrict to pass through the flow corridor. This impact and turbulence and the "heading up" it will cause is expected to result in near total loss of the velocity head, which can be described by the formula $\frac{v^2}{2g}$.

$$Velocity\ Head = \frac{v^2}{2g} = \frac{3.61^2}{2 \times 9.81} = 0.66m$$

A velocity head of 0.7m was found, justifying the need for 700mm concrete barriers at the upstream end of the clean water corridor. In practice, we recommend that motorway median barriers or their equivalent are used to provide mass and to provide 300-400mm additional freeboard.

Realistically, the velocity used in $\frac{v^2}{2g}$. would be that of the flow upstream of the corridor (before the point of flow constriction). This velocity however could not be estimated since we do not know the width of the corridor beneath the bridge. Due to the bottle-neck nature of the corridor entry, the flow velocity within the CSA corridor will inevitably be higher than the flow upstream of the concrete barriers. We decided that a reasonable solution would be to use the CSA corridor flow velocity to estimate the velocity head, as it would be fairly conservative considering the actual velocity of flow impacting the barriers during a 20-year storm would be much lower.

Clean Water Corridor Bund Sizing

A Mannings equation spreadsheet was used to calculate the normal depth of flow through the overland flow corridor (entry to exit) as seen below:

Rectangular Channel

Worksheet Description: Enter description here (e.g. location, name of drain/channel e.t.c.)

Item	Description	Symbol	Unit	Calc. 1 Example	Reference
CHANNEL PROPERTIES					
1.1	Surface description (i.e. mown grass)	-	-	Concrete	NZ Building Code E1
1.2	Manning's n	n	-	0.013	NZ Building Code E1
1.3	Longitudinal slope	s	m/m	0.030	
1.4	Channel width	W	m	5.00	
1.5	Drain length	L	m	722	
APPROACH A - FLOW RATE DETERMINATION					
2.1	Normal depth of flow	d	mm		
2.2	Area of flow	A	m^2	0.00	Eq 3a
2.3	Wetted perimeter	WP	m	5.00	Eq 4a
2.4	Flow rate	Q	m^3/s	0.000	Eq 5
2.5	Critical depth of flow	dc	mm	0	Eq 6
2.6	Flow velocity	v	m/s	#DIV/0!	Eq 7
2.7	Residence time	Rt	min	#DIV/0!	Eq 8
2.8	Froude's number	Fr	-	#DIV/0!	Eq 9
2.9	Flow type	-	-	#DIV/0!	Eq 10
APPROACH B - NORMAL DEPTH DETERMINATION					
3.1	Flow rate	Q	m^3/s	2.703	
3.2	Area of flow	A	m^2	0.75	Eq 3a
3.3	Wetted perimeter	WP	m	5.30	Eq 4a
3.4	Normal depth of flow	d	mm	150	Eq 5
3.5	Critical depth of flow	dc	mm	310	Eq 6
3.6	Flow velocity	v	m/s	3.61	Eq 7
3.7	Residence time	Rt	min	3.3	Eq 8
3.8	Froude's number	Fr	-	2.98	Eq 9
3.9	Flow type	-	-	Supercritical	Eq 10

<table>
<tr><td></td><td></td><td>Flow rate and drain length were retrieved from GeoMaps and then inserted into the spreadsheet. It was found that during a 20-year storm, the flow depth is not expected to exceed 150mm throughout the clean water corridor provided the flow corridor is at least 5 metres wide. This supports our proposal for 150mm bunds along the edges of the “clean water corridor”.

The 150mm maximum bund height has been chosen so it is traversable by construction vehicles. While it does not provide conventional freeboard, the risk arising from minor overtopping is low.</td></tr>
<tr><td colspan="3">Groundwater</td></tr>
<tr><td>12.</td><td>Please provide the “Hydrogeology Factual and Interpretive Report” and the “Geotechnical Interpretive Report” that are referred to in Section 4.1.1 of the “Assessment of Dewatering Effects” report.</td><td rowspan="3">Following the update of the Construction Methodology (Attachment C) provided by the contractors carrying out the excavation works, dewatering of the temporary shaft will now only occur for 9 days (up to 2 days during the shaft construction and 7 day for the tunnel construction). Outside of these dewatering periods the groundwater will be allowed to recharge.

As such, the diversion of groundwater and associated dewatering can now be considered a permitted activity as the relevant standards in Chapter E7 are complied with. Assessment against these standards is provided in the tables below, and within the updated AEE (Attachment A) and Groundwater Permitted Activities Assessment (Attachment G).

In summary, the diversion of groundwater qualifies as a permitted activity as it is exempt from the standards listed in E.7.6.1.10 of the AUP, as the proposed pipe diameter is less than 1.2m and dewatering will only occur for 9 days total.

The associated dewatering of groundwater is also deemed a permitted activity as all standards listed in Table 1-1 below have been met.

Table 1-1: Assessment Standard E7.6.1.6 – Dewatering or groundwater level control.
<table>
<tr><th>Condition</th><th>Complies - Comment</th></tr>
<tr><td>(1) The water take must not be geothermal water;</td><td>Yes</td></tr>
<tr><td>(2) The water take must not be for a period of more than 10 days where it occurs in peat soils, or 30 days in other types of soil or rock; and</td><td>Yes. Greys shaft is only open for 9 days total.</td></tr>
<tr><td>(3) The water take must only occur during construction.</td><td>Yes</td></tr>
</table>
</td></tr>
<tr><td>13.</td><td>The Statutory Assessment in Appendix L does not include an assessment of the proposed activity i.e. the excavation and retention of the “Greys Shaft” and the micro-tunnelling of the new wastewater pipe against AUP Standards E7.6.1.6 (1 to 3) and E7.6.1.10 (1 to 6). Please provide this assessment based on the most up-to-date engineering drawings and be informed by appropriate groundwater level measurements. If the micro-tunnelling, is considered to be a Permitted Activity, in relation to E7.6.1.6 (1 to 3) and E7.6.1.10 (1 to 6), appropriate justification should be provided.</td></tr>
<tr><td>14.</td><td>In the report titled “Assessment of Dewatering Effects” WSP state: “.. but the dewatering for the Mayoral shaft is only assessed in terms of additional drawdown that may occur as a result of the dewatering from the Greys shaft”. Please assess the cumulative effects of both mechanical settlement from retaining wall deflection and consolidation settlement as a result of groundwater drawdown for the Mayoral Shaft and the Greys Shaft.</td></tr>
</table>

15.	It is noted that in Table 4-1 in the Assessment of Dewatering Effects report that the "Best Estimate"' compressibility (/kPa) appears to have been derived from Ref. (4) Freeze & Cherry (1979). Please consider a more appropriate reference which relates to the ground conditions encountered and update the assessment if necessary. If the Freeze & Cherry reference is still considered appropriate, please provide justification.
16.	It is noted that piezometer PZE2 was installed in bore BH23/02 which was drilled in close proximity to the Grey Shaft and had a response zone from 5m to 8.5mbgl i.e. within the ECBF. Please clarify why the response zone was set in the rock and not set over the excavation interval.
17.	Please clarify why only groundwater level readings from PZ01_D and PZ01_S are presented in Figure 2.2.
18.	Please provide the groundwater level monitoring data for PZE2 and clearly identify the groundwater level that was adopted in the assessment and provide justification.
19.	To assist with the assessment of the magnitude of groundwater drawdown, in Table 2-1 in Assessment of Dewatering Effects report, please delete the "static groundwater level" column and replace it with a column which shows the range of groundwater levels measured in both mbgl and mRL over the monitoring period (as shown in Figure 2-2), In addition please add a column – "Piezometer Location" which indicates the distance of the piezometer from the shaft and a Column with Shaft Name/Depth in mbgl and mRL.
20.	Please provide an update of Table 5-1 and 5-3 in the Assessment of Dewatering Effects report to show the

Table 1-2: Assessment Standard E7.6.1.10 – Diversion of groundwater caused by an excavation or tunnel.

Condition	**Complies – Comment**	
	Greys Shaft – Post and Panel	**Pipeline – Trenchless**
(1) All of the following activities are exempt from the Standards E7.6.1.10(2) – (6):		
(a) pipes, cables or tunnels including associated structures which are drilled or thrust and are up to 1.2 m in external diameter;	NA	Yes – Proposed pipe diameter of DN700.
(b) pipes including associated structures up to 1. 5m in external diameter where a closed faced or earth pressure balanced machine is used;	NA	NA
(c) piles up to 1.5 m in external diameter are exempt from these standards;	NA	NA
(d) diversions for no longer than 10 days; or	Yes – Greys shaft will only be dewatered for 9 days.	NA
(e) diversions for network utilities and road network linear trenching activities that are progressively opened, closed and stabilised where the part of the trench that is open at any given time is no longer than 10 days.	NA	NA

As the activity is permitted, no further assessment of effects is required, nor is the provision of a GSMCP necessary.

	groundwater drawdown and settlement at the edge of the Greys Shaft (i.e. distance from shaft 0m)	
21.	Please provide an assessment of the cumulative adverse effects of the proposed groundwater-related activity, of dewatering and groundwater diversion, in relation to any existing dewatering or groundwater diversion consents (Water Permits), located in close proximity (within 20m) of the proposed pipe alignment.	
22.	Please identify all critical cross-sections for the settlement effects assessment - consider: depth of excavations; proximity to adjacent buildings, structures and public services and measured groundwater levels. Careful considerations must be made for the shaft excavations in close proximity to any Heritage listed buildings.	
23.	Using appropriate data (relevant to excavation depth) from groundwater level monitoring, please undertake an assessment of the groundwater drawdown due to the shaft excavations to include consolidation settlement profiles at the critical cross-sections from the edge of the proposed shaft excavation extending beneath neighbouring buildings/structures, infrastructure (footpaths, kerb-lines and roads) and public services.	
24.	Based on the proposed design for the Greys Shaft (given in Section 3.4 of the Assessment of Dewatering Effects report) undertake retaining wall deflection analyses, using appropriate software, in order to determine the likely lateral wall deflection and the preparation of mechanical settlement profiles at the critical cross-sections, from the edge of the proposed shaft excavation extending beneath neighbouring buildings, structures	

	infrastructure (footpaths, kerb-lines and roads) and public services.	
25.	Please provide profiles, at the critical cross-sections, showing the total (combined) settlement (i.e. the consolidation settlement due to groundwater drawdown plus the mechanical settlement due to retaining wall deflection) beneath the neighbouring buildings/structures, infrastructure (footpaths, kerb-lines and roads) and public services. The profiles should be annotated with the calculated maximum differential settlement (slope gradient) across neighbouring buildings/structures, infrastructure (footpaths, kerb-lines and roads) and public services.	
26.	Please provide a total (combined) settlement contour plan around the Greys Shaft extending along the proposed alignment of the pipe and incorporating the total (combined) settlement contour plan at the Mayoral Shaft.	
27.	The assessment of Settlement Effects in Section 7.5 of Assessment of Dewatering Effects report is not appropriate. Please undertake an assessment of the tolerance/sensitivity of the neighbouring buildings & structures to the predicted maximum total and differential settlement that could result from the dewatering and retaining wall deflections, with respect to their age, construction and foundation types (as obtained from Council Property Files), from the structural design engineer for the project. A Stage 1 Assessment - Burland Classification of Damage for the neighbouring buildings/structures is required. If the Stage 1 assessment indicates “Slight Damage or greater”, then a Stage 2 assessment is required.	

28.	Please identify potentially affected public services/utilities and assess the combined effect of groundwater drawdown and retaining wall deflection on these public services/utilities using appropriate assessment criteria.	
29.	Please provide an assessment of the combined effect of groundwater drawdown and retaining wall deflection on infrastructure (footpaths, kerb-lines and roads).	
30.	A draft Groundwater Settlement Monitoring & Contingency Plan (GSMCP) will be required as part of the Resource Consent Application. The draft GSMCP should include (but not be limited to): a plan showing the locations and types of monitoring devices including groundwater monitoring bores, building settlement marks on the neighbouring buildings/structures, ground settlement marks, retaining wall deflection marks and inclinometers (if required). Alert and alarm trigger levels and monitoring frequency are also required for total and differential settlement of the ground surface, buildings and retaining walls and alert levels 1 & 2 for groundwater level monitoring. The draft GSMCP should identify neighbouring buildings/structures, or portions of those building /structures, including those structures under construction, that require pre-and-post dewatering detailed condition surveys. If it is considered that a detailed condition survey of a particular building or structure is not required, then this should be fully justified. In addition, the draft GSMCP should identify public services (specific lengths), which require pre-and - post dewatering CCTV condition surveys. If it is considered that a condition survey of a public service is not required, then this should be fully justified. The draft	

	GSMCP should include a description of the proposed construction methodology/sequence and contingency options.	