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26 May 2023

Auckland Council
Private Bag 92300
Victoria Street West
Auckland 1142
Attention: Ben Willis / Peter Vari

Dear Ben and Peter,

SH16 Brigham Creek to Kumeū Stage 2 - Notice of Requirement Further Section 92 Responses

Further to the two emails received from Peter Vari (directed to Tessa Robins at Waka Kotahi, dated 1 March 2023), the following provides responses to further queries posed by Auckland Council's traffic specialist on traffic matters. This is supplementary to the section 92 response provided on 12 May 2023 which addressed street trees and urban design matters.

In addition, Waka Kotahi considers the Project impacts on adjoining property's onsite wastewater systems is a Notice of Requirement (NoR) matter as per the lodged AEE report and the proffered designation condition. Waka Kotahi therefore provides responses to information requested under the Regional Consenting section 92 request by the Auckland Council wastewater specialist on the 23 March 2023, below in point 11.

Attachments

Attachment 1 – Crash Worksheets (Excel spreadsheet)

Attachment 2 – SH16 Stage 2 process for identifying and remediating affected wastewater systems

Attachment 3 – SH16 Stage 2 Impact on Wastewater Systems - Summary

Attachment 3 – SH16 Stage 2 Wastewater Systems Remediation - Concept Plans

Traffic Assessment

1. **Please provide details of the diverted traffic volumes and routes that traffic from CRH divert to due to the operation of the CRH/SH16 intersection as referenced in Section 2 of the Beca Memo dated 15 March 2021 (Attachment 2 to the S92 response).**

   The 15 March 2021 Beca memo shows that the forecast 2021 and 2038 future volumes on CRH are lower than the existing surveyed volumes on CRH from 2020 by some 300 vehicles. The forecast volumes are with the CRH/SH16 intersection upgraded to a roundabout. Please provide justification for the use of traffic volumes in the analysis for CRH being lower than the actual counted data from 2020.

   Please confirm whether the Flow assessment in August 2017 (Attachment 2 to the S92 response) included any re-routeing of traffic from the Old North Road roundabout to the proposed CRH roundabout; noting that the analysis shows that Old North Road roundabout

is forecast to be significantly over capacity whilst the CRH/SH16 roundabout operates within capacity.

Further response:

The traffic volumes used to inform the SH16 project have changed throughout the course of the project. This is simply due to traffic information continually changing, development and worsening traffic conditions occurring over time.

The original SH16 assessment was undertaken in 2017, which relied on traffic information sourced from the Transport for Future Urban Growth (TFUG) project.

Over time, traffic volumes on Coatesville-Riverhead Highway have changed in response to growth in Kumeu-Huapai and Riverhead, with an element of re-routing being introduced about Old North Road given the congestion experienced on SH16 entering and leaving Kumeu.

This is evident in the changes in volumes on Old Railway Road (west of Old North Road), where morning peak volumes have increased from 85 vehicles two way (2015) to 270 vehicles two way (2021). Similarly, volumes on Old Railway Road (west of CRH) have also increased from 175 vehicles two way (2017) to 250 vehicles two way (2021), with volumes on CRH also increasing from 650 vehicle two way (2015) to some 850 vehicles two way (2021-22). The increase in volumes introduced through rat running accords with the 2017 assessment which highlighted capacity being available at the CRH intersection.

We also note that re-routing would not have been from the Old North Road roundabout, but rather along Old Railway Road, with vehicles avoiding SH16 and Old North Road congestion.

Acknowledging the above and moving forward to the volumes used to assess the NoR, more recent traffic information is now available which has been used to assess the CRH roundabout and confirm its performance.

In relation to forecast volumes used to inform the SH16 NoR design, the NoR analysis at the time relied on the available external data including the Supporting Growth predictions for 2038. More recently however, as indicated by Council, traffic projections have also been presented in the proposed Riverhead Private Plan Change documentation made available to Waka Kotahi. We note that the Riverhead Private Plan Change has recently been declined by the Council under RMA Schedule 1 Clause 25.

As the Council has referred to the Riverhead Plan Change assumptions, we have compared the 2038 traffic predictions and operation predicted in the Riverhead Private Plan Change analysis. The flows and predicted performance from the 2038 NoR assessment and Riverhead 2038 scenarios are set out below.

AM Peak

AM Peak Analysis	WK NoR AM 2038 SGA+40%	WK NoR AM Operation	Riverhead PC AM 2038	Riverhead PC AM Operation
SH16 East Through	1275	LOS A	1183	LOS A
SH16 East Right Turn	230	LOS A	427	LOS B
CRH Left Turn	191	LOS A	911	LOS C
CRH Right Turn	10	LOS B	58	LOS C
SH16 West Left Turn	10	LOS A	25	LOS A

SH16 West Right Turn	1508	LOS A	1383	LOS B
TOTAL	**3224**	**LOS A**	**3987**	**LOS B**

PM Peak

PM Peak Analysis	WK NoR PM 2038 SGA+40%	WK NoR PM Operation	Riverhead PC PM 2038	Riverhead PC PM Operation
SH16 East Through	1664	LOS A	1730	LOS A
SH16 East Right Turn	559	LOS A	628	LOS B
CRH Left Turn	258	LOS A	580	LOS B
CRH Right Turn	10	LOS B	39	LOS B
SH16 West Left Turn	10	LOS B	33	LOS B
SH16 West Right Turn	1418	LOS B	1249	LOS B
TOTAL	**3919**	**LOS A**	**4259**	**LOS B**

Traffic volumes on SH16 are generally similar, with the Riverhead Plan Change analysis assuming higher turning volumes in response to proposed land use development.

While the performance of CRH reduces as a result of higher traffic volumes, the respective results predict the NoR roundabout to operate efficiently with LOS C or better.

2. Please provide details of what development and traffic volumes was included in the modelling for Riverhead for the future years assessed.

Further response:

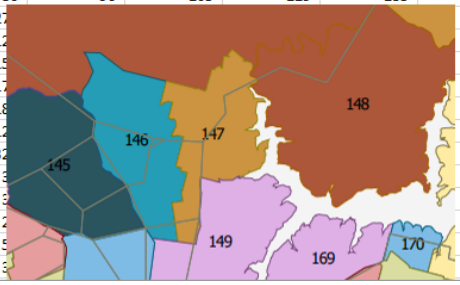
The Supporting Growth Alliance (SGA) SATURN model was used to inform the predicted traffic volumes on the project. The model was originally developed for the TFUG project and was updated in 2021 by SGA to incorporate a land use scenario termed Scenario I11.5 (August 2020). The Regional land use information for the Riverhead area is set out below.

Scenario I Modified Version 11.5

Scenario I MODIFIED

HOUSEHOLD FORECASTS

MSM Zone	Sector	2016	2023	2028	2033	2038	2043	2048	SGA48+
130	Isthmus and North V	1,484	1,571	1,613	1,647	1,670	1,697	1,948	1,948
131	Isthmus and North V	910	919	920	919	917	914	1,008	1,008
132	Isthmus and North V	1,475	1,557	1,582	1,601	1,610	1,622	1,670	1,670
133	Isthmus and North V	2,245	2,345	2,382	2,412	2,428	2,448	2,472	2,472
134	Isthmus and North V	739	786	805	821	832	845	853	853
135	Isthmus and North V	1,599	1,716	1,797	1,868	1,916	1,967	1,999	1,999
136	Isthmus and North V	763	766	762	758	752	746	740	740
137	Isthmus and North V	388	389	387	385	382	379	376	376
138	Isthmus and North V	382	669	706	743	774	807	830	830
139	Isthmus and North V	1,888	1,894	1,885	1,874	1,860	1,846	1,831	1,831
140	Waimauku	426	439	458	487	518	554	576	576
141	Isthmus and North V	131	146	168	199	236	275	300	300
142	Kumeu	75	147	324	581	949	1,162	1,169	1,500
143	Kumeu	44	75	96	329	850	1,152	1,159	1,828
144	Kumeu	506	823	1,048	1,194	1,223	1,238	1,242	1,242
145	Kumeu	300	305	305	601	1,306	1,715	1,723	2,019
146	Kumeu Rural	139	144	144	170	239	288	296	396
147	Riverhead	566	572	572	736	1,148	1,404	1,409	1,772
148	Isthmus and North V	298	305	317	335	355	378	392	392
149	Kumeu Rural	86	96	105	119	135	153	164	164
150	Kumeu Rural	27					280	281	281
151	Kumeu	12					990	995	2,532
152	Kumeu	15					682	685	1,619
153	Kumeu Rural	17					258	272	272
154	Kumeu Rural	18					179	178	178
155	Isthmus and North V	12					146	149	149
156	Isthmus and North V	32					316	314	314
157	Redhills	3					-	-	-
158	Redhills	3					2,183	2,177	3,231
159	Redhills	2					3,152	3,143	4,665
160	Redhills	5					809	807	1,197
161	Redhills	3					1,605	1,601	2,376



Land use scenario termed Scenario I11.5 (August 2020)

As noted in the Flow SH16 Brigham Creek Road to Waimauku, Update to Economic Analysis Dated December 2021 a more recent land use scenario (Scenario I11.6) had been developed by the Auckland Forecasting Centre (AFC) at the time of the Flow 2021 report, but the SGA SATURN model had not yet been updated to reflect these new land use forecasts.

As part of the 2021 Flow report the two land use scenarios in the project area (Kumeū /Huapai and Riverhead) were reviewed and compared.

Scenario I Modified Version 11.6

Scenario I MODIFIED

HOUSEHOLD FORECASTS

MSM Zone		2018	2023	2028	2033	2038	2043	2048
1	2 3	4	5	6	7	8	9	10
142		80	145	315	555	893	1,102	1,125
143		43	61	82	295	779	1,073	1,096
144		1,122	1,319	1,556	1,714	1,744	1,775	1,802
145		324	324	327	599	1,251	1,651	1,683
146		151	151	153	178	239	287	299
147	Riverhead	951	956	972	1,135	1,519	1,776	1,807

The Scenario I11.6 land use increases dwelling numbers in Riverhead to 950 dwellings between 2018 and 2028 (+400), before increasing to 1,500 dwellings in 2038 and 1,800 dwellings in 2048.

The Riverhead Plan Change proposes some 2,000 dwellings, which is some 1,150 additional dwellings (950 (base)+2000 (PC)-1800 (projected)) to that included in the Riverhead long term land use projections.

3. **Please provide details of the "minimum network improvements" included in the 2026 TFUG Saturn Model, including what development is included for the surrounding area (Riverhead, Kumeū, Huapai).**

Further response:

The Do Minimum improvements are associated with the wider Northwest transport upgrades being considered by Te Tupu Ngātahi Supporting Growth Alliance (SGA) as included in the Indicative Strategic Transport network for the North West.

With the exception of the Alternative State Highway elements (1, 3 and 4) and Safe Network Programme (26), future roading connections associated with Redhills, Whenuapai, Westgate were included in the model. We note that the SH16 corridor (26) reflects the existing situation for the "Do Minimum" scenario and that Coatesville Riverhead Highway remains as a single traffic lane.

A plan showing the Indicative Strategic Network is provided below, with the following upgrades being included in the SATURN traffic model.

Redhills (2028/2038)

12- New east west connections from Nelson Rd to Fred Taylor Drive

13- New north south connection from the east-west connection (12) to Royal Road

Whenuapai (2028/2038)

14- Spedding Road upgrade (in part)

17- Upgrade and extension of Māmari Road from Northside Drive to Brigham Creek Road

18- Upgrade Brigham Creek Road

19- Upgrade Trig Road from Brigham Creek Road to Hobsonville Road

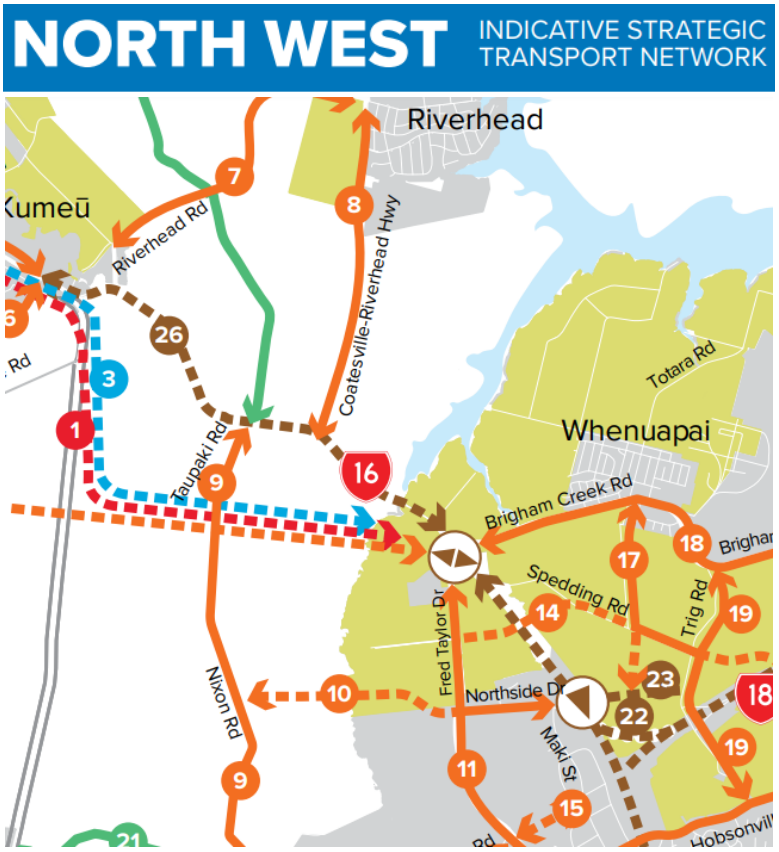
Westgate (2028/2038)

11- Upgrade Fred Taylor Drive and Don Buck Road to Red Hills Road

15- Dunlop Road extension from Fred Taylor Drive to Maki Street

State Highway 16 (2038)

22- Direct State Highway connection between SH16-SH18, new shared path and interchange upgrades.



Source: Supporting Growth Programme

4. **Please provide modelling outputs for the alternative intersection arrangements assessed for the SH16/CRH intersection to support the selection of the proposed roundabout as the preferred intersection arrangement.**

   Further response:

   Alternative SH16/CRH intersection arrangements were assessed with a multi criteria analysis process to evaluate the different layouts based on a number of criteria.

   The following summarised assessment is further detailed within the Assessment of Alternatives and Appendix E.

   Four shortlisted options were considered for the SH16/CRH intersection:

   - *Option 1: Roundabout (with the form being a 2-lane roundabout configuration)*
   - *Option 2: Signalised seagull*
   - *Option 3: Signalised intersection*
   - *Option 4: Slip lane*

   Each option assessed involved four laning (or one additional lane) in Section A and Section C, either side of the potential Coatesville Riverhead Highway intersection. Adding to the existing single lane each way in these sections was the only option to improve efficiency either side of the intersection. Section B was always assessed with Section A or C. As these options were assessed together, to maintain efficiency and minimise potential conflict points where SH16 and CRH intersect, the roundabout (RAB) was designed to be two lanes to integrate with the additional lanes on either side of the RAB as merging at the RAB to one lane would not be efficient or feasible.

The SSBC outlines existing congestion issues from 2015, which noted congestion at the Taupaki Road RAB where vehicles have to merge in and out of the two lane roundabout. To reduce this congestion issue, additional lanes in Section A and C were considered to remove the merging conflict points (at both Brigham Creek and Taupaki RAB). The existing road context means a one lane roundabout is not a feasible option as it would cause another conflict point along the alignment where vehicles would need to merge and induce more congestion, safety risks and a longer travel time.

Table 1 summarises the commentary on each option including the key reasons options were discounted and why the recommended option was chosen.

Table 1: MCA assessment for CRH intersection (Section B).

Options	*Assessment Analysis*
RECOMMENDED ***Option 1*** *Roundabout*	*The roundabout was the recommended option for the following reasons:* • *The roundabout was considered the safest design, as roundabouts generally provide a safer alternative to signalised and other unsignalised intersections. The speed of all vehicles can be reduced at the conflict points, reducing the risk of fatal and serious injuries. Crash reductions at roundabouts are primarily attributed to two factors, reduced traffic speeds and elimination of high-energy conflicts that typically occur at other types of at-grade intersections.* • *Facilities for cyclists crossing and turning can be provided in the design similar to Taupaki roundabout.* • *The roundabout scored the highest for Efficiency as it will reduce the existing congestion (particularly along Coatesville Riverhead Highway) and would create a Level of Service B (AM peak) and C (PM peak) (modelled for the year of 2026).* • *Regarding System Integration and Modal Shift, there are currently 2 existing roundabouts within the SH16 Stage 2 corridor extent. Provision of a roundabout at the Coatesville-Riverhead Highway (CRH) intersection scored the best as it would be consistent with the existing Taupaki roundabout to the north and the existing Brigham Creek roundabout to the south (the adjacent intersections). This would provide the customer with a consistent journey. The two lane roundabout will integrate well with the four lanes north to the Taupaki roundabout and the proposed four lane capacity improvement option between the CRH and the Brigham Creek Roundabout. The roundabout also acts as a safe turnaround facility for road users. The proposed wire rope median barriers will prohibit road users from turning in other locations. The roundabout also provides the opportunity for a fourth leg in the future as the area urbanises.* • *The roundabout will have Technical and Operation and Maintenance constraints since a roundabout has the largest footprint.* • *The roundabout scored the highest from a Cultural perspective as it improves road safety and is the only option to provide a space for cultural interpretation.* • *The roundabout has positive Social benefits. The proposed design will make accessing and exiting popular local businesses on Coatesville-Riverhead Highway such as Boric Food Market and Blossoms Café safer for all users, compared to the existing T-intersection which has a history of unsafe vehicle movements and incidents which impact on community well-being.*

Options	Assessment Analysis
	• *The roundabout scored neutral against Human Health (which was better than the signalised intersections). The proposed solution will reduce congestion at the intersection, particularly congestion backed up along CRH, resulting in less stationary traffic. When compared to the signalised options, the Roundabout option would provide a more balanced approach to delays to all approaches. The Roundabout option has therefore been ranked slightly higher than two of the alternatives in terms of effects on air quality.* ***Non-scored criteria:*** • *The options were made public during an open day and were available online for viewing. The majority of the community and stakeholders surveyed in during public consultation for the business case phase preferred the roundabout option. During this time, initial conversations were held with the owners of Boric Food Market who did not oppose the acquisition of some of their land for a roundabout.*
Option 2 *Signalised Seagull*	*This option was discounted for the following reasons:* • *Did not provide the level of road safety design as the roundabout.* • *Did not provide the level of efficiency as the roundabout.* • *Did not integrate well with existing intersection designs at Brigham Creek and Taupaki.* • *This design integrates better with bus services along the corridor.* • *Scored slightly negative against Human Health as there could be more temporary queues that increase the noise of traffic near dwellings.* • *Scored slightly negative against Cultural as it does not provide for cultural interpretation like the roundabout can and requires more impervious surface area than the roundabout.*
Option 3 *Signalised intersection*	*This option was discounted for the following reasons:* • *Did not provide the level of road safety design as the roundabout.* • *Did not provide the level of efficiency that that the roundabout provides.* • *Did not integrate well with existing intersection designs at Brigham Creek and Taupaki.* • *The traffic lights would support bus, cycle, and pedestrian movements better than other options.* • *Scored slightly negative against Human Health as there could be more temporary queues that increase the noise of traffic near dwellings.* • *Scored slightly negative against Cultural as it does not provide for cultural interpretation like the roundabout can and requires more impervious surface area than the roundabout.*
Option 4 *Slip lane*	*This option was discounted for the following reasons:* • *This option scored neutral for Safety as it would not address historic or current safety issues at this intersection. A slip lane still has a risk of high severity outcomes from T-bone type crashes.* • *The slip lane has a neutral score for Efficiency as it will only allow more left turns out of CRH. This only improves one movement. The overall intersection LOS is unacceptable with significant delays expected on the east approach and CRH approach. A zero score is given as this does not make any significant improvement to the intersection.*

Options	Assessment Analysis
	• *The design does not integrate well with bus services provided along the corridor, as the existing bus stop is located at the turning point of the corridor which cannot be easily accessed by pedestrians.* • *Scored neutral for Cultural as it does not provide for cultural interpretation like the roundabout can.*

A high level analysis (using SIDRA INTERSECTION software) was undertaken as part of the design and evaluation of intersection options. Traffic modelling was then completed for the preferred arrangement. The outcome of this analysis is set out below: (Note: data to fully understand traffic signal impact during off peak hours was not available at the time of this assessment)

Level of service (LOS) is a qualitative measure used to relate the quality of traffic service. LOS is used to analyse highways by categorizing traffic flow and assigning quality levels of traffic based on performance measure like queuing, delay, etc. If this intersection is not upgraded, the following LOS is expected:

1. CRH – LOS F

2. SH16 East approach – LOS F

3. SH16 West approach – LOS A

It is quite evident that the east approach waiting to turn right onto CRH will need to give way to the east bound through movement whilst the queue length keeps increasing. The average delay and queue lengths are significantly high.

***Roundabout:** intersection Level of Service B (AM peak) and C (PM peak) (2026).*

AM peak - The CRH leg has LOS C for the SH west approach as LOS A and SH east approach as LOS B and C. Metering for west approach (PM peak) would improve LOS for the Left turn out of CRH. The Left turn out can also be improved by providing a slip lane that merges further down.

PM peak - The CRH leg has LOS F for the left turn out of CRH. Metering for west approach (PM peak) would improve LOS for the Left turn out of CRH. The Left turn out can also be improved by providing a slip lane that merges further down. It is likely that the left turn slip lane can be provided with minimal impact on the adjacent properties by adjusting the position of the roundabout to the west.

A Roundabout with left turn slip lane has an intersection Level of Service B (AM peak) and A (PM peak) (2026). This changes the Left turn movement out of CRH from LOS F to LOS A.

Metering the west approach will not cause significant adverse effect compared to the traffic signals.

The SH east approach is LOS A and SH west approach is LOS B for both lanes. The Roundabout option would provide a more balanced approach to delays to all approaches.

These LOS are much better than do-nothing and slip lane option. Intersection Level of Service A (2036 with forth leg). This is due to more balanced flows. Metering can be removed at this stage.

Signalised seagull: *intersection Level of Service B (2026).*

AM and PM peak both perform similarly. Left turn out of CRH is has a LOS B for both peaks. Right turn into CRH is LOS D with an average delay of 45 - 48 sec for the two peaks.

This option is slightly better than full signalisation as it has better LOS for through movement west approach (AM peak) and Right Turn out of CRH (AM peak). 8.5 and 10 sec difference respectively. This effect is not significant and is scored same as full signalised layout. No modelling for 2036 as forth leg is proposed and intersection will need to be upgraded to Signals or RAB.

Signalised intersection: *intersection Level of Service B (2026).*

The difference with AM and PM performance is the right turn out of CRH and SH16 west approach through movement. In the AM peak, the through movement faces an additional 6 sec delay and the right turn out has an additional 10 sec delay compared to PM peak. This is 8 – 12 sec more compared to the signalised seagull layout. For this movement, the RAB layout has about 20 sec delay compared to the signalised options that has an average delay of 45 – 60 sec.

The double right turn into CRH performs similar to the signalised seagull layout. Intersection Level of Service C (2036 with forth leg). Signals affects all approaches. Intersection Performance (IP) assessment crucial to understand economic impact.

Slip lane: *Improving from existing layout to allow more left turn out of CRH.*

This only improves one movement. The overall intersection LOS is unacceptable with significant delays expected on the east approach and CRH approach. A zero score is given as this does not make any significant improvement to the intersection as a whole. No modelling for 2036 as forth leg is proposed and intersection will need to be upgraded to full signals or RAB.

The recommended option (Option 1), being a roundabout, was selected as it scored the best against the project objectives (safety, efficiency and modal shift).

The roundabout option is considered to be more consistent with the intersection designs at Taupaki and Brigham Creek and with the existing corridor treatments in this peri-urban environment. The 2-lane roundabout will require 4-laning of SH16 to the west to tie-in with the new 2-lane roundabout at the Taupaki Road intersection. It integrates well with the proposed SH16 4-lane capacity improvement option between the Coatesville Riverhead Highway and the Brigham Creek Road roundabout.

5. **Please confirm if the additional capacity released by the metering of BCR on the approach to the BCR roundabout by PC69 has been included in the analysis.**

   Further response:

   The PC69 mitigation measures that include roundabout metering on BCR on the approach to the roundabout have not been taken into account in the analysis.

6. **Please provide comment on the validity of the December 2021 Economics Update by Flow (Attachment 4 to the S92 response) in view of the comments in items 6 and 7** [this is now renumbered to items 1 and 2 within this s92 response]**.**

Further response:

The December 2021 Economics Update by Flow was based on information that was available at that time.

As outlined above, more recent traffic data is available for the corridor, with the Riverhead Plan Change documentation presenting forecast volumes based on 2022 actual surveys. The traffic modelling completed to support the NoR and that completed for the Riverhead Plan Change shows the roundabout design will perform acceptably.

The 2021 economic analysis does not consider the information available about CRH today, or as assessed through the proposed Riverhead Plan Change. However when utilising the Riverhead Plan Change forecast volumes there will be a reduction in the previously calculated performance of the existing priority controlled intersection. This change relative to the proposed NOR roundabout performance will improve the economic benefits of the project when accounting for the increase in traffic now experienced at CRH.

7. Please provide reports or analysis that clearly shows the crash savings anticipated per section of the route.

Further response:

The SH16 SSBC breaks the SSBC study area into five sections, as set out below.

- Section A – Brigham Creek to Coatesville Riverhead Highway (Rate Analysis)
- Section B – Coatesville Riverhead Highway Intersection (Rate Analysis)
- Section C – Coatesville Riverhead Highway to Taupaki Roundabout (Rate Analysis)
- Section D – Taupaki Roundabout to Old Railway Road (Accident by Accident)
- Section E – Huapai to Waimauku (Accident by Accident)

Sections A to C is based on the crash prediction models included in the Crash Estimation Compendium. Because of this, any update in crash history will not impact on the crash rate analysis outputs. For Section D and E however, updated crash information amends the crash costs. As part of the Flow SSBC Economic Update dated 28 April 2020 an updated crash history for Section D and E was provided.

Section 3.1 Crash Trends Comparison of the Flow Update to Economic Analysis dated December 2021 compared additional crash data from 2020 to 2021. It noted the comparison indicated that the crash record along SH16 during 2020 and 2021 had been affected by the Covid 19 mandated lockdowns, therefore analysis that includes these years was considered unsuitable for crash cost analysis. On this basis, the 2015-2019 crash statistics and evaluation was retained.

Spreadsheets summarising these outputs are provided in Attachment 1.

8. Please provide comment on the implications for the design of the roundabout and the extent of designation to address vehicle tracking for large vehicles that extend outside of the marked circulatory lane lines.

Further response:

Overall, the CRH roundabout has been designed to allow for consistent traffic movement through the altered SH16 corridor and to integrate and be consistent with the existing roundabouts at Brigham Creek Road and Taupaki Road. The proposed CRH roundabout outer diameter matches the existing roundabout diameter at Taupaki Road. The central island incorporates a 1m concrete apron which facilitates tracking of large vehicles in the inner lane without crossing lane lines and is consistent with the designs of both Brigham Creek and Taupaki roundabouts.

Direction from Waka Kotahi Lead Safety Advisor is that the roundabout is to be sized so that a large car and semi-trailer can travel through the roundabout together allowing for limited crossing of lane lines if required.

If the roundabout was to be amended so that large vehicles do not cross the lane lines, the roundabout outer diameter would not have to be increased but the entry and exit radii would need to be larger. This would have the consequence of increasing operating speeds through the roundabout.

An increase in entry and exit radii would increase the footprint of the roundabout approaches and depending on the extent of the increases and geometry required, this may be accommodated within the currently proposed designation or require an alteration to the proposed designation.

The current design meets Waka Kotahi requirements and has been through a preliminary and detailed design Road Safety Audit process.

9. **Please provide justification for not reviewing the speed limits along the corridor as part of the safety improvements for the project. The speed limit will affect the design speeds for the corridor which will in turn have implications for geometry and possible the extent of designation being sought.**

   Further response:

   In parallel to the SH16 Project, Waka Kotahi has undertaken a speed review of this section of the SH16 corridor as part of the wider Speed Review Programme. The speed review concluded that there shall be no change to the speed limit on this section of the corridor. The technical assessment of speeds confirmed that the 80km/h is appropriate, and any changes would not be supported through the speed assessment tool. Reducing speeds would not address the underlying safety problem and would further reduce capacity on an already congested network. Therefore, this Project aims to improve the safety of the corridor as well as respond to issues relating to efficiency, resilience, access, and travel choice within the surrounding area. The focus of the Project was rural areas of the highway with the existing speed limit of around 80km/hr. The Project does not preclude a future speed reduction as the area urbanizes.

10. **Please confirm that land is not required to be designated for site offices or compounds.**

    Further response:

    The designation extent shown on the Designation Plans included with the NoR and AEE Report includes both the permanent area needed for new infrastructure assets and the temporary area needed for the construction works parallel to the existing state highway.

    As mentioned in Section 3.2.2 Construction Yards in the AEE, the exact requirements for site offices and compounds (location, size) are not confirmed at this stage in the Project planning as this will be confirmed by the Contractor based on their methodology and programme staging, therefore the land for these activities have not been included within the NoR.

    Should these activities be required by the Contractor, the necessary land use consents will be sought.

Wastewater

On the 23 March, Auckland Council sent a request for further information under S92 of the Resource Management Act 1991 on the applications for regional resource consents relating to the SH16 Stage 2 Project impacts on private onsite wastewater systems. As noted above, this is considered to be a NoR matter. This section contains a record of the previous correspondence between Auckland Council and Waka Kotahi as well as a response to Council's S92 further request for clarification/information. A colour legend is provided below to identify each request and response. Our most recent response to Council (outlined in blue text) is a refined and expanded response to the Council query and should replace our original response to each question.

Legend

- Original Council s92 question received on the 31 January 2023 in **bold black text**
- Waka Kotahi first response dated 3 March 2023 in black text
- Council's further comments / request dated 23 March in red text
- Waka Kotahi further response dated 26 May 2023 in blue text

11. **The proposal is expected to impact the onsite wastewater systems on 5 properties. The applicant proposes ensuring that the onsite wastewater systems on these 5 sites will be relocated and a condition of consent has been proffered in this respect. It has been further established that onsite wastewater systems for a further 14 properties may or may not be impacted. The location and extent of the existing wastewater systems on some properties is currently unknown and consultation with these property owners is ongoing to determine the exact location and extent of these systems where property file records are absent.**

The overall general approach is generally okay. However, it lacks sufficient detail, timeframes and conditions. Five properties have been confirmed as being impacted. Impacted is specified as the functioning of the onsite wastewater system, or compliance with TP58. Impacted in terms of the wastewater rules of the AUP can take many forms. For example, a change in the site area to wastewater volume may be an impact, stormwater or groundwater changes may result in an impact, changes to soil buffer areas and so on. I would think we would like to review the results of the applicant's wastewater study at some stage to confirm if we are in agreement.

The proffered condition is not adequate for a number of reasons:

1. **It doesn't specify an assessment process or timeframes.**
2. **It doesn't reference the design standards or the rules of the AUP to be achieved.**
3. **The proffered condition is limited to the confirmed 5 affected properties only. The number of properties requiring relocated/upgraded onsite wastewater systems is subject to ongoing investigation.**
4. **Timeframes have not been specified.**

Please provide the onsite wastewater assessment for the impacted 59 properties for council review, or amend the proffered condition to address the above points.

The approach that was adopted to identify affected properties is set out below:

Step 1:

- Identify all habitable dwellings within 50 m of the alignment
- For properties within 50 m, confirm whether there is a land requirement for the Project – this could potentially directly impact the site's wastewater system or reduce the separation distances and/or the site area to wastewater volume, making the wastewater system non-compliant with TP58.

- For properties within 50 m, confirm whether the Project results in stormwater systems being relocated closer to the property - this could reduce the separation distances between the wastewater system and the stormwater system, potentially making the site's wastewater system non-compliant with TP58.
- Where properties were greater than 50m from the Project works or there was no land requirement and no change to the stormwater system, no further investigation was undertaken as these properties were deemed to be unaffected by the Project, in terms of the wastewater system.
- Properties within 50 m and where there was a land requirement and/or the stormwater system is to be moved closer to the property were deemed to be potentially affected and the subsequent steps were undertaken.

Step 2:

- For the properties that were identified as potentially affected, all property files were ordered from Auckland Council to confirm the location of the wastewater facilities and the type of treatment[1].
- If Council did not have any records of this, engagement was undertaken with the landowners to confirm the location and type of onsite wastewater treatment system.
- This allowed more properties to be identified as affected or not. For affected properties, Step 3 will be applied.

Step 3:

- For the properties that are confirmed as affected by the Project[2], a concept plan will be developed, agreed with the property owners and sent to Auckland Council for review to agree an appropriate approach to make the wastewater system compliant with the requirements of TP58 where possible.
- These concepts have not been finalised yet, as engagement with landowners is still ongoing.

Waka Kotahi will work with all landowners on properties that will be affected to remediate their wastewater disposal systems as far as practical. Waka Kotahi will relocate the systems to try achieve compliance with TP58 where practical. Where compliance cannot be met, Waka Kotahi will assist landowners with resource consent applications for the agreed remediation.

Where information is not available from Council or the landowners to confirm the location of the wastewater disposal systems, Waka Kotahi will take caution during construction. If the wastewater systems are found or disturbed during construction, works in that area will stop immediately and any accidental impact will be remedied as soon as practicable prior to construction in that area resuming. If wastewater systems are found/disturbed, Step 3 above will be implemented.

We would also like to note that in section 8.3.12 of the AEE, 350 SH16 was identified as a property potentially affected by the project. New information found recently confirms that this property will not be affected by the project.

[1] The property files that have been ordered are: 171 SH16, 173 SH16, 175 SH16, 177 SH16, 179 SH16, 181 SH16, 183 SH16, 191 SH16, 218-220 SH16, 222A SH16, 238 SH16, 239 SH16, 264 SH16, 291 SH16, 299 SH16, 300 SH16, 315 SH16, 324 SH16, 340 SH16, 350 SH16, 393 SH16, 407 SH16, 418 SH16, 429 SH16, 436 SH16, 451 SH16, 464 SH16, 465 SH16, 489 SH16, 491 SH16, 507 SH16, 505 SH16, 538 SH16, 550 SH16, 1411, 1368,1397,1409 Coatesville Riverhead Highway, 26 Old Railway Road, 466 Taupaki Road, 7, 37, 43, 45 Main Road, 2 Kennedys Road.

[2] Five properties confirmed as affected: 238 SH16, 264 SH16, 264A SH16, 340 SH16 and 1404/1368 Coatesville Riverhead Highway

Waka Kotahi will not do any further investigations on the properties where we do not have any available information to confirm if they are affected. However, we have proposed the following revised condition to address Council's concerns:

The Project has the potential to impact the onsite wastewater systems located at 238 SH16, 264 SH16, 264A SH16, 340 SH16, 1404/1368 Coatesville Riverhead Highway. The Requiring Authority shall work with the owners at 238 SH16, 264 SH16, 264A SH16, 340 SH16, 1404/1368 Coatesville Riverhead Highway to develop the methodology for any necessary relocations of private onsite wastewater systems. The requiring authority shall, at its own cost and subject to the agreement of the relevant property owner, undertake any necessary work to achieve compliance with TP58. Where compliance with TP58 cannot be achieved, the Requiring Authority shall, at its own cost and subject to the agreement of the relevant property owner, obtain resource consent to ensure the ongoing operation for the onsite wastewater system and undertake any work required by the resource consent.

There is currently no information about the location of the onsite wastewater systems located at 171 SH16, 218-220 SH16, 222A SH16, 299 SH16, 315 SH16, 324 SH16, 350 SH16, 418 SH16, 429 SH16, 436 SH16, 522 SH16, 1411, 1397 Coatesville Riverhead Highway and 26 Old Railway Road. The Requiring Authority shall instruct the contractor undertaking work adjacent to these properties to undertake due care when excavating or undertaking earthworks in these areas. If onsite wastewater systems are uncovered or disturbed during construction, works in that area shall stop immediately and any damage to the system shall be remedied as soon as practicable prior to construction in that area resuming.

Within three (3) months of the completion of construction works on, or adjacent to any property listed in condition X above, a Works Completion Report shall be submitted to Council for information. The Works Completion Report shall be prepared by a Suitably Qualified and Experienced Engineer and contain sufficient detail to address the following matters:

a. A summary of the works undertaken onsite detailing the relocation of any onsite wastewater systems or confirmation none were encountered;
b. Location and dimensions of any relocated wastewater systems detailed in an as-built plan, in accordance with the design standards of TP58; and
c. Where wastewater systems have been relocated and the standards of the AUP:OP or TP58 have not been met, a copy of the resource consent obtained to authorise the wastewater system.

Council has advised: *The proposed [draft condition] wording is not agreed*, and has provided further feedback on the Waka Kotahi methodology for investigating private onsite wastewater system impacts.

Waka Kotahi consider that the Project impacts on adjoining property's onsite wastewater systems is a Notice of Requirement (NoR) matter as per the lodged AEE report and the proffered designation condition. Additionally, no regional wastewater discharge consents are being sought alongside this NoR. Nonetheless, the below response is being shared with the processing planner for both the NoR and regional resource consent applications to aid any necessary Council discussions with the wastewater specialist who has raised this query.

The information below is provided following further investigative works to determine the specific properties with wastewater systems impacted by the Project. Waka Kotahi provide a refined and expanded response to Council questions on wastewater matters, which replaces our previous s92 response. The following sets out the Waka Kotahi methodology, the outcome of the screening

methodology applied, investigation findings and proposed actions to be undertaken by Waka Kotahi to remedy potential wastewater effects resulting from the Project.

SUMMARY OF METHODOLOGY FOR INVESTIGATION

As previously stated, an approach was adopted to screen all properties adjoining the Project alignment to identify whether the Project would directly impact existing wastewater systems or potentially make them non-compliant with Chapter E5 of the AUP:OP or any existing discharge consents. This process is set out in the diagram in Attachment 2 to this response and summarized as follows:

Step 1: Screening

- Identify all habitable dwellings within 50m of the alignment (Note: the response to question 1 below provides the rationale for the 50m distance)
- For properties within 50m, confirm whether there is a land requirement for the Project which could potentially impact the site's wastewater system or reduce the separation distances and/or the site area to wastewater volume, making the wastewater system non-compliant with Chapter E5 of the AUP:OP and TP58.
- For properties within 50m, confirm whether the Project results in stormwater systems being relocated closer to the property which could reduce the separation distances between the wastewater system and the SH16 stormwater system, potentially making the site's wastewater system non-compliant with Chapter E5 of the AUP:OP and TP58.
- Properties with buildings located greater than 50m from the Project works or where no land requirement and no change to the stormwater system is proposed, no further investigation was undertaken as these properties were deemed to be unaffected by the Project, in terms of the wastewater system.
- Properties within 50m and where there was a land requirement and/or the stormwater system is to be moved closer to the property were deemed to be potentially affected and the subsequent steps were undertaken.

Step 2: Investigation

- For the properties that were identified as potentially affected, all property files were ordered from Auckland Council to confirm the location of the wastewater facilities and the type of wastewater treatment system they currently have.
- Where no Council records existed at the time of request, engagement (including site visits where necessary) was undertaken with the landowners to identify the location and type of onsite wastewater treatment system. In some instances, this led to landowners sharing information on system location / type and allowed more properties to be confirmed as affected or not.
- For affected properties, Step 3 was applied.
- Where properties were not affected, no further investigation was undertaken.

Step 3: Concept Plan development

For the properties where existing onsite wastewater systems are affected by the Project, a Concept Plan has been developed for engagement with landowners. These have generally been developed to achieve compliance with TP58 requirements and meet the Permitted Activity standards within AUP:OP Chapter E5, where practicable. Once agreed with landowners, Waka Kotahi will assess the Concept Plans against AUP:OP Chapter E5 Table E5.4.1 Activity Table and E5.6 Standards to confirm any resource consent requirements (refer to Step 4 below)

Step 4: Confirm Consenting Requirements

Review of the Concept Plans to confirm whether the proposed remediation will comply with TP58 requirements and determine any resource consent requirements in accordance with AUP:OP

Chapter E5 Table E5.4.1 Activity Table and E5.6 Standards to determine which of the following steps apply:

- Where compliance with E5.4.1(A1/A4) is achieved, Waka Kotahi will determine if the existing wastewater system has existing use rights or an existing discharge consent.
    - Where there is an existing discharge consent, Waka Kotahi will lodge and application in the name of the landowner / consent holder for an RMA s127 consent or Managers Approval, on behalf of the landowner subject to their agreement. If the landowner refuses to allow Waka Kotahi to lodge the application/s to undertake the work for any reason, then the Waka Kotahi remediation obligations will be deemed to have been satisfied.
    - Where a wastewater system has existing use rights and can comply with the current Permitted Activity standards of Chapter E5 of the AUP:OP no consenting is required and the as built plan will be submitted to Council for information.
- Where compliance with E5.4.1(A1/A4) cannot be achieved, Waka Kotahi will lodge applications in the name of the landowner for the necessary resource and building consents, on behalf of the landowner subject to their agreement. If the landowner refuses to allow Waka Kotahi to lodge the application/s to undertake the work for any reason, then the Waka Kotahi remediation obligations will be deemed to have been satisfied.
- If the landowner does not agree to the Concept Plan, Waka Kotahi will no longer be responsible for the affected wastewater system.

OUTCOME OF SCREENING

There are 71 properties adjoining the Project alignment. The screening process has been undertaken and the Waka Kotahi wastewater specialist has confirmed:

- 57 properties have buildings located within 50m of the Project alignment and required further investigation.

INVESTIGATION FINDINGS

57 properties were investigated further per the methodology set out above, and these have been grouped into three categories including:

1) **Impacted** – the property has been identified as being impacted in terms of a direct impact on the existing wastewater system or by an increased non-compliance with AUP requirements / TP58.
2) **Not Impacted** – the wastewater system on the property will not be impacted by the Project works.
3) **Investigation Pending** – the Project team has undertaken best endeavours to complete due diligence yet there are no records which provide evidence there may be any impact on wastewater systems so further engagement with the landowners/onsite investigation is pending. We will submit the outcome of our investigation in June.

The findings (to date) are:

- Impacted – 7 properties are confirmed to have existing wastewater systems that will be impacted by the Project
- Not impacted – 48 properties are confirmed to have existing wastewater systems that will not be impacted by the works
- Investigation Pending – 2 properties have no records with Council. These properties include:
    - 222A SH16, which is owned by Waka Kotahi. As the landowners, Waka Kotahi will ensure that there is an existing onsite wastewater system which is compliant with AUP:OP Chapter E5 Permitted Activity standards or any necessary Wastewater discharge consent is obtained.
    - 324 SH16, which is understood to be the site of a flower growing operation. Waka Kotahi are in the process of further engagement with landowners and follow up onsite investigation if necessary. The outcome of this further investigative work will be provided in the detailed wastewater report to be provided to Council in June 2023.

The Table in Attachment 3 provides a more detailed breakdown of the investigations (to date) and the proposed Waka Kotahi actions where required. A more detailed wastewater investigation report compiling the investigation findings, including the 7 properties impacted by the Project, will be shared with Council for information in June 2023. Waka Kotahi provides the Concept Plans for these properties for information in Attachment 4.

RECONFIRMATION OF AFFECTED PARTIES – WASTEWATER SYSTEM IMPACTS

New information has arisen during further investigation and landowner engagement which has helped refine the list of properties with wastewater systems that will be affected by the Project works.

In summary (per the Table in Attachment 3), there are 7 properties with wastewater systems that will be impacted by the Project, including:

- 171 SH16
- 218-220 SH16
- 238 SH16
- 264 SH16
- 1404 Coatesville Riverhead Highway
- 340 SH16
- 429 SH16

We would like to note that in section 8.3.12 of the AEE, 350 SH16 was identified as a property with a wastewater system potentially affected by the Project. New information found recently confirms that the wastewater system at this property will not be affected by the Project.

NEXT STEPS

As set out in Steps 3 and 4 above, Waka Kotahi have, and continue to engage with all landowners identified as Affected Parties to work with them to develop the Concept Plans that seek to remediate the Project impact on their onsite wastewater disposal systems as far as practical. Table 2 below provides a breakdown of the progress of these Concept Plans:

Table 2: Concept plans

Property	**Progress of Concept Plan**
171 SH16	A Concept Plan has been developed and is provided in Attachment 4
218-220 SH16	A Concept Plan has been developed and is provided in Attachment 4
238 SH16	A Concept Plan has been developed and is provided in Attachment 4
264 SH16	A Concept Plan has been developed and is provided in Attachment 4
1404 Coatesville Riverhead Highway	A Concept Plan has been developed and is provided in Attachment 4.
340 SH16	A Concept Plan has been developed and is provided in Attachment 4
429 SH16	Two Concept Plans have been prepared (Option A and Option B) with engagement to be undertaken with the landowners to determine the final option. The preferred option will be shared with Council in June, in the interim both Plans are provided in Attachment 4.

Where compliance with AUP:OP Permitted Activity standards cannot be met, Waka Kotahi will (with landowners' agreement), lodge applications for the necessary Resource Consents (including s127 or Managers Approval where relevant) and Building Consents for the agreed remediation works. Where landowners do not agree to the proposed remediation work on Concept Plans, then Waka Kotahi responsibilities in relation to the wastewater system cease.

Waka Kotahi, as Requiring Authority for the lodged NoR, proffer the following Designation condition to formalise this process, which supersedes the proposed draft designation condition relating to wastewater effects management that was included within Appendix Y to the AEE report:

WW.1 Prior to construction commencing at 171 SH16, 218-220 SH16, 238 SH16, 264 SH16, 340 SH16, 429 SH16 and 1404 Coatesville-Riverhead Highway (the Properties), the Requiring Authority shall, at its own cost and subject to the agreement of the relevant property owner, be responsible for obtaining any required resource consents or alterations to resource consents to authorise the works at these sites where compliance with the permitted activity standards of E5 of the AUP is no longer met as a result of the Project; and shall undertake the work to upgrade or relocate the non-compliant onsite wastewater systems to address the impact of the Project on the affected wastewater systems (or such other solution agreed with the landowner to remedy the non-compliance caused by the project).

a. The Requiring Authority shall provide to Council a copy of the upgraded or relocated wastewater system as-built plan confirming compliance with the permitted activity standards in E5.6.2 of the AUP and/or conditions of consent.

b. All work on the affected wastewater systems shall be completed prior to construction commencing adjacent to or within these properties.

c. If the landowner refuses to allow Waka Kotahi to lodge the application/s and/or to undertake the work for any reason, then the Waka Kotahi remediation obligations will be deemed to have been satisfied.

RESPONSE TO SPECIFIC COUNCIL COMMENTS/QUERIES

Waka Kotahi provides the following responses to the specific Council comments or queries raised.

The proposed wording is not agreed. There are a number of important points in terms of wastewater which the WW specialist doesn't think the proposed conditions reflect:

1. I do not agree with the approach to only consider onsite wastewater systems where habitable dwellings are within 50m of the project works. Onsite wastewater systems can be located at significant distances from an actual dwelling depending on site constraints and other factors. For example, I recently reviewed a system where the wastewater from the dwelling discharged into a septic tank, then was reticulated 90m to a barn where the secondary treatment plant was located, and then was reticulated 50m from there to the land disposal. Suggest the approach is amended to include all properties along the alignment where there is a land requirement or proposed works on or adjacent to the property.

The Project team chose 50m as their benchmark to assess the effects on buildings as TP58 has a minimum separation distance between wastewater systems and any surface water of 20m for primary treatment systems. The Project team chose a conservative buffer to identify potentially affected properties in accordance with the requirements of TP58 (i.e. a 50m setback distance rather than 20m was utilised).

The adopted methodology to review all buildings within 50m of the proposed designation boundary was also adopted in Stage 1 of the Project. This approach was discussed with Robyn Floyd, Council Senior Wastewater Specialist, during Stage 1 (between 2020 and 2022), who considered the

methodology to be a sensible approach. Following this advice from Council, the same approach was adopted for Stage 2.

2. I would expect Council would like to review and approve the results of the study untaken to identify the affected onsite wastewater systems and those identified as 'unknown'. This should be recommended as a condition of consent.

   The outcome of investigations to date is summarised above where we have identified 2 remaining sites with no Council records of existing wastewater systems. As stated above, the following actions apply to these sites:

   - 222A SH16, is owned by Waka Kotahi. As the landowners, Waka Kotahi will ensure that there is an existing onsite wastewater system which is compliant with AUP:OP Chapter E5 Permitted Activity standards or any necessary Wastewater discharge consent is obtained.
   - 324 SH16 is the site of a flower growing operation. Waka Kotahi are in the process of further engagement with landowners and follow up onsite investigation if necessary. The outcome of this further investigative work will be provided in the detailed wastewater report to be provided to Council in June 2023.

3. The applicant's conditions refer to compliance with TP58. This reference should make reference to the permitted activity standards of E5 of the AUP.

   Noted. Waka Kotahi have amended the proffered Designation Condition to reference Chapter E5 of the AUP:OP.

4. No site should be occupied without an operational onsite wastewater system at all times.

   Agreed. We note this is a legal requirement under the Building Act 2004 and Resource Management Act 1991 and therefore does not need to be conditioned.

5. The conditions make mention of remediating any onsite wastewater system damaged or disturbed during the construction before construction resumes. Two points here:
   a. If the integrity of the onsite wastewater system is comprised during construction, it can no longer operate. It will need to be immediately closed for use and the occupants of the site relocated off-site, or alternative facilities provided, so they can remain living on the site.
   b. An onsite system if uncovered, disturbed or damaged is not as simple remedying or fixing the problem such that construction can resume. An application for building consent will be required to install a new or alter any componentry of the wastewater system.

   As set out above, further investigative works has confirmed all but 2 sites where wastewater systems will either be impacted or not impacted by the Project. A revised Designation condition is proffered above to cover the process that will be undertaken by Waka Kotahi for the 7 impacted sites.

   For the 2 remaining sites (222A SH16 and 324 SH16), investigative works are currently being undertaken, the outcome of which will be shared with Council in June 2023. Therefore, no condition is required to cover any sites where the location and extent of existing wastewater systems is 'unknown'.

6. The applicant has proposed submitting to council a works completion report within 3 months of completion works on, or adjacent to any property, for those properties already identified as impacted or which are impacted during construction. I don't agree with the order of this condition. To avoid the risk of adverse effects, the new system would have to be designed, installed and operating before the site works commences on, or in proximity to, the affected property. Evidence of this should be provided before works commences.

A more detailed wastewater investigation report compiling the investigation findings will be shared with Council for information in June 2023. However Waka Kotahi provides the Concept Plans for the proposed remediation at the 7 properties impacted by the Project, for information in Attachment 4.

Steps 3 and 4 set out above will be undertaken to confirm the wastewater systems that require resource and building consents. The process set out will be followed to ensure that Waka Kotahi obtain these necessary consents on behalf of landowners (where they agree). The revised Designation condition proffered above will ensure this is done.

SUMMARY

In summary, Waka Kotahi has developed a process for investigating the potential impact of the Project on 57 wastewater systems along the extent of the alignment. This process has identified 7 wastewater systems that will be impacted by the Project, 48 wastewater systems that will not be affected by the Project and 2 wastewater systems where investigation is still pending. Steps 3 and 4 set out above will ensure a suitable solution will be designed and necessary consents obtained by Waka Kotahi to remediate the Project impacts which is formalised in the Designation condition proffered above.

We consider the above and attached information satisfies Council's concerns in respect to potential wastewater impacts in a sufficient manner to enable an assessment of effects to be undertaken for notification decision making.

We trust this satisfies all outstanding requests for information and processing of the NoR can resume.

Yours sincerely

Ashlie Carlyle

Senior Associate - Planning

on behalf of

Beca Limited

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Copy
Tessa Robins, Waka Kotahi
Andria D'Souza, Waka Kotahi
Rex Faithfull, Waka Kotahi

Attachment 1 – Crash Worksheet (Excel Spreadsheet)

Note: Worksheet originally referred to tables in EEM 2013. These references have been updated to EEM 2018 - EH

Worksheets A6: Crash cost savings

Crash by crash analysis - do minimum

Worksheet A6.2

	Project option	Section D			
	Movement category	All	Vehicle involvement	All	
1	Do minimum mean speed	80	Road category		80
	Posted speed limit	80	Traffic growth rate		2.00%

	Do minimum	Severity			Non-injury	
		Fatal	Serious	Minor		
3	Number of years of typical crash rate records	5				
4	Number of reported crashes over period	0	4	8	24	
5	Fatal/serious severity ratio (tables A6.2(a) to (c))	0	0.8	1	1	Table 6.2 (c) all movements
6	Number of reported crashes adjusted by severity **(4)** × **(5)**	0	3.2	8	24	
7	Crashes per year = **(6)**/**(3)**	0	0.64	1.6	4.8	
8	Adjustment factor for crash trend (table A6.1(a))	1.02				Beca used 1.21 (which is 7% growth rate)
9	Adjusted crashes per year = **(7)** x **(8)**	0	0.6528	1.632	4.896	
10	Under-reporting factors (tables A6.3(a) and (b))	1	1.9	4.5	18.5	
11	Total estimated crashes per year = **(9)** x **(10)**	0	1.240	7.34	91	

12	Crash cost, 100 km/h limit (tables A6.4(e) to (h))	$ 4,850,000	$ 525,000	$ 30,000	$ 3,200	all movements
13	Crash cost, 50 km/h limit (tables A6.4(a) to (d))	$ 4,600,000	$ 475,000	$ 28,000	$ 2,800	all movements
14	Mean speed adjustment = (**(1)** - 50)/50	0.6				
15	Cost per crash = **(13)** + **(14)** x [**(12)** – **(13)**]	$ 4,750,000	$ 505,000	28000	$ 3,040	
16	Crash cost per year = **(11)** x **(15)**	$ -	$ 626,362	205632	275351	
17	Total cost of crashes per year (sum of columns in row **(16)** fatal + serious + minor + non-injury) $	$ 1,107,345				

Worksheets A6: Crash cost savings

Crash by crash analysis - option

Worksheet A6.3

	Project option	Option 3		
	Movement category		Vehicle involvement	
2	Option mean speed	80	Road category	
	Posted speed limit	80		

	Option	Severity			Non-injury
		Fatal	Serious	Minor	
18	Percentage crash reduction	0.79	0.766	0.864	0.952
19	Percentage of crashes 'remaining' [100 – **(18)**]	21%	23%	14%	5%
20	Predicted crashes per year **(11)** x **(19)**	0	0.950	6.35	86.23
21	Crash cost, 100 km/h limit (tables A6.4(e) to (h))	$ 4,850,000	$ 525,000	$ 30,000	$ 3,200
22	Crash cost, 50 km/h limit (tables A6.4(a) to (d))	$ 4,600,000	$ 475,000	$ 28,000	$ 2,800
23	Mean speed adjustment = (**(2)** - 50)/50	0.6			
24	Cost per crash = **(22)** + **(23)** x [**(21)** – **(22)**]	$ 4,750,000	$ 505,000	$ 29,200	$ 3,040
25	Crash cost per year = **(20)** x **(24)**	$ -	$ 479,793	$ 185,280	$ 262,134
26	Total cost of crashes per year (sum of columns in row **(25)** fatal + serious + minor + non-injury) $	$			927,207

Beca used (11) x (18)

Note: Worksheet originally referred to tables in EEM 2013. These references have been updated to EEM 2018 - EH

Worksheets A6: Crash cost savings

Crash by crash analysis - do minimum **Worksheet A6.2**

	Project option	Section E			
	Movement category	All	Vehicle involvement	All	
1	Do minimum mean speed	100	Road category	100	
	Posted speed limit		Traffic growth rate	2.00%	

	Do minimum	**Severity**			**Non-injury**	
		Fatal	**Serious**	**Minor**		
3	Number of years of typical crash rate records	5				
4	Number of reported crashes over period	0	6	8	18	
5	Fatal/serious severity ratio (tables A6.2(a) to (c))	0	0.8	1	1	Table 6.2 (c) all movements
6	Number of reported crashes adjusted by severity **(4)** × **(5)**	0	4.8	8	18	
7	Crashes per year = **(6)**/**(3)**	0	0.96	1.6	3.6	
8	Adjustment factor for crash trend (table A6.1(a))	1.02				Beca used 1.21 (which is 7% growth rate)
9	Adjusted crashes per year = **(7)** x **(8)**	0	0.9792	1.632	3.672	
10	Under-reporting factors (tables A6.3(a) and (b))	1	1.9	4.5	18.5	
11	Total estimated crashes per year = **(9)** x **(10)**	0	1.860	7.34	68	

12	Crash cost, 100 km/h limit (tables A6.4(e) to (h))	$ 4,850,000	$ 525,000	$ 30,000	$ 3,200	all movements
13	Crash cost, 50 km/h limit (tables A6.4(a) to (d))	$ 4,600,000	$ 475,000	$ 28,000	$ 2,800	all movements
14	Mean speed adjustment = (**(1)** - 50)/50	1				
15	Cost per crash = **(13)** + **(14)** x [**(12)** – **(13)**]	$ 4,850,000	$ 525,000	28000	$ 3,200	
16	Crash cost per year = **(11)** x **(15)**	$ -	$ 976,752	205632	217382	
17	Total cost of crashes per year (sum of columns in row **(16)** fatal + serious + minor + non-injury) $	$			1,399,766	

Worksheets A6: Crash cost savings

Crash by crash analysis - option **Worksheet A6.3**

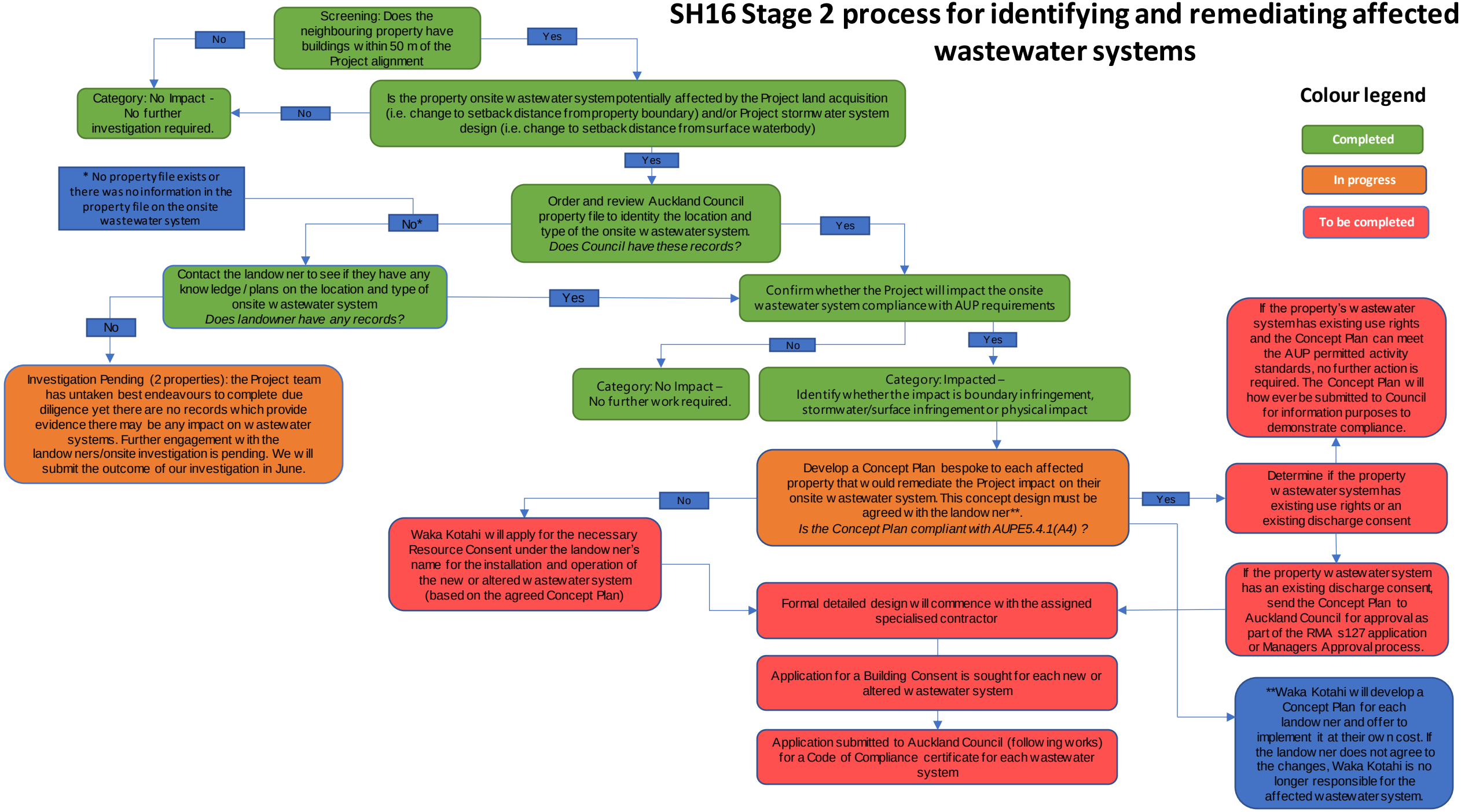
	Project option	Option 4		
	Movement category		Vehicle involvement	
2	Option mean speed	100	Road category	
	Posted speed limit			

	Option	Severity			Non-injury
		Fatal	Serious	Minor	
18	Percentage crash reduction	0.73	0.77	0.912	0.968
19	Percentage of crashes 'remaining' [100 – **(18)**]	27%	23%	9%	3%
20	Predicted crashes per year **(11)** x **(19)**	0	1.433	6.698	65.758
21	Crash cost, 100 km/h limit (tables A6.4(e) to (h))	$ 4,850,000	$ 525,000	$ 30,000	$ 3,200
22	Crash cost, 50 km/h limit (tables A6.4(a) to (d))	$ 4,600,000	$ 475,000	$ 28,000	$ 2,800
23	Mean speed adjustment = (**(2)** - 50)/50	1			
24	Cost per crash = **(22)** + **(23)** x [**(21)** – **(22)**]	$ 4,850,000	$ 525,000	$ 30,000	$ 3,200
25	Crash cost per year = **(20)** x **(24)**	$ -	$ 752,099	$ 200,932	$ 210,426
26	Total cost of crashes per year (sum of columns in row **(25)** fatal + serious + minor + non-injury) $	$			1,163,457

Beca used (11) x (18)

Attachment 2 – SH16 Stage 2 Process for Identifying and Remediating Affected Wastewater Systems

SH16 Stage 2 process for identifying and remediating affected wastewater systems



Attachment 3 – SH16 Stage 2 Impact on Wastewater Systems - Summary

By: Nicholas Berry **Date:** 17 May 2023

Subject: SH16 Stage 2 Impact on Wastewater Systems - Summary **Our Ref:** 3235084

Property (address)	**Existing system type**	**RMA status:** - **Existing Use Rights** - **DIS consent**	**Project impact:** - **no impact** - **direct impact vs infringement of TP58/other PA standards** - **no records**	**Solution for remediation**	**Landowner engagement feedback (Y/N)**	**Concept Plan developed (Y/N)**	**Consenting Requirements**	**Waka Kotahi action**
171 SH16	Septic tank + trench	Existing use rights	Affects compliance with TP58 – separation from surface water	Upgrade treatment, new drip irrigation system	Y	Y	Permitted Activity	Share Concept Plan with Council for their records. Apply for Building Consent in name of landowner.

Property (address)	Existing system type	RMA status: - Existing Use Rights - DIS consent	Project impact: - no impact - direct impact vs infringement of TP58/other PA standards - no records	Solution for remediation	Landowner engagement feedback (Y/N)	Concept Plan developed (Y/N)	Consenting Requirements	Waka Kotahi action
173 SH16	Septic tank + trench	Existing use rights	No impact					
175 SH16	Secondary treatment + drip irrigation	Resource Consent, expired Dec 2022	No impact Existing catchpit excludes use of reserve area – Project may improve this					
177 SH16	Septic tank	Existing use rights	No impact					
179 SH16	Septic tank	Existing use rights	No impact					
181 SH16	Septic tank	Existing use rights	No impact					

Property (address)	Existing system type	RMA status: - Existing Use Rights - DIS consent	Project impact: - no impact - direct impact vs infringement of TP58/other PA standards - no records	Solution for remediation	Landowner engagement feedback (Y/N)	Concept Plan developed (Y/N)	Consenting Requirements	Waka Kotahi action
183 SH16	Septic tank	Existing use rights	No impact					
212 SH16	Septic tank	Existing use rights	No impact					
218-220 SH16	Multiple septic tanks, secondary treatment, drip irrigation	No record of consent but system serves 1x dwelling + commercial building – may exceed $2m^3/d$	Potential impact on compliance with TP58 for minor dwelling at front of property.	TBC	Y	Y		Further landowner engagement. Share Concept Plan with Council.
185 SH16 / 2 Kennedys Road	Septic tank	Existing use rights	No impact					

Property (address)	Existing system type	RMA status: - Existing Use Rights - DIS consent	Project impact: - no impact - direct impact vs infringement of TP58/other PA standards - no records	Solution for remediation	Landowner engagement feedback (Y/N)	Concept Plan developed (Y/N)	Consenting Requirements	Waka Kotahi action
222A SH16		No property file exists.						Property is owned by Waka Kotahi and it is vested as road
191 SH16	Septic tank	Existing use rights	No impact					
238 SH16	Advanced primary + drip line irrigation	Existing use rights	Affects compliance with TP58 – separation from surface water	Relocate/extend drip irrigation area	Y	Y	Application for resource consent as would not meet the AUP Permitted Activity standards because it is	Apply for Resource Consent / Building Consent in name of landowner.

Property (address)	Existing system type	RMA status: - Existing Use Rights - DIS consent	Project impact: - no impact - direct impact vs infringement of TP58/other PA standards - no records	Solution for remediation	Landowner engagement feedback (Y/N)	Concept Plan developed (Y/N)	Consenting Requirements	Waka Kotahi action
							only primary treatment	
239 SH16	Secondary treatment + drip irrigation	Existing use rights	No impact					
256 SH16	Septic tank	Existing use rights	No impact					
264 SH16 Minor Dwelling	Septic tank + trench	Existing use rights	Direct impact on dispersal trench	Upgrade treatment, new drip irrigation system	Y	Y	Permitted Activity	Share Concept Plan with Council for their records. Apply for Building Consent in

Property (address)	Existing system type	RMA status: - Existing Use Rights - DIS consent	Project impact: - no impact - direct impact vs infringement of TP58/other PA standards - no records	Solution for remediation	Landowner engagement feedback (Y/N)	Concept Plan developed (Y/N)	Consenting Requirements	Waka Kotahi action
								name of landowner.
264 SH16 Major Dwelling	Septic tank + trench	Existing use rights	No impact					
291 SH16	Septic tank	Existing use rights	No impact					
299 SH16	Septic tank + trenches	Existing use rights	No impact					
300 SH16	Septic tank	Existing use rights	No impact					
312 SH16	No dwelling or wastewater		No impact					

Property (address)	Existing system type	RMA status: - Existing Use Rights - DIS consent	Project impact: - no impact - direct impact vs infringement of TP58/other PA standards - no records	Solution for remediation	Landowner engagement feedback (Y/N)	Concept Plan developed (Y/N)	Consenting Requirements	Waka Kotahi action
315 SH16	Septic tank + trenches	Existing use rights	No impact					
324 SH16	None identified							
1397 Coatesville-Riverhead Highway	Septic tank + trenches	Existing use rights	No impact					
1404 Coatesville-Riverhead Highway	Secondary treatment + drip irrigation	Consented	Direct impact on 1x treatment system and drip irrigation system	Relocate 1 treatment plant Extend irrigation	Y	Y	Application for RMA s127 change of consent	
1411 Coatesville-	Septic tank + trench(es)	Existing use rights	No impact					

Property (address)	Existing system type	RMA status: - Existing Use Rights - DIS consent	Project impact: - no impact - direct impact vs infringement of TP58/other PA standards - no records	Solution for remediation	Landowner engagement feedback (Y/N)	Concept Plan developed (Y/N)	Consenting Requirements	Waka Kotahi action
Riverhead Highway								
340 SH16	Septic tank + trenches	Existing use rights	Affects compliance with TP58 – separation from surface water	Upgrade treatment, new drip irrigation system	Early engagement	Y	Permitted Activity	Share Concept Plan with Council for their records. Apply for Building Consent in name of landowner.
350 SH16	Septic tank	Existing use	No impact					
366 SH16	TBC	Unsure – likely consented	No impact					

Property (address)	Existing system type	RMA status: - Existing Use Rights - DIS consent	Project impact: - no impact - direct impact vs infringement of TP58/other PA standards - no records	Solution for remediation	Landowner engagement feedback (Y/N)	Concept Plan developed (Y/N)	Consenting Requirements	Waka Kotahi action
393 SH16			No impact					
466 Taupaki Road	Septic tank	Existing use rights	No impact					
407 SH16	Septic tank	Existing use rights	No impact					
418 SH16	Septic tank + trench	Existing use rights	No impact					
429 SH16	Septic tank + trench	Existing use rights	Affects compliance with TP58 – separation from surface water	Upgrade treatment, new drip irrigation system	Y	Y (to be revised)		Further landowner engagement. Finalise Concept Plan.

Property (address)	Existing system type	RMA status: - Existing Use Rights - DIS consent	Project impact: - no impact - direct impact vs infringement of TP58/other PA standards - no records	Solution for remediation	Landowner engagement feedback (Y/N)	Concept Plan developed (Y/N)	Consenting Requirements	Waka Kotahi action
								Determine consenting requirements.
436 SH16	Septic tank	Existing use rights	No impact					
451 SH16	Septic tank	Existing use rights	No impact Owner upgrading system – will need to comply with separation requirements based on new alignment of SH16					
464 SH16	Septic tank	Existing use rights	No impact					

Property (address)	Existing system type	RMA status: - Existing Use Rights - DIS consent	Project impact: - no impact - direct impact vs infringement of TP58/other PA standards - no records	Solution for remediation	Landowner engagement feedback (Y/N)	Concept Plan developed (Y/N)	Consenting Requirements	Waka Kotahi action
465 SH16	Septic tank	Existing use rights	No impact					
472 SH16	Septic tank	Existing use rights	No impact					
475 SH16			No impact					
482 SH16			No impact					
489 SH16	Sand filter	Existing use rights	No impact					
491 SH16			No impact					
493 SH16	Septic tank	Existing use rights	No impact					

Property (address)	Existing system type	RMA status: - Existing Use Rights - DIS consent	Project impact: - no impact - direct impact vs infringement of TP58/other PA standards - no records	Solution for remediation	Landowner engagement feedback (Y/N)	Concept Plan developed (Y/N)	Consenting Requirements	Waka Kotahi action
26 Old Railway Road	No dwelling or wastewater		No impact					
505 SH16			No impact					
506 SH16	Septic tank	Existing use rights	No impact					
507 SH16			No impact					
522 SH16	Unconfirmed	Existing use rights	No impact					
538 SH16	Reticulated		No impact					
550 SH16	Septic tank	Existing use rights	No impact					

Property (address)	Existing system type	RMA status: - Existing Use Rights - DIS consent	Project impact: - no impact - direct impact vs infringement of TP58/other PA standards - no records	Solution for remediation	Landowner engagement feedback (Y/N)	Concept Plan developed (Y/N)	Consenting Requirements	Waka Kotahi action
7 Main Road	Septic tank	Existing use rights	No impact					
16 Main Road			No impact					
37 Main Road	Septic tank	Existing use rights	No impact					
40 Main Road	Appears to be reticulated		No impact					
43 Main Road	Appears to be reticulated		No impact					
45 Main Road	Appears to be reticulated		No impact					

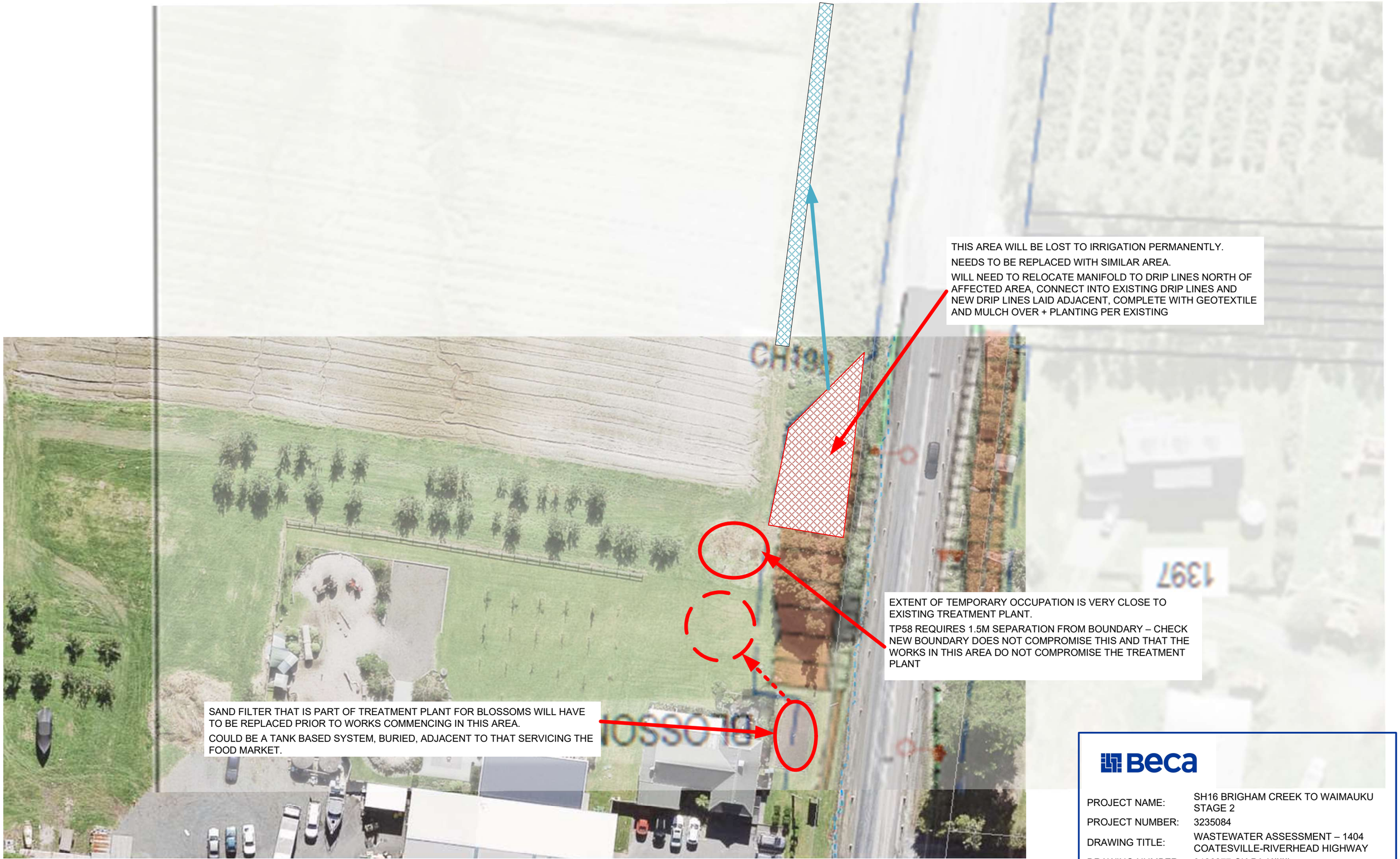
Property count by Category:

No Impact	48
Impacted	7
No Information	2
Total properties investigated	57

A Concept Plan has been developed for 6 of the 7 impacted properties (yet 1 of these needs to be revised following landowner engagement).

Nicholas Berry

Attachment 4 – SH16 Stage 2 – Wastewater Systems Remediation - Concept Plans



THIS AREA WILL BE LOST TO IRRIGATION PERMANENTLY.

NEEDS TO BE REPLACED WITH SIMILAR AREA.

WILL NEED TO RELOCATE MANIFOLD TO DRIP LINES NORTH OF AFFECTED AREA, CONNECT INTO EXISTING DRIP LINES AND NEW DRIP LINES LAID ADJACENT, COMPLETE WITH GEOTEXTILE AND MULCH OVER + PLANTING PER EXISTING

EXTENT OF TEMPORARY OCCUPATION IS VERY CLOSE TO EXISTING TREATMENT PLANT.

TP58 REQUIRES 1.5M SEPARATION FROM BOUNDARY – CHECK NEW BOUNDARY DOES NOT COMPROMISE THIS AND THAT THE WORKS IN THIS AREA DO NOT COMPROMISE THE TREATMENT PLANT

SAND FILTER THAT IS PART OF TREATMENT PLANT FOR BLOSSOMS WILL HAVE TO BE REPLACED PRIOR TO WORKS COMMENCING IN THIS AREA.

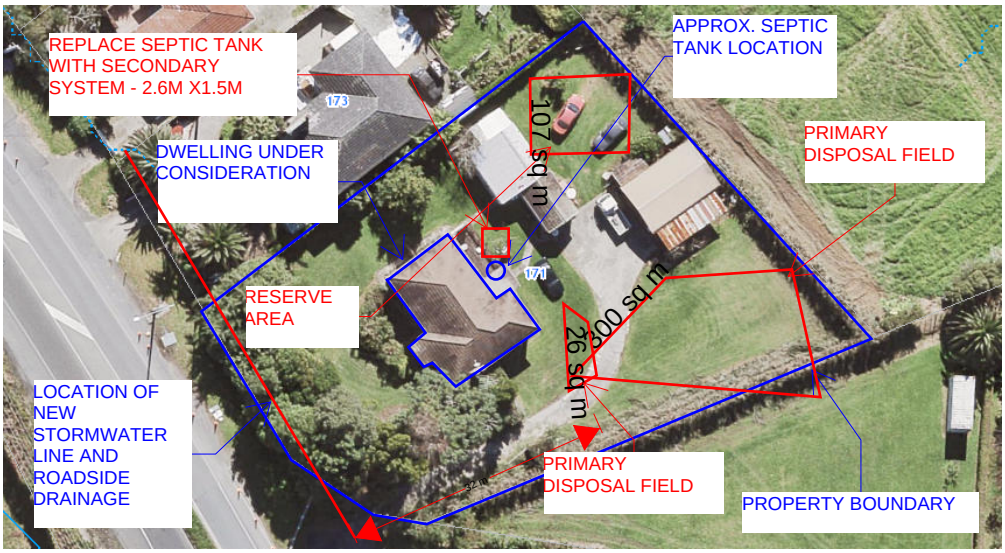
COULD BE A TANK BASED SYSTEM, BURIED, ADJACENT TO THAT SERVICING THE FOOD MARKET.

NOTES:

- THE EXISTNG SYSTEM IS CONSENTED.
- ALL CHANGES WILL HAVE TO BE APPROVED BY COUNCIL PRIOR TO IMPLEMENTATION AND AFTER IMPLEMENTATION.
- PLANNING TO CONFIRM IF CHANGES SUFFICIENT TO MERIT A S27 APPLICATION TO VARY THE EXISTNG CONSENT

Beca

PROJECT NAME:	SH16 BRIGHAM CREEK TO WAIMAUKU STAGE 2
PROJECT NUMBER:	3235084
DRAWING TITLE:	WASTEWATER ASSESSMENT – 1404 COATESVILLE-RIVERHEAD HIGHWAY
DRAWING NUMBER:	3126277-SK-PA-K###
REVISION:	A
DATE:	19-05-2023
DRAWING BY:	NDB
CHECKED BY:	
SCALE:	NTS

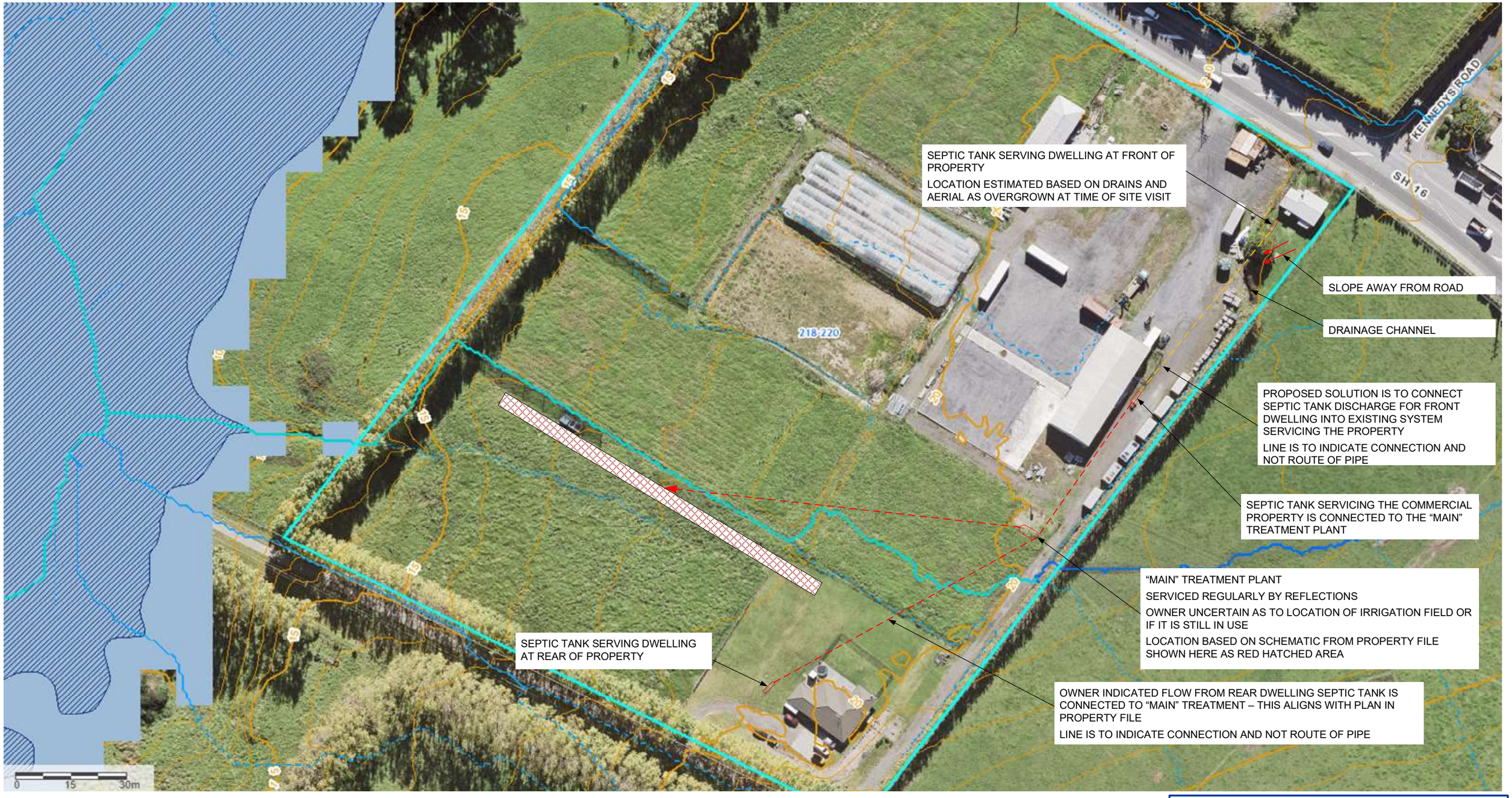


DESIGN ASSUMPTIONS

1. NUMBER OF BEDROOMS: 4 (FROM COUNCIL RECORDS)
2. OCCUPANCY: 6
3. PER CAPITA FLOW IS ASSUMED TO BE 190 l/PERSON/DAY.
4. SOIL TYPE IS ASSUMED AS TYPE 4 SOIL WITH AN AREAL LOADING RATE OF 3.5MM/DAY.
5. PRIMARY IRRIGATION AREA IS SIZED TO ACHIEVE THE LOADING RATE.
6. RESERVE IRRIGATION AREA IS 33% OF PRIMARY IRRIGATION AREA.

NOTES

2. REPLACE SEPTIC TANK WITH SECONDARY TREATMENT WITH PUMPED DISCHARGE.
3. ALL DIMENSIONS ARE APPROXIMATE ONLY, NO SURVEY COMPLETED
4. FINAL DESIGN TO BE PREPARED BY DRAINAGE SUBCONTRACTOR INSTALLING THE WORKS FINAL DESIGN.
5. FINAL DESIGN TO BE APPROVED BY AUCKLAND COUNCIL PRIOR TO CONSTRUCTION.
6. AS BUILT DRAWINGS TO BE PROVIDED BY DRAINAGE SUBCONTRACTORS AFTER INSTALLATION.



SEPTIC TANK SERVING DWELLING AT FRONT OF PROPERTY

LOCATION ESTIMATED BASED ON DRAINS AND AERIAL AS OVERGROWN AT TIME OF SITE VISIT

SLOPE AWAY FROM ROAD

DRAINAGE CHANNEL

PROPOSED SOLUTION IS TO CONNECT SEPTIC TANK DISCHARGE FOR FRONT DWELLING INTO EXISTING SYSTEM SERVICING THE PROPERTY

LINE IS TO INDICATE CONNECTION AND NOT ROUTE OF PIPE

SEPTIC TANK SERVICING THE COMMERCIAL PROPERTY IS CONNECTED TO THE “MAIN” TREATMENT PLANT

“MAIN” TREATMENT PLANT

SERVICED REGULARLY BY REFLECTIONS

OWNER UNCERTAIN AS TO LOCATION OF IRRIGATION FIELD OR IF IT IS STILL IN USE

LOCATION BASED ON SCHEMATIC FROM PROPERTY FILE SHOWN HERE AS RED HATCHED AREA

SEPTIC TANK SERVING DWELLING AT REAR OF PROPERTY

OWNER INDICATED FLOW FROM REAR DWELLING SEPTIC TANK IS CONNECTED TO “MAIN” TREATMENT – THIS ALIGNS WITH PLAN IN PROPERTY FILE

LINE IS TO INDICATE CONNECTION AND NOT ROUTE OF PIPE

NOTES:

- THREE SEPTIC TANKS SERVING DWELLINGS AT FRONT AND REAR OF PROPERTY AND THE COMMERCIAL BUILDING.
- OWNER INDICATED THAT DISCHARGE FROM ALL THREE SEPTIC TANKS FLOWS INTO THE “MAIN” TREATMENT PROCESS WHICH PROVIDES SECONDARY TREATMENT, PREVIOUS CONSULTATION NOTES INDICATE FRONT DWELLING HAS A SEPARATE WASTEWATER SYSTEM, CONSISTENT WITH A DRAWING SHOWING THE WASTEWATER SYSTEM FOUND IN THE PROPERTY FILE.
- OWNER INDICATED THAT THERE USED TO BE AN IRRIGATION SYSTEM BUT NOT STILL USED, HOWEVER, THE MAIN TREATMENT PROCESS IS SERVICED REGULARLY BY REFLECTIONS WHICH INDICATES THE PLANT AND DISCHARGE ARE OPERATIONAL.
- THE LOCATION OF IRRIGATION WAS UNCLEAR, PLAN IN PROPERTY FILE SHOWS A DRIPLINE SYSTEM IN APPROXIMATE AREA SHOWN BY RED HATCHING.
- FRONT DWELLING IS LIKELY SERVED BY A SOAKAGE TRENCH IN THE GARDEN. THIS IS LIKELY NON COMPLIANT WITH THE REQUIRED SEPARATION DISTANCE, ALTHOUGH ANY “EVENT” UNLIKELY TO RESULT IN RUNOFF TO ROADSIDE DRAIN DUE TO SLOPE.
- ASSUMING THE FRONT DWELLING REMAINS WHERE IT IS, A SOLUTION TO MEET THE REQUIRED SEPARATION DISTANCE WOULD BE TO PUMP THE SEPTIC TANK DISCHARGE INTO THE “MAIN” TREATMENT SYSTEM.
- BEFORE THE CONCEPT IS FINALISED, NEED TO CONFIRM THE “MAIN” TREATMENT PROCESS HAS CAPACITY AND WHETHER ADDITION OF THE DWELLING RESULTS IN A VOLUME EXCEEDING 2000 L/DAY WHICH WOULD TRIGGER THE NEED FOR A CONSENT

Beca

PROJECT NAME:	SH16 BRIGHAM CREEK TO WAIMAUKU STAGE 2
PROJECT NUMBER:	3235084
DRAWING TITLE:	WASTEWATER ASSESSMENT – 218-220 SH16
DRAWING NUMBER:	3126277-SK-PA-K###
REVISION:	A
DATE:	19-05-2023
DRAWING BY:	NDB
CHECKED BY:	
SCALE:	NTS

NOTES:

- EXISTING DRIP IRRIGATION AREA (AS SIGHTED DURING LANDOWNER MEETING) IS SHOWN IN RED HATCHING ABOVE.
- IRRIGATION WAS INSTALLED WHEN HOUSE EXTENDED, SUBJECT OF BUILDING CONSENT APPLICATION SO SHOULD HAVE CODE OF COMPLIANCE CERTIFICATE
- TREATMENT IS A NATURAL FLOW WORMERATOR SYSTEM – PRIMARY TREATMENT
- CONSENT APPLICATION INDICATES SEPARATION FROM SURFACE WATER MEETS 20M REQUIREMENT, HOWEVER, IT IS WITHIN 20M OF THE EXISTING OVERLAND FLOW PATH
- RISK IS PROBABLY LOW DUE TO SLOPE OF LAND BEING TOWARDS NE SO FLOW PATH TO SURFACE WATER DRAINAGE COULD WELL BE >20M
- ROADSIDE DRAINAGE FOR NEW ROAD FOLLOWS THE EXISTING ALIGNMENT TO EAST OF THE DRIVEWAY SO THE SEPARATION DISTANCE IS NOT CHANGED BY THE PROJECT
- MY INITIAL ASSESSMENT IS THAT NO CHANGES ARE REQUIRED DUE TO THE PROJECT.
- HOWEVER, IF COUNCIL IS NOT OF SAME OPINION, EXISTING SYSTEM COULD BE SHORTENED AND WIDENED AS SHOWN IN BLUE HATCHED AREA.

Beca

PROJECT NAME:	SH16 BRIGHAM CREEK TO WAIMAUKU STAGE 2
PROJECT NUMBER:	3235084
DRAWING TITLE:	WASTEWATER ASSESSMENT - 238 SH16
DRAWING NUMBER:	3126277-SK-PA-K###
REVISION:	A
DATE:	19-05-2023
DRAWING BY:	NDB
CHECKED BY:	
SCALE:	NTS

NOTES:

- BASED ON DRAWINGS ON PROPERTY FILE, THE MAIN DWELLING WASTEWATER SYSTEM IS >20m FROM THE NEW DRAINAGE ALIGNMENT AND IS THEREFORE NOT AFFECTED BY THE PROJECT.
- THE DISCHARGE TRENCH FOR THE SEPTIC TANK SERVING THE MINOR DWELLING AT THE FRONT OF THE PROPERTY IS DIRECTLY AFFECTED BY THE PROJECT – THE LAND TAKE RUNS THROUGH THE TRENCH ALIGNMENT AND A NEW NOISE WALL IS TO BE CONSTRUCTED DIRECTLY ON TOP OF THE EXISTING TRENCH LOCATION.
- THE WATER TANK IS ALSO LIKELY TO BE AFFECTED BY THE PROJECT AND WILL HAVE TO BE RELOCATED.
- TO COMPLY WITH PERMITTED ACTIVITY RULES, THE WASTEWATER SYSTEM SHOULD BE UPGRADED TO SECONDARY TREATMENT WITH DRIPLINE IRRIGATION. A POSSIBLE SOLUTION IS OUTLINED ABOVE.
- THE LOCATION IDENTIFIED BY THE OWNER IS CURRENTLY A GRAZED PADDOCK, THERE MAY BE A REQUIREMENT TO IMPROVE THE SOIL PRIOR TO INSTALLATION OF THE NEW SYSTEM.
- THE DRIPLINE IRRIGATION AREA WILL HAVE TO BE FENCED IF THE REST OF THE PADDOCK IS TO BE GRAZED.

Beca

PROJECT NAME:	SH16 BRIGHAM CREEK TO WAIMAUKU STAGE 2
PROJECT NUMBER:	3235084
DRAWING TITLE:	WASTEWATER ASSESSMENT – 264 SH16
DRAWING NUMBER:	3126277-SK-PA-K###
REVISION:	A
DATE:	19-05-2023
DRAWING BY:	NDB
CHECKED BY:	
SCALE:	NTS

Drawing Plotted: 28 Mar 2022 3:57 PM

RECONSTRUCT EXISTING PROPERTY ACCESS

312

BACK BERM WIDENED FOR VECTOR TRANSFORMER. FOR DETAIL REFER TO DRAWING 3235084-CA-1248

SHARED PATH OFF ROAD RAMP. FOR DETAILS REFER TO DRAWING 3235084-CA-1248

NEW 3:1 EARTHWORKS

NEW INDENTED BUS BAY 63m LENGTH AS PER AUCKLAND TRANSPORT TDM

NEW CONVEYANCE AND DIVERSION CHANNEL. FOR DETAILS REFER TO STORMWATER DRAWINGS

NEW SHARED PATH ON ROAD RAMP. FOR DETAIL REFER TO DRAWING 3235084-CA-1248

TO BRIGHAM CREEK

MATCHLINE-REFER TO SHEET 4

NEW BUS SHELTER

RELOCATED INDENTED BUS BAY 63m LENGTH AS PER AUCKLAND TRANSPORT TDM

NEW RAISED MEDIAN ISLAND. FOR DETAILS REFER TO CIVIL WORKS DRAWINGS

315

RECONSTRUCT EXISTING PROPERTY ACCESS

NEW SIGNALISED RAISED TABLE CROSSING WITH CYCLE WAY HANDRAILS AS PER AUCKLAND TRANSPORT TDM DETAIL CY0001A FOR DETAILS REFER TO TRANSPORTATION DRAWINGS. MEDIAN WIDENED TO 2.5m AT CROSSING

1411

NEW RAISED MEDIAN ISLAND. FOR DETAILS REFER TO CIVIL WORKS DRAWINGS

RECONSTRUCT EXISTING PROPERTY ACCESS

NEW RAISED TABLE

NEW DRIVEWAY ACCESS FOR PROPERTY 1411

EXISTING CELL TOWER TO REMAIN

RECONSTRUCT EXISTING PROPERTY ACCESS

1409

NEW SHARED PATH ON ROAD RAMP. FOR DETAIL REFER TO DRAWING 3235084-CA-1248

NEW LEFT OUT ONLY FROM NURSERY

REFER INSET A

RECONSTRUCT EXISTING PROPERTY ACCESS

NEW ROUNDABOUT CENTRAL ISLAND. FOR DETAILS REFER TO LANDSCAPE DRAWINGS

NEW 3m SHARED PATH WITH 1m BERM EITHER SIDE

NEW RAISED MEDIAN ISLAND. FOR DETAILS REFER TO CIVIL WORKS DRAWINGS

324

EXISTING INFORMAL PARK AND RIDE TO BE REMOVED

NEW RETAINING WALL GRW3. FOR DETAILS REFER TO GEOTECHNICAL DRAWINGS

REPLACE SEPTIC TANK WITH SECONDARY SYSTEM - 2.6M X1.5M

APPROX. LOCATION OF SOAKAGE FIELD

LOCATION OF STORMWATER PIPELINE

SHARED PATH OFF ROAD RAMP. FOR DETAILS REFER TO DRAWING 3235084-CA-1248

NEW RAISED MEDIAN ISLAND. FOR DETAILS REFER TO CIVIL WORKS DRAWINGS

NEW LEFT IN/LEFT OUT TO BORIC SUPERMARKET WITH RECONFIGURED CAR PARK

1368

BORIC SUPERMARKET

EXISTING BORIC SUPERMARKET ENTRANCE/EXIT TO BE RECONSTRUCTED

BLOSSOMS CAFE

NEW BIO-RETENTION SWALE. FOR DETAILS REFER TO STORMWATER DRAWINGS

EXTENSION OF PROPERTY BOUNDARY BEYOND DRAWING

PROPOSED LOCATION OF NEW DISPOSAL FIELD AFTER UPGRADES

PROPOSED RESERVE AREA

1365sq m

271 sq m

NEW SHARED PATH ON ROAD RAMP. FOR DETAIL REFER TO DRAWING 3235084-CA-1248

NEW 5m WIDE COMBINED DRIVEWAY ACCESS FOR PROPERTIES 324 AND 340

SEPTIC TANK LOCATION. NOTE 2

340

NEW 2.0m HIGH NOISE WALL

17 m

22 m

SH16

LOCATION OF STORMWATER SUPERPIT

NEW TL-3 WIRE ROPE BARRIER SYSTEM

EXISTING LIGHTING COLUMN

TO KUMEU

MATCHLINE-REFER TO SHEET 6

NOTES
2. REPLACE SEPTIC TANK WITH SECONDARY TREATMENT WITH PUMPED IRRAGATION.
3. ALL DIMENSIONS ARE APPROXIMATE ONLY, NO SURVEY COMPLETED
4. FINAL DESIGN TO BE PREPARED BY DRAINAGE SUBCONTRACTOR INSTALLING THE WORKS FINAL DESIGN.
5. FINAL DESIGN TO BE APPROVED BY AUCKLAND COUNCIL PRIOR TO CONSTRUCTION.
6. AS BUILT DRAWINGS TO BE PROVIDED BY DRAINAGE SUBCONTRACTORS AFTER INSTALLATION.

DESIGN ASSUMPTIONS
1. NUMBER OF BEDROOMS: 3 (FROM COUNCIL RECORDS)
2. OCCUPANCY: 5
3. PER CAPITA FLOW IS ASSUMED TO BE 200 l/PERSON/DAY.
4. SOIL TYPE IS ASSUMED AS TYPE 4 SOIL WITH AN AREAL LOADING RATE OF 3.5MM/DAY.
5. PRIMARY IRRIGATION AREA IS SIZED TO ACHIEVE THE LOADING RATE.
6. RESERVE IRRIGATION AREA IS 50% OF PRIMARY IRRIGATION AREA.

KEY PLAN

1 2 3 4 5 6 7 8 9 10 11 12 13

INSET A

COATESVILLE-RIVERHEAD HWY

BORIC S

BLOSSOMS CAFE

1397

NEW BIO-RETENTION SWALE. FOR DETAILS REFER TO STORMWATER DRAWINGS

ORIGINAL DRAWING IN COLOUR

DRAFT DETAILED DESIGN
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
C	DRAFT DETAILED DESIGN	AH	AH	GC	18.03.22
B	DRAFT DETAILED DESIGN	AH	AH	GC	19.01.22
A	PRELIMINARY DESIGN	AH	AH	NL	26.03.21

Drawing Originator: Beca

Original Scale (A1) 1:500
Reduced Scale (A3) 1:1000

Design	A. HOLT	26.03.21	Approved For Construction*
Drawn	A. HOLT	26.03.21	
Dsg Verifier			
Dwg Check			Date

* Refer to Revision 1 for Original Signature

Client: WAKA KOTAHI NZ TRANSPORT AGENCY

Project: SH16 - SAFETY IMPROVEMENTS STAGE 2 BRIGHAM CREEK TO KUMEU

Title: GENERAL ARRANGEMENT PLAN SHEET 5

Discipline: CIVIL ENGINEERING

Drawing No. 3235084-CA-1205 Rev. C

Document No. 3235084-CA-1201 TO 1213.DWG

DO NOT SCALE

IF IN DOUBT ASK.

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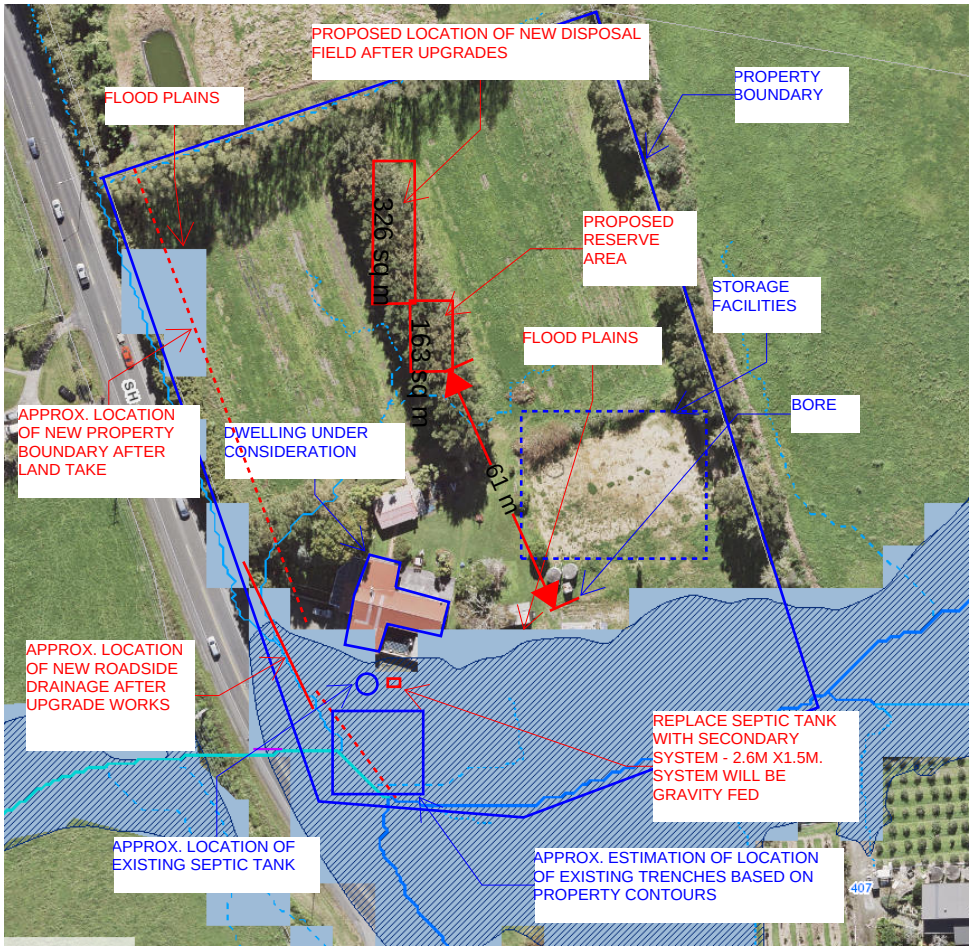
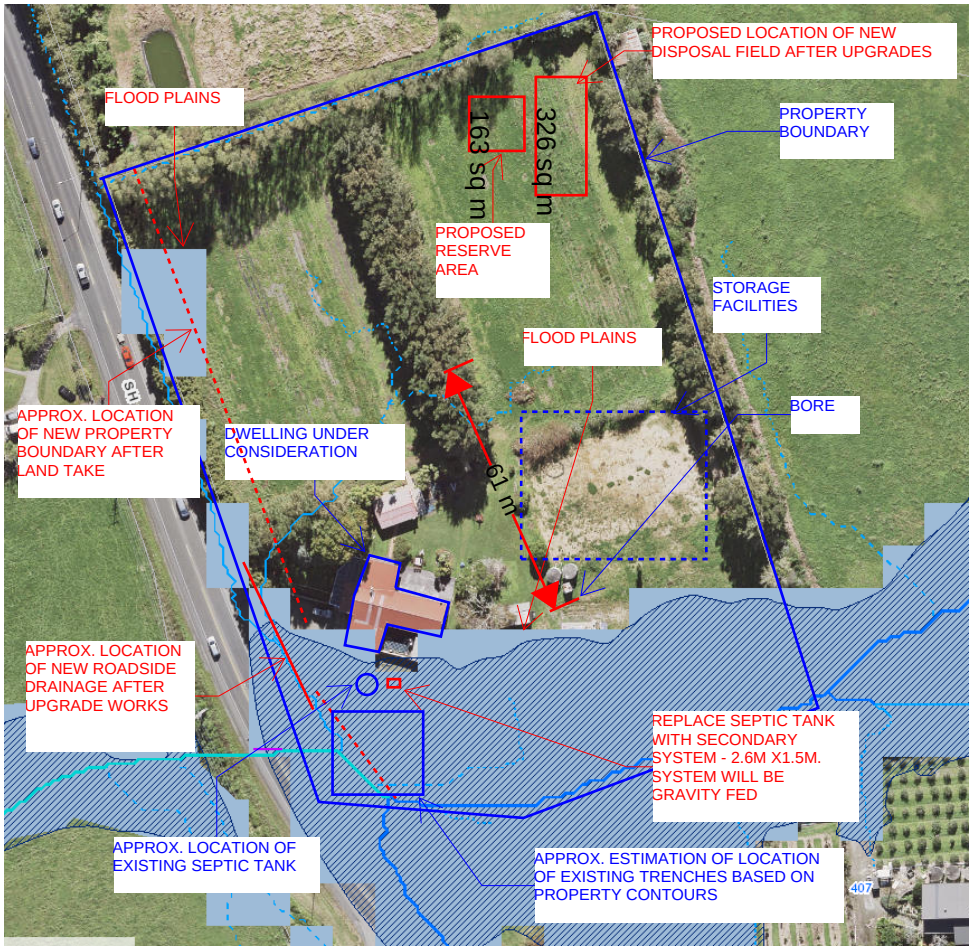


NOTES

2. REPLACE SEPTIC TANK WITH SECONDARY TREATMENT WITH PUMPED DISCHARGE.
3. ALL DIMENSIONS ARE APPROXIMATE ONLY, NO SURVEY COMPLETED
4. FINAL DESIGN TO BE PREPARED BY DRAINAGE SUBCONTRACTOR INSTALLING THE WORKS FINAL DESIGN.
5. FINAL DESIGN TO BE APPROVED BY AUCKLAND COUNCIL PRIOR TO CONSTRUCTION.
6. AS BUILT DRAWINGS TO BE PROVIDED BY DRAINAGE SUBCONTRACTORS AFTER INSTALLATION.
7. 20M SEPARATION DISTANCE BETWEEN EXISTING BORE AND PROPOSED SOAKAGE FIELD ACCOUNTED FOR.

DESIGN ASSUMPTIONS

1. NUMBER OF BEDROOMS: 8 (FROM COUNCIL RECORDS)
2. OCCUPANCY: 12
3. PER CAPITA FLOW IS ASSUMED TO BE 190 l/PERSON/DAY.
4. SOIL TYPE IS ASSUMED AS TYPE 4 SOIL WITH AN AREAL LOADING RATE OF 3.5MM/DAY.
5. PRIMARY IRRIGATION AREA IS SIZED TO ACHIEVE THE LOADING RATE.
6. RESERVE IRRIGATION AREA IS 50% OF PRIMARY IRRIGATION AREA.



NOTES

2. REPLACE SEPTIC TANK WITH SECONDARY TREATMENT WITH PUMPED DISCHARGE.
3. ALL DIMENSIONS ARE APPROXIMATE ONLY, NO SURVEY COMPLETED
4. FINAL DESIGN TO BE PREPARED BY DRAINAGE SUBCONTRACTOR INSTALLING THE WORKS FINAL DESIGN.
5. FINAL DESIGN TO BE APPROVED BY AUCKLAND COUNCIL PRIOR TO CONSTRUCTION.
6. AS BUILT DRAWINGS TO BE PROVIDED BY DRAINAGE SUBCONTRACTORS AFTER INSTALLATION.
7. 20M SEPARATION DISTANCE BETWEEN EXISTING BORE AND PROPOSED SOAKAGE FIELD ACCOUNTED FOR.

DESIGN ASSUMPTIONS

1. NUMBER OF BEDROOMS: 8 (FROM COUNCIL RECORDS)
2. OCCUPANCY: 12
3. PER CAPITA FLOW IS ASSUMED TO BE 190 l/PERSON/DAY.
4. SOIL TYPE IS ASSUMED AS TYPE 4 SOIL WITH AN AREAL LOADING RATE OF 3.5MM/DAY.
5. PRIMARY IRRIGATION AREA IS SIZED TO ACHIEVE THE LOADING RATE.
6. RESERVE IRRIGATION AREA IS 50% OF PRIMARY IRRIGATION AREA.