WAIKATO DISTRICT COUNCIL

NGAARUAWAAHIA STRUCTURE PLAN LEVEL 1 STORMWATER DEVICE ASSESSMENT

STORMWATER MASTERPLAN

MORPHUM environmental

TE MIRO. WATER

Document Version

Version	Date	Author	Reviewer	Change Description
1	02/04/24	Britta Jensen	Stu Joyce	Final

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1. INTRODUCTION AND PURPOSE OF ASSESSMENT

It is well documented that changes from rural to urban catchments as well as infill development in existing urban spaces produces contaminants, increased runoff volume and larger peak flows that can negatively impact the built environment, waterways and wetlands. The Ngaaruawaahia Structure Plan presents an opportunity to determine the best practice catchment management solutions, mitigating flood hazard, increased peak flows, volume changes and contaminant loads (including hydrocarbons and heavy metals (zinc/copper)) from existing farm practices, existing unmitigated urban areas and new intensive development. Undertaking assessment now, enables Council to provide space and funding to achieve positive environmental outcomes for the future.

This report summarises a high-level assessment of the Ngaaruawaahia future urban zoned area (existing urban areas and future growth areas) as presented in Figure 1, determining the likely stormwater management infrastructure required to ensure stormwater related effects associated with medium density urban development are managed.

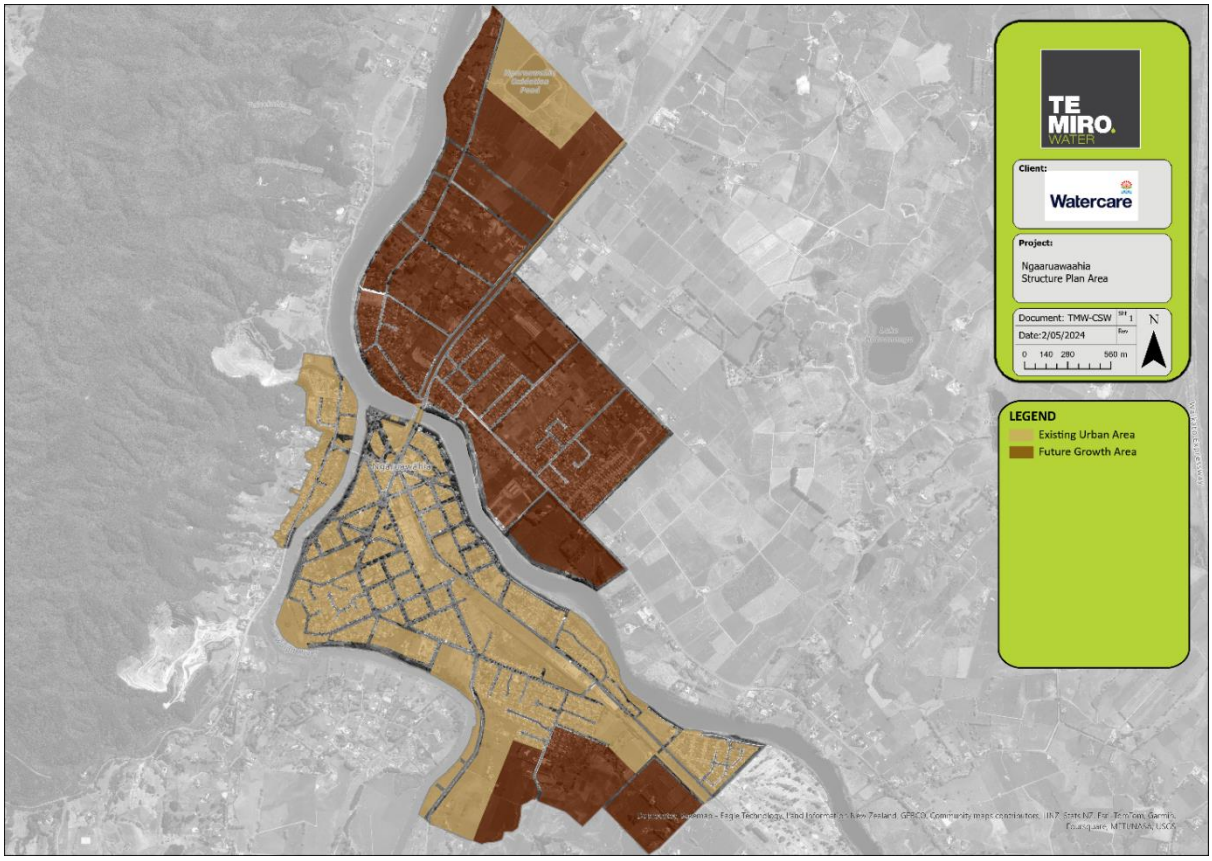

Figure 1. Existing Urban and Future Growth Areas

The assessment has been undertaken utilising the following guidance (Table 1) to ensure the proposed works align with Waikato Regional Council (WRC) and Waikato District Council likely future Comprehensive Stormwater Discharge Consent Requirements (due to expire in 2028).

Table 1: Guidance Document Summary

Guidance Document	Information Contained
WRC TR2018/01 – Stormwater Management Guidelines	Technical guidance and design criteria for stormwater management devices
WRC TR2018/02 – Stormwater Runoff Modelling Guideline	Guideline document for hydrology in the Waikato Region
Regional Infrastructure Technical Specifications (RITS)	Design and construction standards for public infrastructure within the Waikato District. This document gives precedence to WRC's TR201/01 and TR2018/02

This report addresses:

1. An assessment of areas that are at risk of containing natural wetlands areas as defined by the NES over the full structure plan area.
2. An assessment of contaminant risks within the existing urban growth areas.
3. An assessment of erosion and volume risk within the existing urban areas.

2. An assessment of the Maximum Probable Development model (MPD) for existing urban areas utilising the proposed Zone 10 district plan zones and the PC3 MDRS assumptions to future flood risk for the 2, 10, and 100-year ARI (1% AEP) (RCP 6) design events.

3. An assessment of the 1 in 100-year ARI (1% AEP) (RCP 6) flood Impacts resulting from unmitigated MPD as outlined by the currently undeveloped "growth zones".

4. High level mitigation philosophy to achieve best practise outcomes for water quality, erosion mitigation and flood management for areas of the whole Structure Plan for the MPD scenario.

5. 50% contingency engineering estimates for all proposed mitigation options.

2. PROPOSED STRUCTURE PLAN URBAN AREA

The following Structure Plan zones for the urban areas of Ngaaruawaahia have been considered in the conceptual stormwater design as outlined in Figure 2. It is noted that these zones may be change in the future (as they are still subject to consultation) but are required to be assumed at this stage to allow for an effects assessment. The assumptions associated with the Structure Plan areas are:

1. The percentage impervious assumption for the site are in line with the Medium Density Residential Standards (MDRS) assumptions assuming, 70% for all residential zones, 90% for commercial and 90% for industrial zones. Roading imperious areas are included in Zones at this stage.
2. Modelling is currently undertaken as rain on grid with losses removed from the rainfall.
3. We have included assets shown in the 2022 LIDAR and Councils asset data base as provided by WDC GIS team. It is worth noting that if a subdivision is not currently handed over to Council it may not yet be captured.
4. As the pipe and culvert infrastructure within the growth areas is limited, the terrain has been altered to remove these obstructions where known.
5. It is assumed that in general existing landforms are maintained, however in the mitigated scenarios existing low points will be graded out and drained to stormwater devices.
6. Currently road, landform and reserve areas are indicative only and as such all-stormwater assumptions are based on existing and broad assumptions.

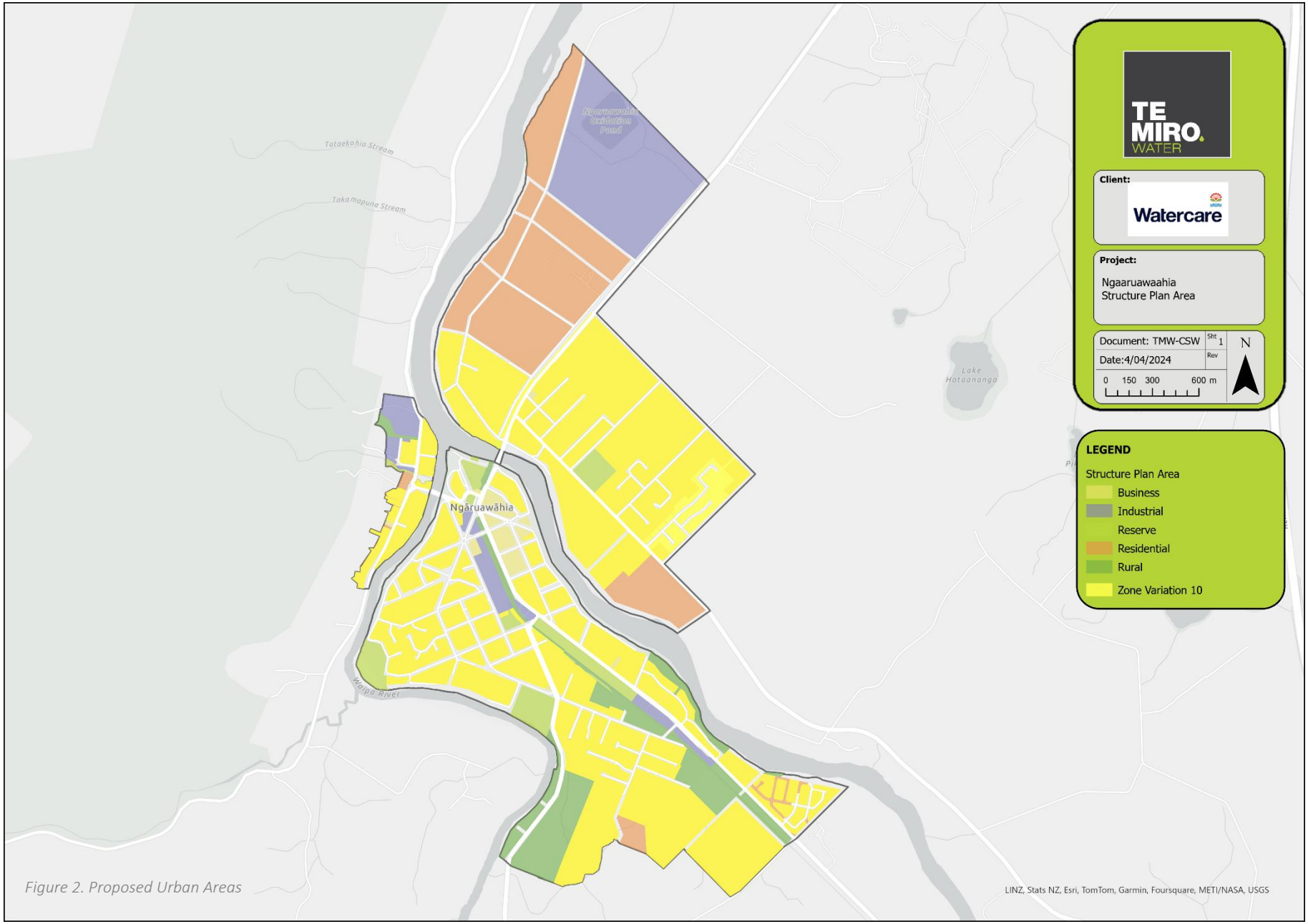

Figure 2. Proposed Urban Areas

3. TECHNICAL RISK ASSESSMENT

A risk assessment was undertaken to review:

1. The likelihood and extent of natural wetlands being present as defined by the NES for the whole of the structure plan area.
2. The likelihood and risk of catchments contributing to contaminant loads to the receiving environment for the existing urban area (MPD).
3. The likelihood and risk of catchments contributing to erosion of the receiving environment for the existing urban area (MPD).
4. The pipes in the existing urban area that are below a 10-year ARI (10% AEP) level of service.
5. The likely extent of 100-year ARI (1% AEP) (RCP 6) flooding present should the Structure Plan areas be developed to the MPD.

3.1. LIKELIHOOD OF NATURAL WETLAND ASSESSMENT

It has been identified that there is a high likelihood of natural wetlands being present with the new growth and existing urban areas of the Structure Plan due to the topography and local experience within this area. Whilst the National policy Statement for Freshwater requires regional authorities to map wetlands, this process has not been completed in in the Waikato.

To determine the potential extent and location of natural wetlands, a desktop assessment has been undertaken utilising LiDAR, aerials (including historic), GIS tools such as hill shade, as well as the existing 2-year ponded areas within the Structure Plan area. The assumptions behind this model can be found in the Model Build Report (Morphum and TMW, 2023). The potential extent and locations of natural wetlands is presented in Figures 3 & 4 below.

This assessment considers only wetlands that would be valley bottom and lowland and cannot account for hill seeps or wetlands formed by springs. It is recommended that a wetland specialist is engaged to assess and confirm the wetlands within the indicative areas provided., Any wetland areas will need to be avoided or assessed through the effects management hierarchy to meet the current requirements of the NES:FW. The detail of this assessment is documented in the memo - Desktop Potential Wetland Assessment Methodology – Ngāruawāhia & Taupiri (Morphum and TMW, 2023).

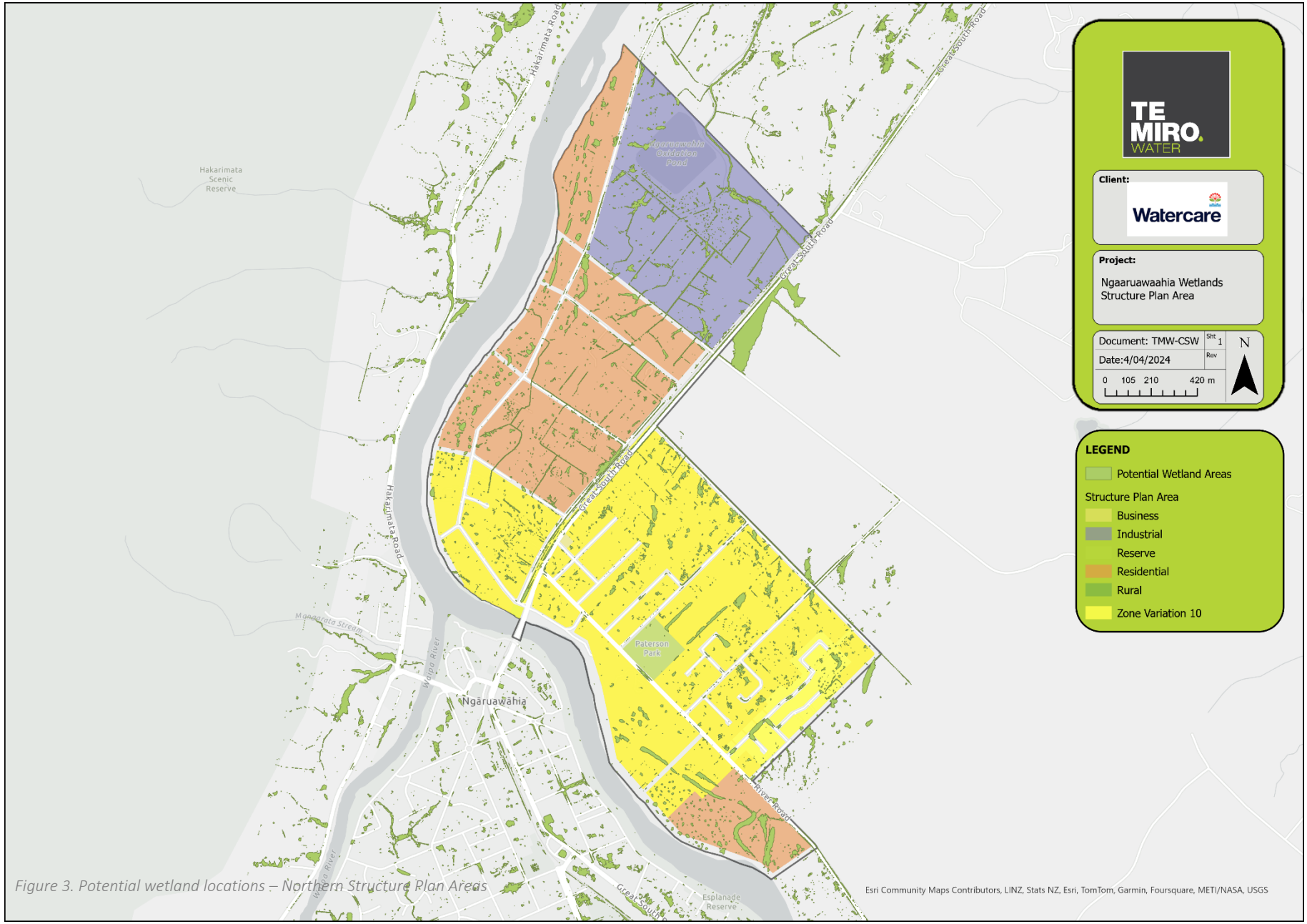

Figure 3. Potential wetland locations – Northern Structure Plan Areas

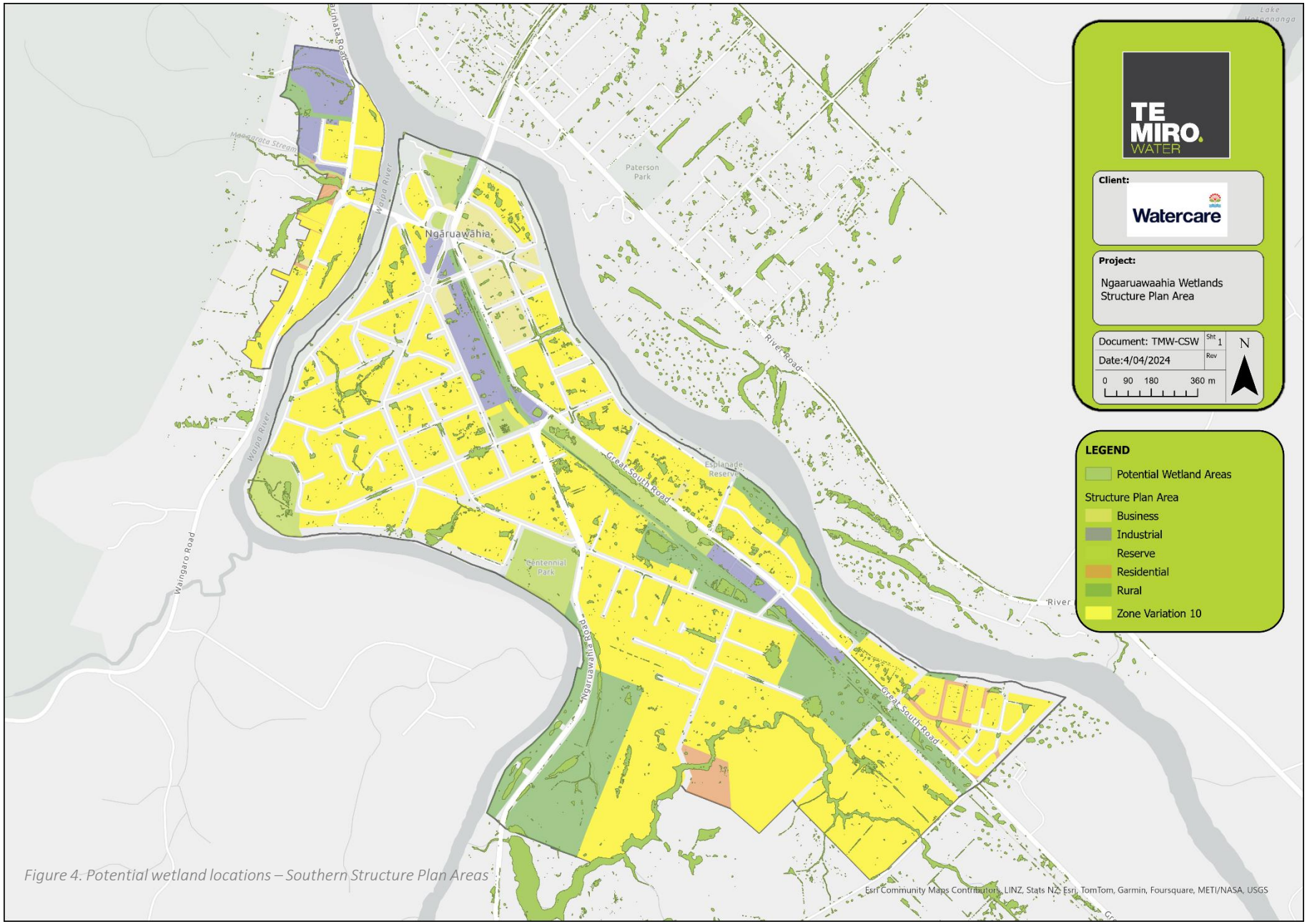

Figure 4. Potential wetland locations – Southern Structure Plan Areas

3.2. EXISTING CATCHMENTS WITH HIGH CONTAMINANT AND VOLUME (EROSION) LOAD RISK

It is well documented that contaminants and increased runoff volume from urban areas negatively impact waterways, lakes, and wetlands. The best practice catchment management solutions should mitigate discharge volumes and contaminants (including hydrocarbons and heavy metals (zinc/copper)) from existing and new development.

Contaminant risk modelling and volume risk modelling was undertaken to assess the catchments of risk, with site visits of receiving environments being undertaken as outlined in the Erosion and Water Quality Assessment Report (Morphum and TMW, 2023). The assessment findings summarise the catchments of risk as presented in Figures 5, 6, 7 & 8 below. In general, volume risk was the greatest within the catchments that contained a high impervious percentage. This correlated well to site observations. Additionally, catchments with large commercial and industrial development, intensified residential development, and sizeable main road areas produce greater contaminant loads.

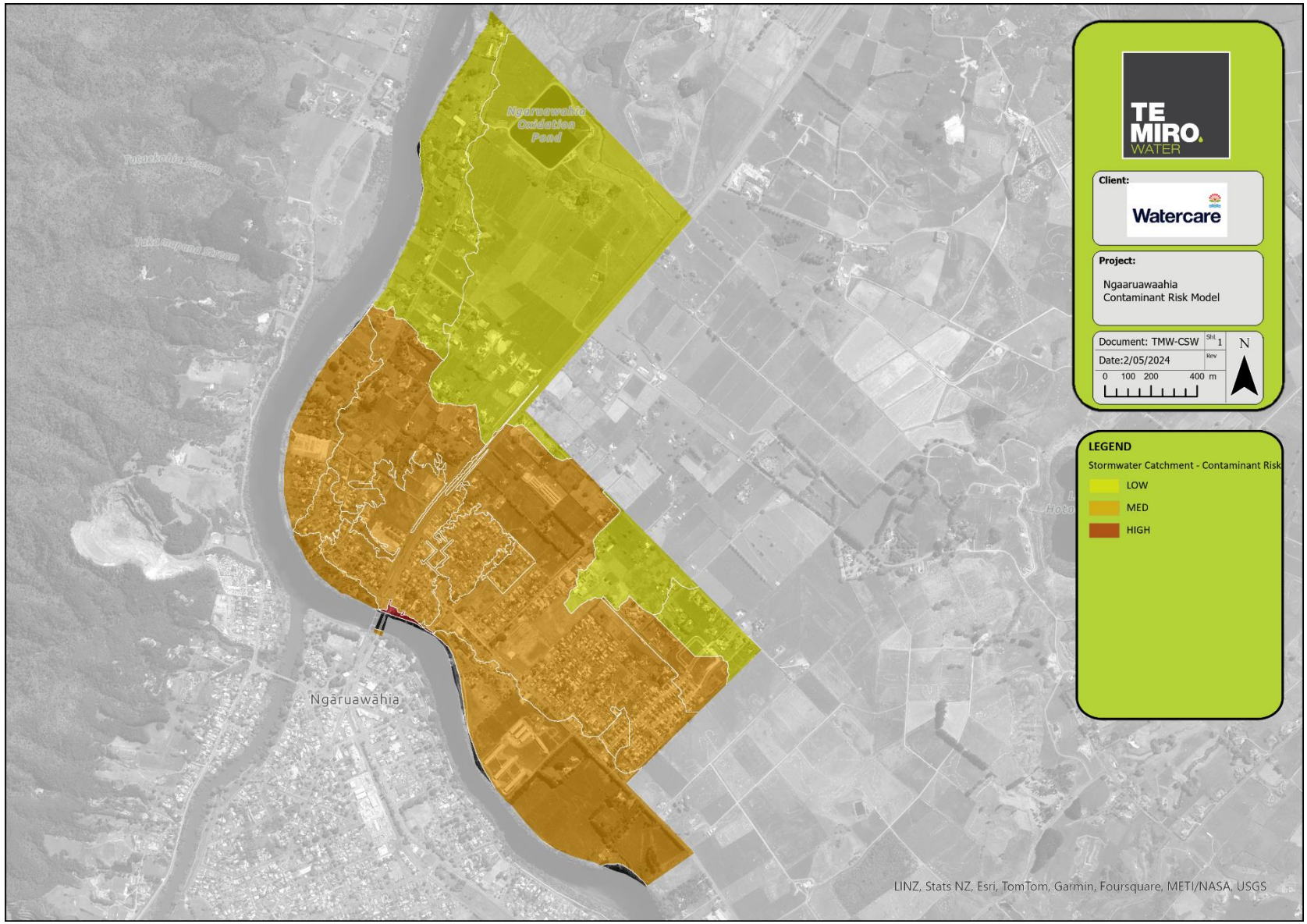

Figure 5. Contaminant Load Risk – Northern Structure Plan Area – Existing development

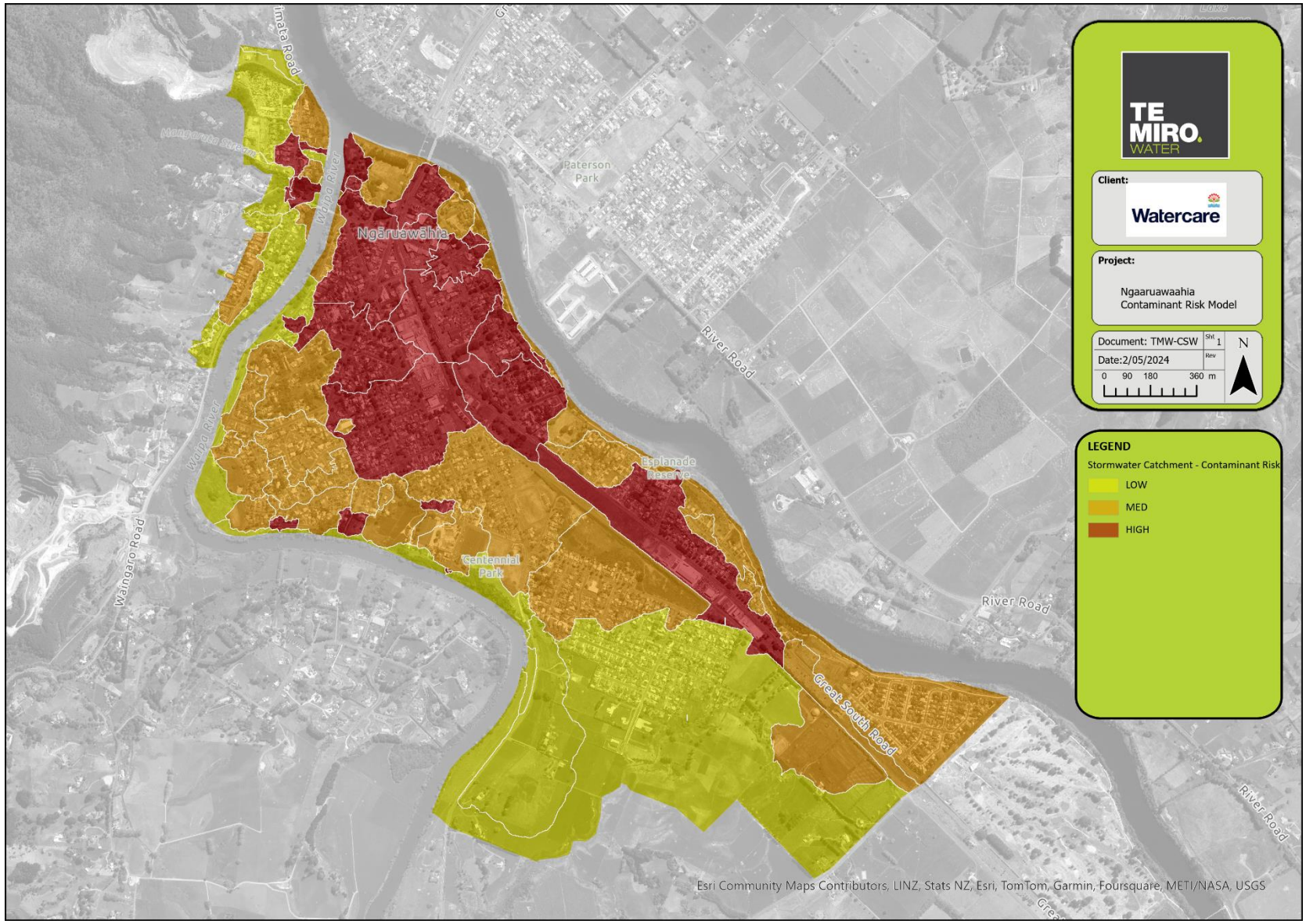

Figure 6. Contaminant Load Risk – Southern Structure Plan Area – Existing Development

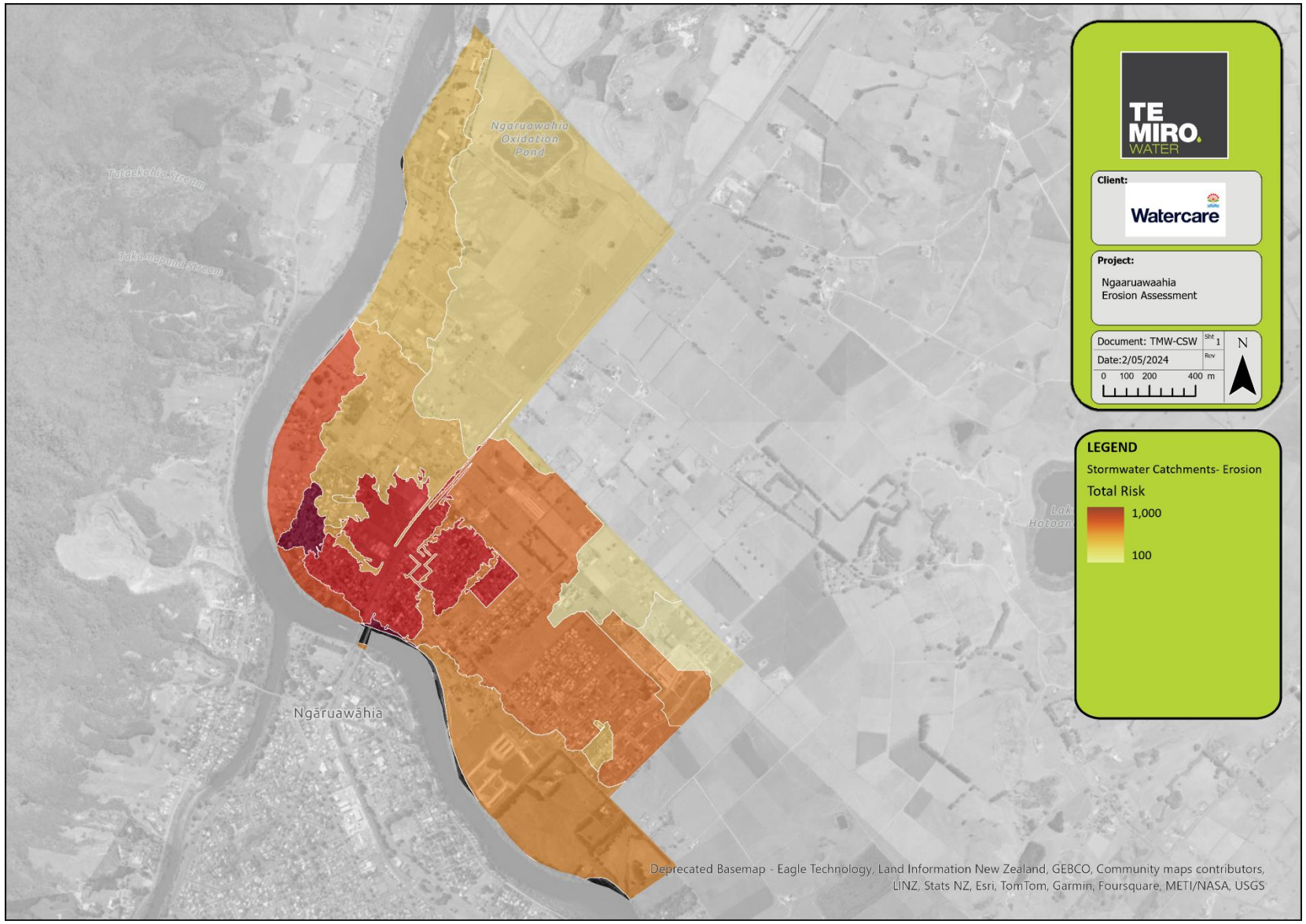

Figure 7. Volume Risk – Northern Structure Plan Area – Existing development

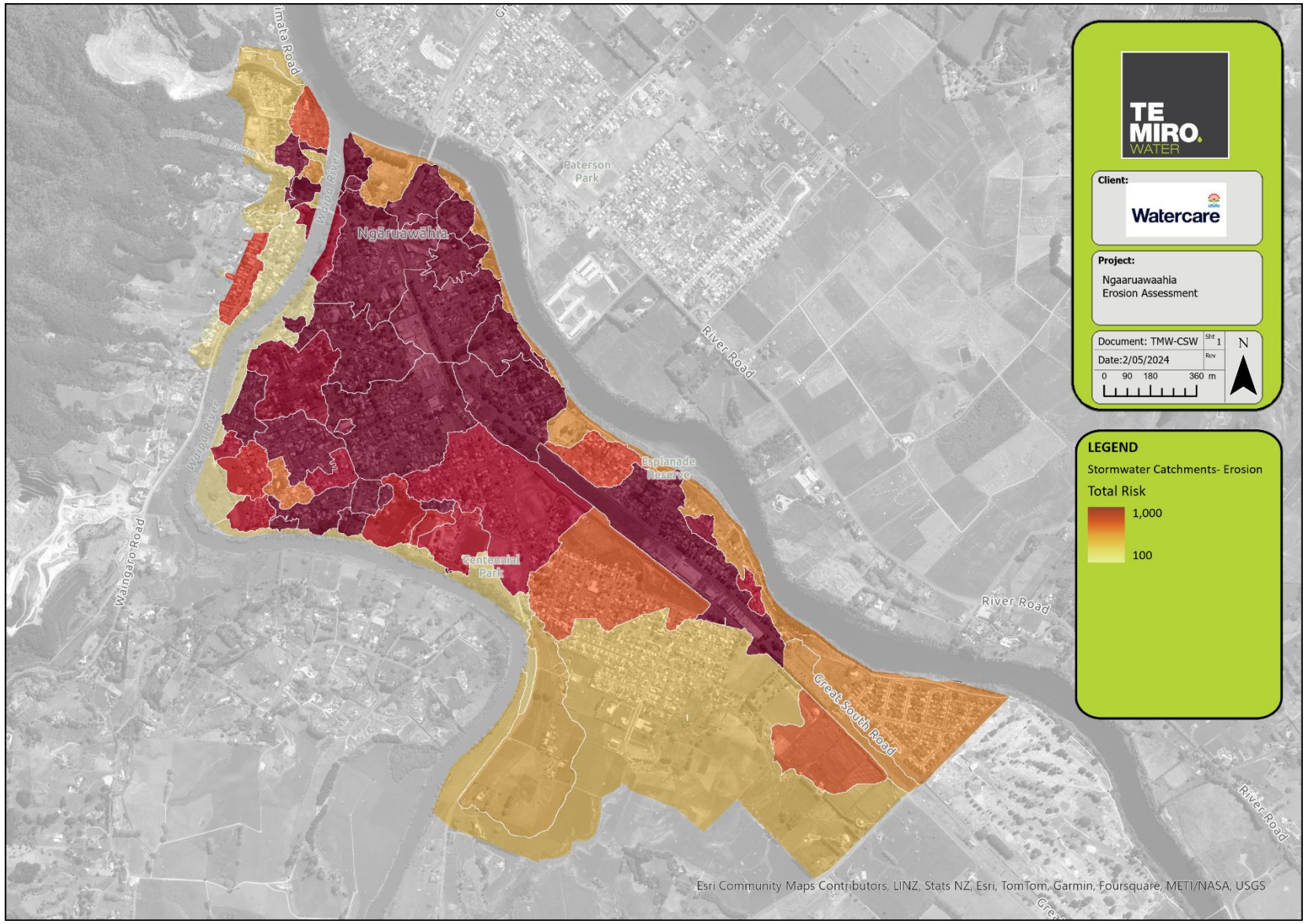

Figure 8. Volume Risk – Southern Structure Plan Area – Existing development

3.3. ASSESSMENT OF PIPE 10 YEAR ARI LOS

A 10-year ARI (10% AEP) (RCP 6) pipe model was developed to provide an indication of the level of service of existing pipe in the catchment. The assumptions and methodology associated with the modelling results can be found in the Model Build Report (Morphum and TMW, 2023). The existing pipes that do and don't meet the level of service are provided in in Figures 9 &10.

Figure 9. Pipe Level of Service in 10 Year Rainfall Event – Northern Structure Plan Area

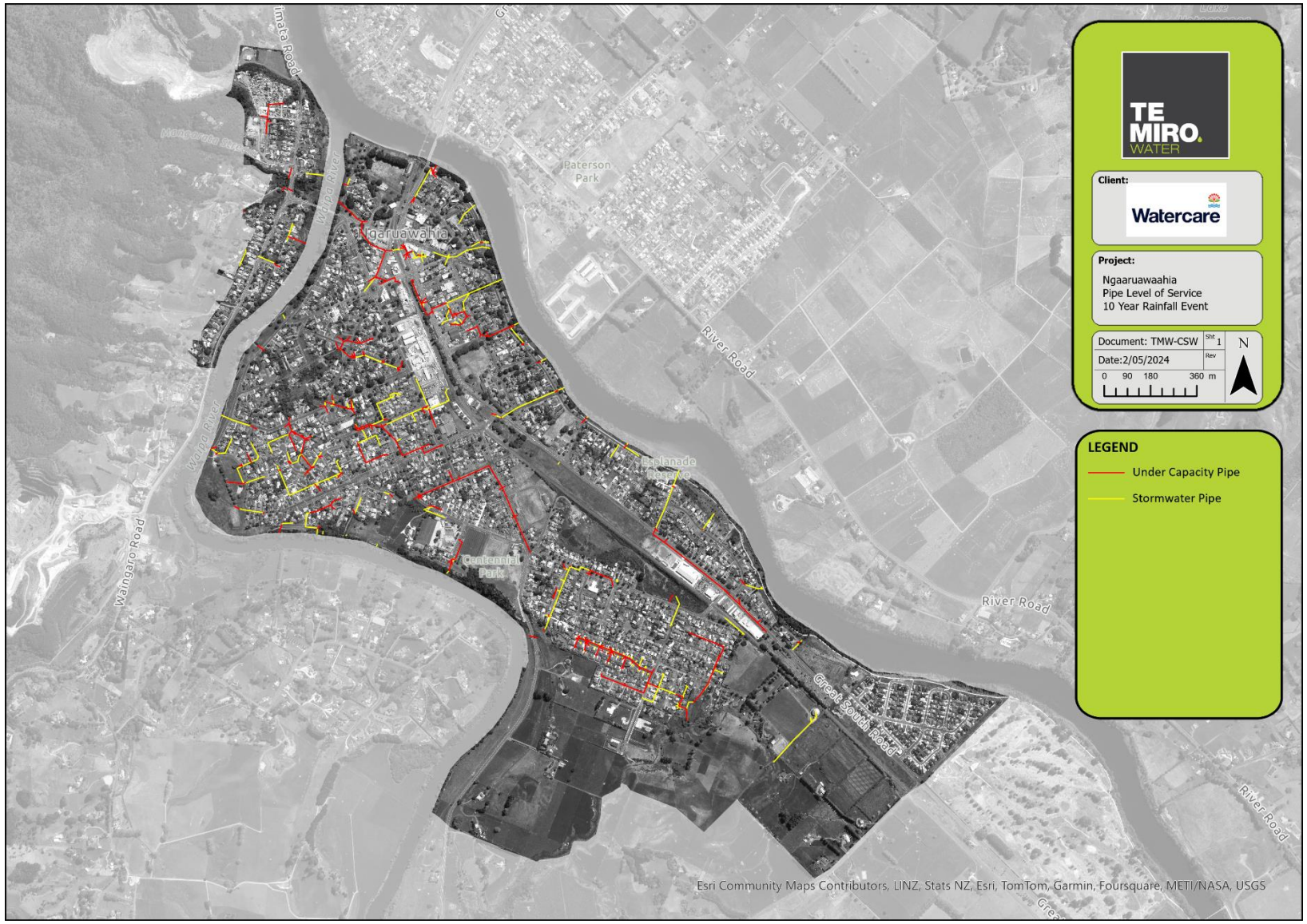

Figure 10. Pipe Level of Service in 10 Year Rainfall Event – Southern Structure Plan Area

3.4. 100 YEAR ARI UNMITIGATEED FLOOD IMPACTS

A 100-year ARI (1% AEP) (RCP 6) rain on grid model was developed to provide an indication of the unmitigated flood extents and depths that may occur if the Structure Plan areas were to be developed to the MPD. The assumptions and methodology associated with the modelling results can be found in the Model Build Report (Morphum and TMW, 2023). The flood extents for the 100- year ARI (1% AEP) ARI (RCP 6) MPD scenario (un mitigated) are provided in Figures 11 & 12. The areas of flooding will need to be offset/moved, or avoided should development occur. It is recommended that a site visit is conducted to confirm farm drains and culverts in these areas as data is currently limited.

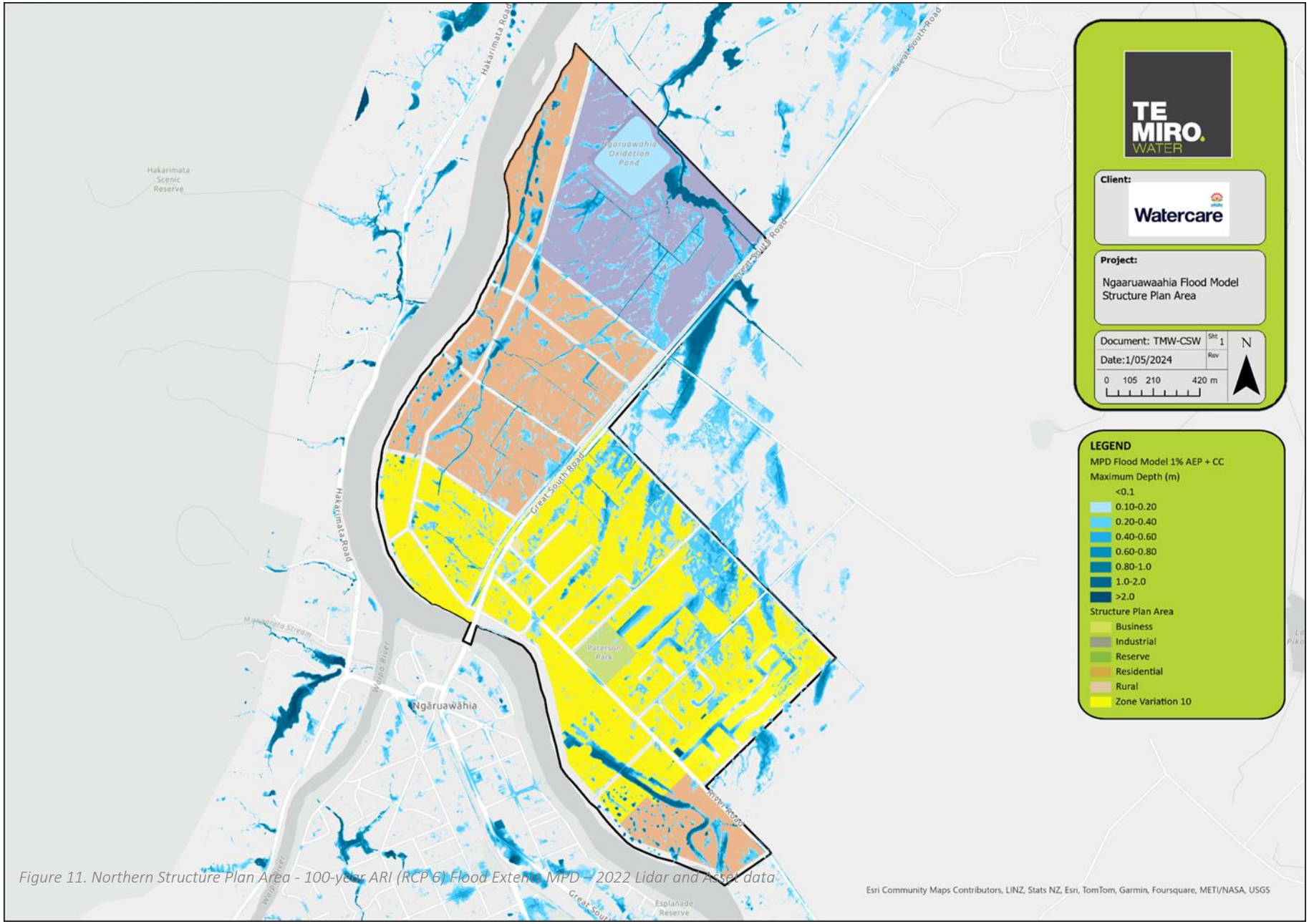

Figure 11. Northern Structure Plan Area - 100-year ARI (RCP 6) Flood Extents, MPD – 2022 Lidar and Asset data

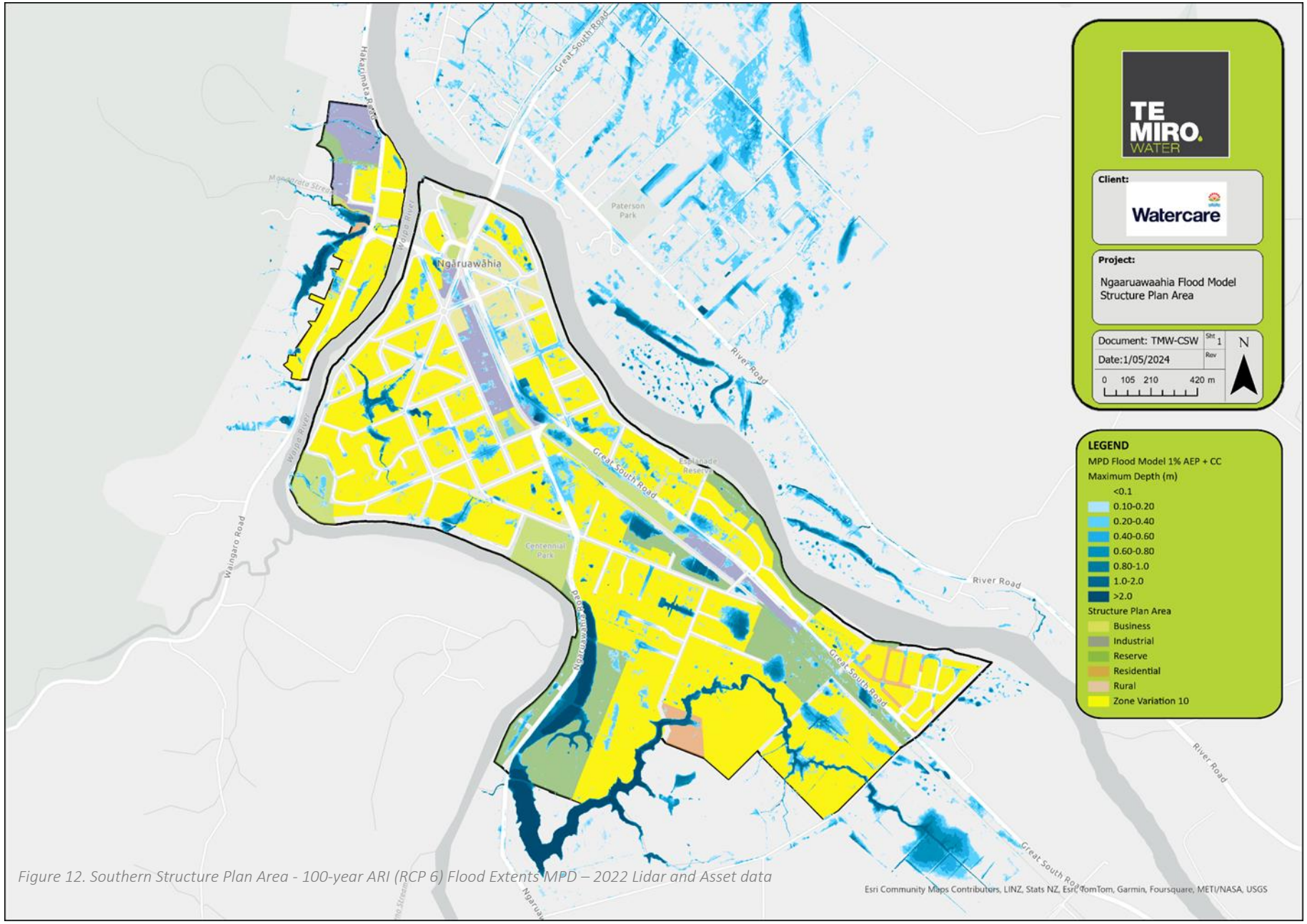

Figure 12. Southern Structure Plan Area - 100-year ARI (RCP 6) Flood Extents MPD – 2022 Lidar and Asset data

4. PROPOSED STORMWATER MITIGATION OPPORTUNITIES

The proposed stormwater mitigation is separated between:

1. Mitigation opportunities proposed to offset the effects of future development on the receiving environment, encompassing peak flow management, conveyance, contaminant load management and the effects of increased volume discharge.
2. Mitigation opportunities proposed to offset the effects of future infill development in existing urban areas as well as manage and mitigate existing water quality, volume and flood hazard issues.

Mitigation has been determined through a high-level assessment of the likely receiving environments along with best practice outcomes that reflect likely Waikato Regional and District design requirements. Proposed mitigation options are provided in Figures 13 & 14 below with a description provided in Table 2 and 3.

4.1. FLOOD HAZARD, WATER QUALITY AND VOLUME MITIGATION OF GROWTH AREAS

In the determination of the device sizing for undeveloped growth areas, the following assumptions apply:

Flood Risk Management.

1. 80% 100-year flood mitigation is provided where the downstream environment is constrained and would likely be difficult to upgrade (i.e. an existing culvert, farm drain or impacted property is present).

2. 100-year flood storage volumes are assessed using the difference between the existing vs developed runoff volumes, with the assumption that 10% of the existing volumes remain trapped and cannot discharge into the receiving environment.

3. 100-year flood storage assumes that the structure planned catchments are graded towards the proposed device.

4. Swales are sized to convey the maximum 100-year ARI design flows (RCP6) and are assumed to be 1 metre deep.

5. Detention basins are assumed to be 1.5 metres in depth

Water Quality

1. Wetland area is assumed to be 5% of the contributing area and an average of 750 mm in depth.

2. Raingarden area is assumed to be 3% of the contributing area and are treating road runoff only (houses will be managed though on lot treatment).

3. Swales are assumed to be planted and check dams are required to achieve residence times.

4. It is assumed that on lot treatment devices may be required to “top up” public device treatment through swales.

Volume capture:

1. It is assumed the extended detention and initial abstraction volume will be managed within detention basins and wetlands. Local experience indicates that soakage may be unviable across much of the catchment.

2. 2-year detention is provided where it is considered the receiving environment may be subject to erosion risk.

4.2. FLOOD HAZARD, WATER QUALITY AND VOLUME MITIGATION OF EXISITNG URBAN AREAS

Mitigation options for the existing urban areas were determined through the following process:

1. A visual evaluation and locations of possible risk and mitigation were determined based on:
    a. 100-year flood risk was present over dwellings.
    b. 100-year flood risk was present over roads and properties.
    c. 10-year flood risk was present over dwellings.
    d. the pipe network was not meeting the 10-year level of service.
2. A high level first principals' assessment of ability to provide mitigation and subsequently reduce risk was undertaken on all possible risk and mitigation locations. Some sites were removed based on inability to feasibly provide a cost effective a benefit solution.
3. A proposal of options were provided to WDC and a local engineer to determine if they were feasible based on local knowledge of the townships. Some sites were removed based on an inability to feasibly provide a cost effective and beneficial solution.
4. A site visit was undertaken to determine the feasibility of mitigation options. Some sites were removed based on an inability to feasibly provide a cost effective and beneficial solution.
5. Options were modelled in a hydraulic model through an iterative process (over 50 different scenarios) to determine possible mitigation options.

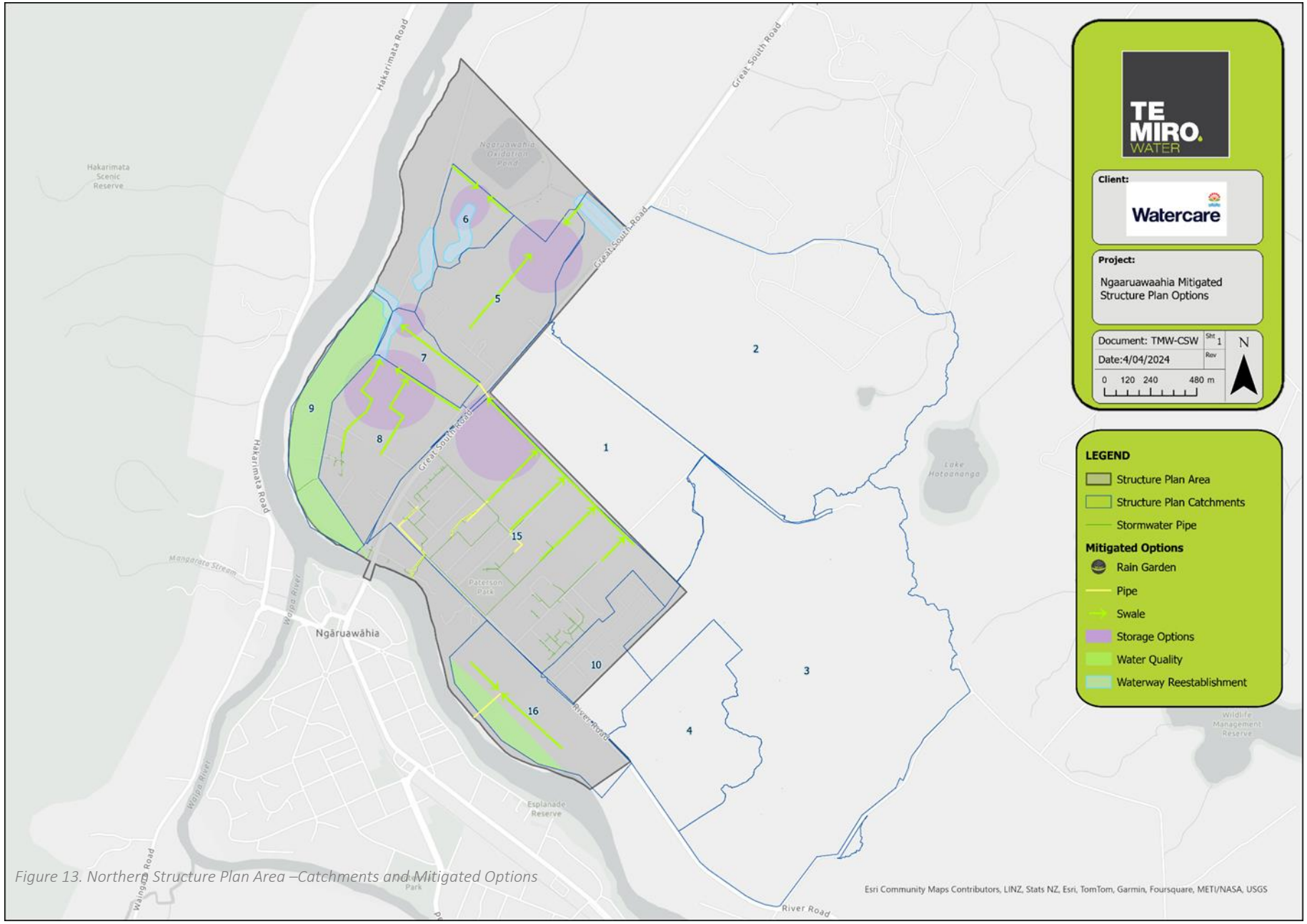

Figure 13. Northern Structure Plan Area –Catchments and Mitigated Options

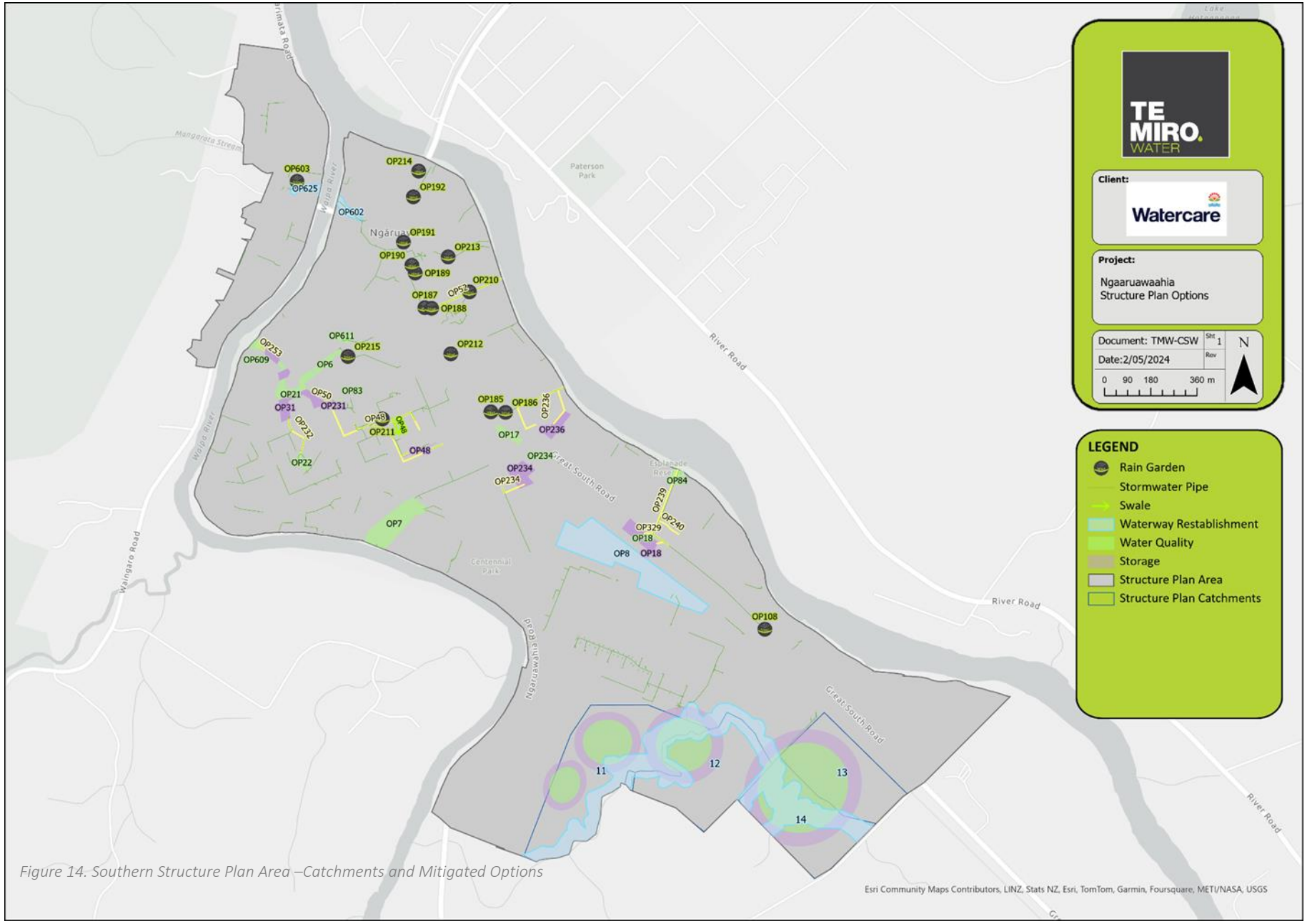

Figure 14. Southern Structure Plan Area –Catchments and Mitigated Options

Table 2. Summary of proposed mitigation for growth areas

Catchment	Description of Mitigation	Approximate 100-year ARI Storage Volume (m3)	Approximate 100-year ARI Storage Area (assume 1.5 deep pond) (m2)	Approximate 2- year ARI Storage Volume (m3)	Approximate 2-year ARI Storage Area (assume 1.5 deep pond) (m2)	Approximate Wetland Volumes (m3)	Approximate Raingarden Area (m2)	Approximate Swale Earthworks volumes (m3)	Approximate Swale widths (assuming 1 metre depth)	Pipes and Culverts (m)
Catchment 5	The catchment has a receiving environment gully network that is recommended to undergo restoration (cathcment 2 as shown in Figure 13). Due to the small receiving environment and flat, flood impacted terrain, it is recommended that a swale network convey the development runoff to a 100-year detention basin prior to discharging to the gully. Volume mitigation will be incorporated in the larger detention basin and water quality treatment can be managed in the swale network.	34440	22960					9800	4.3	
Catchment 6	The catchment is made up of a gully network that can undergo restoration. Due to the small receiving environment and flat, flood impacted terrain, it is recommended that a swale network convey the development runoff to a 100-year detention basin prior to discharging to the downstream catchment. Volume mitigation will be incorporated in the larger detention basin and water quality treatment can be managed in the swale network.	9720	6480					400	1.9	
Catchment 7	The catchment is made up of a gully network that can undergo restoration. Due to the small receiving environment and flat, flood impacted terrain, it is recommended that a swale network convey the development	9240	6160					800	1.9	

Catchment	Description of Mitigation	Approximate 100-year ARI Storage Volume (m3)	Approximate 100-year ARI Storage Area (assume 1.5 deep pond) (m2)	Approximate 2- year ARI Storage Volume (m3)	Approximate 2-year ARI Storage Area (assume 1.5 deep pond) (m2)	Approximate Wetland Volumes (m3)	Approximate Raingarden Area (m2)	Approximate Swale Earthworks volumes (m3)	Approximate Swale widths (assuming 1 metre depth)	Pipes and Culverts (m)
	runoff to a 100-year detention basin prior to discharging to the gully. Volume mitigation will be incorporated in the larger detention basin and water quality treatment can be managed in the swale network.									
Catchment 8	The catchment is made up of a gully network that can undergo restoration. Due to the small receiving environment and flat, flood impacted terrain, it is recommended that a swale network convey the development runoff to a 100-year detention basin prior to discharge to the gully.	20520	13680					1100	2.2	
Catchment 9	The catchment is made up of a gully network that can undergo restoration. Due to the small receiving environment and flat, flood impacted terrain, it is recommended that a swale network convey the development runoff to a 100 year detention basin prior to discharge to the gully.						550			
Catchment 11	The Southern Structure Plan area will encompass a deep planted gully. It is likely that the gully will require mitigation for erosion up to the 2- year event and water quality will be required.			3440	2293	4510				

Catchment	Description of Mitigation	Approximate 100-year ARI Storage Volume (m3)	Approximate 100-year ARI Storage Area (assume 1.5 deep pond) (m2)	Approximate 2- year ARI Storage Volume (m3)	Approximate 2-year ARI Storage Area (assume 1.5 deep pond) (m2)	Approximate Wetland Volumes (m3)	Approximate Raingarden Area (m2)	Approximate Swale Earthworks volumes (m3)	Approximate Swale widths (assuming 1 metre depth)	Pipes and Culverts (m)
Catchment 12				2520	1680	3280				
Catchment 13				1920	1280	2510				
Catchment 14				2240	1493	2920				
Catchment 15	Catchment 15 is heavily impacts by an existing floodplain. Filling and drainage improvements will be required to mitigate the impacts of this existing issue. It is recommended that a large dual-use swale network is developed for water quality and conveyance. The channels will outlet into a large 100-year detention basin that is required due to the restricted culvert under the rail. Upgrades in this area will likely improve existing flood issues and	70920	47280					2000	3.3	

Catchment	Description of Mitigation	Approximate 100-year ARI Storage Volume (m3)	Approximate 100-year ARI Storage Area (assume 1.5 deep pond) (m2)	Approximate 2- year ARI Storage Volume (m3)	Approximate 2-year ARI Storage Area (assume 1.5 deep pond) (m2)	Approximate Wetland Volumes (m3)	Approximate Raingarden Area (m2)	Approximate Swale Earthworks volumes (m3)	Approximate Swale widths (assuming 1 metre depth)	Pipes and Culverts (m)
	therefore some upgrades to existing pipes have also been identified.									
Catchment 16	Catchment 16 has a direct outlet to the river so storage will not be required. Water quality and conveyance of existing flood impacts will be mitigated through larger pipes and a defined swale. The upper catchment may be treated in the swale network and the lower catchment will need raingardens where there is direct discharge to the river.						1850	1110	2.3	

Table 3. Summary of proposed mitigation measure for existing urban areas

Project Identifier	Location/Project	Device	Physical location	Approximate Storage Volume (m^3) to reduce flood hazard	Approximate Treatment Area (m^2)	Pipes and Culverts (m)
OP108	Ngaaruawaahia – at key intersections through urban area	Raingardens and associated upgrade works	Great South Road		2.4 by 1.8 metre Rain Garden	22.5
OP185	Ngaaruawaahia – at key intersections through urban area	Raingardens and associated upgrade works	Corner of Great South Road and Ellery Street		2.4 by 1.8 metre Rain Garden	22.5
OP186	Ngaaruawaahia – at key intersections through urban area	Raingardens and associated upgrade works	Great South Road		2.4 by 1.8 metre Rain Garden	22.5
OP187	Ngaaruawaahia – at key intersections through urban area	Raingardens and associated upgrade works	Great South Road		2.4 by 1.8 metre Rain Garden	22.5
OP188	Ngaaruawaahia – at key intersections through urban area	Raingardens and associated upgrade works	Corner of Great South Road and Martin Street		2.4 by 1.8 metre Rain Garden	22.5
OP189	Ngaaruawaahia – at key intersections through urban area	Raingardens and associated upgrade works	Corner of Great South Road and Newcastle Street		2.4 by 1.8 metre Rain Garden	22.5
OP190	Ngaaruawaahia – at key intersections through urban area	Raingardens and associated upgrade works	Corner of Great South Road and Newcastle Street		2.4 by 1.8 metre Rain Garden	22.5
OP210	Ngaaruawaahia – at key intersections through urban area	Raingardens and associated upgrade works	Corner of Gallieo Street and Martin Street		2.4 by 1.8 metre Rain Garden	22.5
OP212	Ngaaruawaahia – at key intersections through urban area	Raingardens and associated upgrade works	Corner of Great South Road and Jordan Street		2.4 by 1.8 metre Rain Garden	22.5
OP213	Ngaaruawaahia – at key intersections through urban area	Raingardens and associated upgrade works	Centre of Waikato Esplande and Jesmond Street Roundabout		2.4 by 1.8 metre Rain Garden	22.5
OP214	Ngaaruawaahia – at key intersections through urban area	Raingardens and associated upgrade works	Great South Road, south of Lower Waikato Esplande		2.4 by 1.8 metre Rain Garden	22.5

Project Identifier	Location/Project	Device	Physical location	Approximate Storage Volume (m^3) to reduce flood hazard	Approximate Treatment Area (m^2)	Pipes and Culverts (m)
OP603	Ngaaruawaahia	Raingardens and associated upgrade works	Hakarimata Road		2.4 by 1.8 metre Rain Garden	22.5
OP215	Ngaaruawaahia	Raingardens and associated upgrade works	Durnham Street		2.4 by 1.8 metre Rain Garden	22.5
OP236	Ngaaruawaahia - Galileo Street	Pipe upgrades and associated works	Galileo Street			1023
OP239	Ngaaruawaahia - North Street	Pipe upgrades and associated works	North Street			262.5
OP240	Ngaaruawaahia - North Street	Pipe upgrades and associated works	North Street in back of lots			900
OP48	Ngaaruawaahia - Herschel Street, Ellery Street and Kephler Street	Pipe upgrades and associated works	Ellery Road			1270.5
OP50	Ngaaruawaahia - Drunham Street	Pipe upgrades and associated works	Durham Street from Kepler to Durnham culvert outlet			435
OP52	Ngaaruawaahia - Martin Street	Pipe upgrades and associated works	Martin Street			470
OP602	Ngaaruawaahia - Sampson Street	Waterway planting and associated upgrade works	Downstream of Sampson Street		3000	
OP604	Ngaaruawaahia - Hakarimata Road	Outlet Erosion Protection	Downstream of culvert Hakarimata Road		50	
OP608	Ngaaruawaahia - Sampson Street	Outlet Erosion Protection	Downstream of Sampson Street		50	
OP612	Ngaaruawaahia - Old Taupiri Road	Waterway planting and associated upgrade works	Downstream of Old Taupiri Road		1100	
OP614	Ngaaruawaahia - Jordan Street	Outlet Erosion Protection	Downstream of Sampson Street		50	
OP626	Ngaaruawaahia - Hakarimata Road	Waterway planting and associated upgrade works	Downstream of Culvert Hakarimata Road		3000	
OP627	Ngaaruawaahia - Martin Street	Outlet Erosion Protection	Downstream of Sampson Street		50	

Project Identifier	Location/Project	Device	Physical location	Approximate Storage Volume (m^3) to reduce flood hazard	Approximate Treatment Area (m^2)	Pipes and Culverts (m)
OP7	Ngaaruawaahia - Havelock Road	Waterway planting and associated upgrade works	Havelock Road		20700	
OP8	Ngaaruawaahia - North Street	Waterway planting and associated upgrade works	North Street (above railway)		59400	
OP83	Ngaaruawaahia - Drunham Street	Wetland and associated upgrade works	Drunham Street	3500		40
OP84	Ngaaruawaahia - North Street	Waterway planting and associated upgrade works	North Street at pipe outlet		3358	

5. PRELIMINARY ESTIMATE OF COSTS

The engineering estimate of costs for each mitigation opportunity is provided in Table 4 and 5. The estimates are provided with the following assumptions.

- **Estimates Only:** The cost estimates provided are for preliminary structure plan informational purposes only and are not a final or binding quote. Actual project costs may vary based on further investigation.
- **Accuracy:** The estimate is based on available information and assumptions at the time of preparation. It does not guarantee the accuracy of the final costs.
- **Scope of Work:** The estimate is based on the defined scope of work and may not include costs for unforeseen items or changes to the project scope.
- **Contingencies:** The estimate includes a 50% contingency to account for unforeseen conditions or changes in project requirements
- **Inflation:** The estimate may not account for inflation, and the costs are expressed in current value terms.
- **Local Conditions:** The estimate considers general market conditions, and actual costs may vary depending on specific regional or local conditions.
- **Availability of Materials and Labour:** The estimate assumes the availability of materials and labour at the time of the estimate. Delays or changes in availability may impact costs.
- **Approval Process:** The estimate may not include costs associated with permit fees, regulatory approvals, or other administrative expenses.
- **Assumptions:** The estimate is based on certain assumptions, and any changes to these assumptions may impact the final cost.
- **Design Development:** The estimate is based on preliminary or conceptual design and may not account for detailed design changes.
- **Currency:** The estimate is expressed in a specific currency (New Zealand Dollars) and may not consider fluctuations in exchange rates.
- **Change Orders:** The estimate does not account for potential change orders or variations that may arise during the course of the project.

5.1. RATES AND ASSOCIATED ASSUMPTIONS

All items and detailed rates assumptions associated with the mitigation opportunities are described within the schedule provided in Appendix A.

The following assumptions are applied to the engineering estimate of costs for each opportunity.

- Pricing is considered high-level, and all rates are based on similar projects from May 2023.
- All pricing should be used for the purposes of preliminary and conceptual planning costs only. These prices may change subject to design changes.
- A 15% design budget has been applied to all total mitigation opportunities.
- Costs associated with consenting have not been applied.
- Costs associated with maintenance access or landscaping have not been applied.
- All rates assume that mitigation opportunities will be undertaken as small to medium size projects. For example, two different construction activities and consultation with up to 10 landowners/stakeholder

Table 4. Preliminary estimate of costs for the growth areas.

PROJECT NUMBER	LOCATION/PROJECT	DEVICE	PHYSICAL ADDRESS	PRELIMINARY & GENERAL	EROSION & SEDIMENT CONTROL	EARTHWORKS	STORMWATER	UTILITY SERVICES	TOTAL		
				ESTIMATE COST OF PRELIMINARY & GENERAL	ESTIMATE COST OF EROSION & SEDIMENT CONTROL	ESTIMATE COST OF EARTHWORKS	ESTIMATE COST OF STORMWATER	ESTIMATE COST OF UTILITY SERVICES	DETAIL DESIGN	ESTIMATED TOTAL COST	CONTINGENCY 50%
CATCHMENT 5	NGAARUAWAAHIA - STRUCTURE PLAN	BASIN	NGAARUAWAAHIA	$105,891.00	$50,821.24	$985,125.99	$198,797.83	$0.00	$202,000.00	$1,543,000.00	$2,314,500.00
CATCHMENT 5	NGAARUAWAAHIA - STRUCTURE PLAN	SWALE	NGAARUAWAAHIA	$105,891.00	$15,301.71	$363,382.80	$222,857.45	$132,289.00	$126,000.00	$966,000.00	$1,449,000.00
CATCHMENT 6	NGAARUAWAAHIA - STRUCTURE PLAN	BASIN	NGAARUAWAAHIA	$78,395.00	$35,678.04	$286,723.00	$198,797.83	$0.00	$90,000.00	$690,000.00	$1,035,000.00
CATHCMENT 6	NGAARUAWAAHIA - STRUCTURE PLAN	SWALE	NGAARUAWAAHIA	$105,891.00	$6,653.71	$20,414.40	$126,791.90	$0.00	$39,000.00	$299,000.00	$448,500.00
CATCHMENT 7	NGAARUAWAAHIA - STRUCTURE PLAN	BASIN	NGAARUAWAAHIA	$105,891.00	$35,365.24	$280,117.84	$198,797.83	$0.00	$94,000.00	$715,000.00	$1,072,500.00
CATCHMENT 7	NGAARUAWAAHIA - STRUCTURE PLAN	SWALE	NGAARUAWAAHIA	$105,891.00	$6,791.71	$25,887.30	$126,791.90	$0.00	$40,000.00	$306,000.00	$459,000.00
CATCHMENT 8	NGAARUAWAAHIA - STRUCTURE PLAN	BASIN	NGAARUAWAAHIA	$105,891.00	$42,283.64	$598,382.88	$198,797.83	$0.00	$142,000.00	$1,088,000.00	$1,632,000.00
CATCHMENT 8	NGAARUAWAAHIA - STRUCTURE PLAN	SWALE	NGAARUAWAAHIA	$105,891.00	$6,791.71	$45,410.34	$126,791.90	$0.00	$43,000.00	$328,000.00	$492,000.00
CATCHMENT 9	NGAARUAWAAHIA - STRUCTURE PLAN	RAINGARDENS	NGAARUAWAAHIA	$78,546.00	$506.00	$27,285.50	$3,354,633.38	$132,289.00	$539,000.00	$4,133,000.00	$6,199,500.00
CATCHMENT 11	NGAARUAWAAHIA - STRUCTURE PLAN	BASIN	NGAARUAWAAHIA	$94,824.00	$29,698.04	$101,732.80	$198,797.83	$0.00	$64,000.00	$490,000.00	$735,000.00

PROJECT NUMBER	LOCATION/PROJECT	DEVICE	PHYSICAL ADDRESS	PRELIMINARY & GENERAL	EROSION & SEDIMENT CONTROL	EARTHWORKS	STORMWATER	UTILITY SERVICES	TOTAL		
				ESTIMATE COST OF PRELIMINARY & GENERAL	ESTIMATE COST OF EROSION & SEDIMENT CONTROL	ESTIMATE COST OF EARTHWORKS	ESTIMATE COST OF STORMWATER	ESTIMATE COST OF UTILITY SERVICES	DETAIL DESIGN	ESTIMATED TOTAL COST	CONTINGENCY 50%
CATCHMENT 11	NGAARUAWAAHIA - STRUCTURE PLAN	WETLAND	NGAARUAWAAHIA	$94,824.00	$11,805.71	$186,413.20	$67,043.70	$0.00	$55,000.00	$416,000.00	$624,000.00
CATCHMENT 12	NGAARUAWAAHIA - STRUCTURE PLAN	BASIN	NGAARUAWAAHIA	$94,824.00	$29,698.04	$75,197.40	$198,797.83	$0.00	$60,000.00	$459,000.00	$688,500.00
CATCHMENT 12	NGAARUAWAAHIA - STRUCTURE PLAN	WETLAND	NGAARUAWAAHIA	$94,824.00	$10,333.71	$138,397.00	$67,043.70	$0.00	$47,000.00	$358,000.00	$537,000.00
CATCHMENT 13	NGAARUAWAAHIA - STRUCTURE PLAN	BASIN	NGAARUAWAAHIA	$94,824.00	$29,698.04	$58,920.40	$198,797.83	$0.00	$58,000.00	$441,000.00	$661,500.00
CATCHMENT 13	NGAARUAWAAHIA - STRUCTURE PLAN	WETLAND	NGAARUAWAAHIA	$94,824.00	$9,413.71	$106,981.60	$67,043.70	$0.00	$42,000.00	$321,000.00	$481,500.00
CATCHMENT 14	NGAARUAWAAHIA - STRUCTURE PLAN	BASIN	NGAARUAWAAHIA	$94,824.00	$29,698.04	$68,333.80	$198,797.83	$0.00	$59,000.00	$451,000.00	$676,500.00
CATCHMENT 14	NGAARUAWAAHIA - STRUCTURE PLAN	WETLAND	NGAARUAWAAHIA	$94,824.00	$9,873.71	$122,909.80	$67,043.70	$0.00	$45,000.00	$340,000.00	$510,000.00
CATCHMENT 15	NGAARUAWAAHIA - STRUCTURE PLAN	BASIN	NGAARUAWAAHIA	$105,891.00	$73,195.64	$2,053,800.48	$198,797.83	$0.00	$365,000.00	$2,797,000.00	$4,195,500.00
CATCHMENT 15	NGAARUAWAAHIA - STRUCTURE PLAN	SWALE	NGAARUAWAAHIA	$105,891.00	$8,125.71	$78,792.00	$126,791.90	$0.00	$48,000.00	$368,000.00	$552,000.00
CATCHMENT 15	NGAARUAWAAHIA - STRUCTURE PLAN	PIPE	NGAARUAWAAHIA	$85,546.00	$6,285.71	$23,181.00	$1,040,203.70	$0.00	$174,000.00	$1,330,000.00	$1,995,000.00

PROJECT NUMBER	LOCATION/PROJECT	DEVICE	PHYSICAL ADDRESS	PRELIMINARY & GENERAL	EROSION & SEDIMENT CONTROL	EARTHWORKS	STORMWATER	UTILITY SERVICES	TOTAL		
				ESTIMATE COST OF PRELIMINARY & GENERAL	ESTIMATE COST OF EROSION & SEDIMENT CONTROL	ESTIMATE COST OF EARTHWORKS	ESTIMATE COST OF STORMWATER	ESTIMATE COST OF UTILITY SERVICES	DETAIL DESIGN	ESTIMATED TOTAL COST	CONTINGENCY 50%
CATCHMENT 16	NGAARUAWAAHIA - STRUCTURE PLAN	SWALE	NGAARUAWAAHIA	$105,891.00	$7,297.71	$45,954.60	$103,330.52	$0.00	$40,000.00	$303,000.00	$454,500.00
CATCHMENT 16	NGAARUAWAAHIA - STRUCTURE PLAN	RAINGARDENS	NGAARUAWAAHIA	$85,546.00	$138.00	$10,821.50	$1,248,839.70	$132,289.00	$222,000.00	$1,700,000.00	$2,550,000.00
CATCHMENT 16	NGAARUAWAAHIA - STRUCTURE PLAN	PIPE	NGAARUAWAAHIA	$85,546.00	$6,285.71	$17,394.00	$713,985.20	$0.00	$124,000.00	$948,000.00	$1,422,000.00
CATHCMENT 9	NGAARUAWAAHIA - STRUCTURE PLAN	STREAM RESTORATION	NGAARUAWAAHIA	$8,300.00	$6,285.71	$48,070.00	$0.00	$0.00	$10,000.00	$73,000.00	$109,500.00
CATHCMENT 7	NGAARUAWAAHIA - STRUCTURE PLAN	STREAM RESTORATION	NGAARUAWAAHIA	$8,300.00	$6,285.71	$39,620.00	$0.00	$0.00	$9,000.00	$64,000.00	$96,000.00
CATHCMENT 6	NGAARUAWAAHIA - STRUCTURE PLAN	STREAM RESTORATION	NGAARUAWAAHIA	$8,300.00	$6,285.71	$64,970.00	$0.00	$0.00	$12,000.00	$92,000.00	$138,000.00
CATHCMENT 5	NGAARUAWAAHIA - STRUCTURE PLAN	STREAM RESTORATION	NGAARUAWAAHIA	$8,300.00	$6,285.71	$90,320.00	$0.00	$0.00	$16,000.00	$121,000.00	$181,500.00

Table 5. Preliminary estimate of costs for the existing urban areas.

PROJECT NUMBER	LOCATION/PROJECT	DEVICE	PHYSICAL ADDRESS	PRELIMINARY & GENERAL	EROSION & SEDIMENT CONTROL	EARTHWORKS	STORMWATER	UTILITY SERVICES	TOTAL		
				ESTIMATE COST OF PRELIMINARY & GENERAL	ESTIMATE COST OF EROSION & SEDIMENT CONTROL	ESTIMATE COST OF EARTHWORKS	ESTIMATE COST OF STORMWATER	ESTIMATE COST OF UTILITY SERVICES	DETAILED DESIGN	ESTIMATED TOTAL COST	50% CONTINGENCY
OP108	NGARUAWAHIA	RAINGARDENS		$15,000.00	$184.00	$1,608.00	$0.00	$34,737.00	$9,000.00	$69,000.00	$103,500.00
OP17	NGARUAWAHIA - GALILEO STREET	WETLAND	GALILEO STREET	$91,135.00	$9,045.00	$116,070.00	$0.00	$32,456.00	$38,000.00	$287,000.00	$430,500.00
OP18	NGARUAWAHIA - NORTH STREET	WETLAND	NORTH STREET	$87,446.00	$8,125.00	$326,791.00	$0.00	$16,831.00	$66,000.00	$506,000.00	$759,000.00
OP185	NGARUAWAHIA	RAINGARDENS		$15,000.00	$184.00	$1,608.00	$0.00	$34,737.00	$9,000.00	$69,000.00	$103,500.00
OP186	NGARUAWAHIA	RAINGARDENS		$15,000.00	$184.00	$1,608.00	$0.00	$34,737.00	$9,000.00	$69,000.00	$103,500.00
OP187	NGARUAWAHIA	RAINGARDENS		$15,000.00	$184.00	$1,608.00	$0.00	$34,737.00	$9,000.00	$69,000.00	$103,500.00
OP188	NGARUAWAHIA	RAINGARDENS		$15,000.00	$184.00	$1,608.00	$0.00	$34,737.00	$9,000.00	$69,000.00	$103,500.00
OP189	NGARUAWAHIA	RAINGARDENS		$15,000.00	$184.00	$1,608.00	$0.00	$34,737.00	$8,000.00	$60,000.00	$90,000.00
OP190	NGARUAWAHIA	RAINGARDENS		$15,000.00	$184.00	$1,608.86	$0.00	$34,737.68	$8,000.00	$60,000.00	$90,000.00
OP192	NGARUAWAHIA	RAINGARDENS		$15,000.00	$184.00	$1,608.86	$0.00	$34,737.68	$9,000.00	$69,000.00	$103,500.00

PROJECT NUMBER	LOCATION/PROJECT	DEVICE	PHYSICAL ADDRESS	PRELIMINARY & GENERAL	EROSION & SEDIMENT CONTROL	EARTHWORKS	STORMWATER	UTILITY SERVICES	TOTAL		
				ESTIMATE COST OF PRELIMINARY & GENERAL	ESTIMATE COST OF EROSION & SEDIMENT CONTROL	ESTIMATE COST OF EARTHWORKS	ESTIMATE COST OF STORMWATER	ESTIMATE COST OF UTILITY SERVICES	DETAILED DESIGN	ESTIMATED TOTAL COST	50% CONTINGENCY
OP2	NGARUAWAHIA - NORTH STREET	BASIN	NORTH STREET	$91,135.00	$30,342.04	$369,618.26	$0.00	$48,779.20	$85,000.00	$652,000.00	$978,000.00
OP210	NGARUAWAHIA	RAINGARDENS		$15,000.00	$184.00	$1,608.86	$0.00	$34,737.68	$8,000.00	$60,000.00	$90,000.00
OP212	NGARUAWAHIA	RAINGARDENS		$15,000.00	$184.00	$1,608.86	$0.00	$34,737.68	$8,000.00	$60,000.00	$90,000.00
OP213	NGARUAWAHIA	RAINGARDENS		$15,000.00	$184.00	$1,608.86	$0.00	$34,737.68	$8,000.00	$60,000.00	$90,000.00
OP214	NGARUAWAHIA	RAINGARDENS		$15,000.00	$184.00	$1,608.86	$0.00	$34,737.68	$8,000.00	$60,000.00	$90,000.00
OP215	NGARUAWAHIA	RAINGARDENS		$15,000.00	$184.00	$1,608.86	$0.00	$34,737.68	$8,000.00	$60,000.00	$90,000.00
OP236	NGARUAWAHIA - GALILEO STREET	PIPE UPGRADES	GALILEO STREET	$92,979.50	$6,469.71	$36,594.36	$22,840.80	$1,565,430.31	$261,000.00	$1,999,000.00	$2,998,500.00
OP239	NGARUAWAHIA - NORTH STREET	PIPE UPGRADES	NORTH STREET	$91,135.00	$32,458.04	$5,820.00	$10,361.00	$477,389.32	$97,000.00	$741,000.00	$1,111,500.00
OP240	NGARUAWAHIA - NORTH STREET	PIPE UPGRADES	NORTH STREET IN BACK OF LOTS	$89,290.50	$32,458.04	$5,820.00	$0.00	$472,845.56	$93,000.00	$707,000.00	$1,060,500.00
OP48	NGARUAWAHIA - HERSCHEL STREET, ELLERY STREET AND KEPHLER STREET	PIPE UPGRADES	ELLERY ROAD	$94,824.00	$6,837.71	$34,221.26	$51,600.50	**$864,124.21**	$160,000.00	$1,225,000.00	$1,837,500.00

PROJECT NUMBER	LOCATION/PROJECT	DEVICE	PHYSICAL ADDRESS	PRELIMINARY & GENERAL	EROSION & SEDIMENT CONTROL	EARTHWORKS	STORMWATER	UTILITY SERVICES	TOTAL		
				ESTIMATE COST OF PRELIMINARY & GENERAL	ESTIMATE COST OF EROSION & SEDIMENT CONTROL	ESTIMATE COST OF EARTHWORKS	ESTIMATE COST OF STORMWATER	ESTIMATE COST OF UTILITY SERVICES	DETAILED DESIGN	ESTIMATED TOTAL COST	50% CONTINGENCY
OP50	NGARUAWAHIA - DRUNHAM STREET	PIPE UPGRADES	DRUNHAM STREET FROK KEPHLER TO DURNHAM CULVERT OUTLET	$92,979.50	$7,205.71	$21,790.12	$17,596.00	$455,563.52	$92,000.00	$701,000.00	$1,051,500.00
OP52	NGARUAWAHIA - MARTIN STREET	PIPE UPGRADES	MARTIN STREET	$94,824.00	$6,469.71	$18,590.38	$10,361.00	$408,341.15	$84,000.00	$643,000.00	$964,500.00
OP602	NGARUAWAHIA - SAMPSON STREET	WATERWAY PLANTING	DOWNSTREAM OF SAMPSON STREET	$8,300.00	$460.00	$31,170.00	$0.00	$1,800.00	$7,000.00	$49,000.00	$73,500.00
OP603	NGARUAWAHIA	RAINGARDENS		$15,000.00	$184.00	$1,608.86	$0.00	$34,737.68	$9,000.00	$69,000.00	$103,500.00
OP604	NGARUAWAHIA - HAKARIMATA ROAD	OUTLET EROSION PROTECTION	DOWNSTREAM OF CULVERTAT HAKARIMATA ROAD	$10,144.50	$460.00	$5,820.00	$0.00	$9,896.50	$4,000.00	$31,000.00	$46,500.00
OP608	NGARUAWAHIA - SAMPSON STREET	OUTLET EROSION PROTECTION	DOWNSTREAM OF SAMPSON STREET	$10,144.50	$460.00	$5,820.00	$0.00	$9,896.50	$4,000.00	$31,000.00	$46,500.00
OP612	NGARUAWAHIA - OLD TAUPIRI ROAD	WATERWAY PLANTING	DOWNSTREAM OF OLD TAUPIRI ROAD	$10,144.50	$460.00	$15,115.00	$0.00	$17,993.00	$7,000.00	$51,000.00	$76,500.00
OP614	NGARUAWAHIA - JORDAN STREET	OUTLET EROSION PROTECTION	DOWNSTREAM OF SAMPSON STREET	$10,144.50	$460.00	$5,820.00	$0.00	$9,896.50	$4,000.00	$31,000.00	$46,500.00
OP626	NGARUAWAHIA - HAKARIMATA ROAD	WATERWAY PLANTING	DOWNSTREAM OF CULVERTAT	$8,300.00	$460.00	$31,170.00	$0.00	$1,800.00	$7,000.00	$49,000.00	$73,500.00

PROJECT NUMBER	LOCATION/PROJECT	DEVICE	PHYSICAL ADDRESS	PRELIMINARY & GENERAL	EROSION & SEDIMENT CONTROL	EARTHWORKS	STORMWATER	UTILITY SERVICES	TOTAL		
				ESTIMATE COST OF PRELIMINARY & GENERAL	ESTIMATE COST OF EROSION & SEDIMENT CONTROL	ESTIMATE COST OF EARTHWORKS	ESTIMATE COST OF STORMWATER	ESTIMATE COST OF UTILITY SERVICES	DETAILED DESIGN	ESTIMATED TOTAL COST	50% CONTINGENCY
			HAKARIMATA ROAD								
OP627	NGARUAWAHIA - MARTIN STREET	OUTLET EROSION PROTECTION	DOWNSTREAM OF SAMPSON STREET	$10,144.50	$460.00	$5,820.00	$0.00	$9,896.50	$4,000.00	$31,000.00	$46,500.00
OP7	NGARUAWAHIA - HAVELOCK ROAD	WATERWAY PLANTING	HAVELOCK ROAD	$52,950.00	$920.00	$180,870.20	$0.00	$0.00	$36,000.00	$36,000.00	$406,500.00
OP8	NGARUAWAHIA - NORTH STREET	WATERWAY PLANTING	NORTH STREET (ABOVE RAILWAY)	$8,300.00	$920.00	$502,149.70	$0.00	$0.00	$77,000.00	$77,000.00	$883,500.00
OP83	NGARUAWAHIA - DRUNHAM STREET	WETLAND	DRUNHAM STREET	$91,135.00	$9,045.71	$171,735.00	$0.00	$32,456.14	$46,000.00	$46,000.00	$526,500.00
OP84	NGARUAWAHIA - NORTH STREET	WATERWAY PLANTING	NORTH STREET AT PIPE OUTLET	$8,300.00	$920.00	$33,519.10	$0.00	$8,096.50	$8,000.00	$8,000.00	$88,500.00

6. NEXT STEPS

1. Consultation with the community and key stakeholders.
2. Concept design and consenting of existing and growth area with a catchment management plan.
3. Detailed design and designation.
4. Construction of devices

7. REFERENCES

1. RITS (2018)
2. Waikato Stormwater Management Guideline (2020). Technical Report 2020/07
3. Waikato Stormwater Runoff Guideline (2020). Technical Report 2020/07

APPENDIX A – SCHEDULE OF RATES AND ASSUPTIONS

Schedule of rates and assumptions

Item	Description	Ut	Rate
1	PRELIMINARY & GENERAL		
1.01	Establishment and Disestablishment		
1.01.1	Allow for establishment onsite of all work facilities, equipment, etc. and the removal of the same upon completion of the construction works (SMALL to MEDIUM projects)	LS	$ 42,500.00
1.01.2	Allow for establishment onsite of all work facilities, equipment, etc. and the removal of the same upon completion of the construction works. Include Insurances, setting out, temporary traffic control, Services locations, construction Management plans, dust management plans, liaison, temporary fencing, as built data, H and S and the contract quality plan and erosion and sediment control as outlined in the descriptions below (RAIN GARDENS ONLY))	LS	$ 15,000
1.02	Insurances		
1.02.1	Allow to effect and maintain all insurances as stipulated in the contract documentation for the duration of the contract.	LS	$ 2,500.00
1.03	Setting Out of the Works and Site Surveying		
1.03.1	Allow for all costs for setting out the construction work in the specified position and to the specified level as detailed on the design drawings. Refer contract documentation for the information that will be provided by the Engineer for the construction set out.	LS	$ 23,496.00
1.04	Temporary Traffic Control		
1.04.1	Prepare and implement Traffic Management Plan, submit a CAR in accordance with latest version of NZTA COPTTM and WDC requirements, achieve approved Works Approval Notice including all signage, cones, barriers, vehicles, personnel etc. for the duration of the contract.	LS	$ 2,500.00
1.05	Services Location		
1.05.1	Liaise with service providers, obtain utility service plans and locate all existing services within the extents of the contract works. Includes all potholing as necessary and reinstatement.	LS	$ 1,500.00
1.06	Construction Management Plan		
1.06.1	Prepare, submit and implement CMP including site management details, inspection, testing and quality plan to achieve compliance with the specifications/requirements of the Contract including all requisite testing, hold points, monitoring, sampling, analysis etc. Includes Construction Management Plan.	LS	$ 4,500.00
1.07	Dust Management Plan		
1.07.1	Prepare, submit and implement DMP including site management details, inspection and compliance WITH THE Contract.	LS	$ 2,500.00
1.08	Liaison		
1.08.1	Liaison with all utility providers for protection of services and all subdivision diversions/services installation works, liaison with Council officers for consent compliance/inspections and liaison with adjacent Contractors for duration of the works.	LS	$ 2,000.00
1.09	Temporary Fencing (lm)		
1.09.1	Supply and Install temporary security fencing. Includes dismantle and return. (Provisional Item)	lm	$ 36.89
1.10	As-built Information and Data Supply		
1.10.1	Prepare and supply as-built information/plans in specified format for the preparation of as built by the Engineer and all code compliance certification.	LS	$ 2,250.00
1.11	Health and Safety Management Plan		

Item	Description	Ut	Rate
1.11.1	Prepare and maintain Health and Safety Management Plan, including onsite Hazard Board, JSA, toolbox meeting and coordination with respective Hauraki District Council representatives and Engineer	LS	$ 1,800.00
1.12	Contract Quality Plan		
1.12.1	Prepare, maintain and IMPLEMENT CONTRACT Quality Plan (CQP). All Quality Assurance Testing, to be in accordance with the Waikato District Council Development Manual and Earthworks Specification and results provided to the Engineer and/or Geotech Engineer as appropriate.	LS	$ 1,900.00
2	EROSION & SEDIMENT CONTROL		
	Allow all costs to construct erosion and sediment control measures in accordance with WRC TR0902 and as detailed on the drawings or as directed by the Engineer/Council Representative. All rates are to allow for the phasing of controls as required throughout the contract works, inspection and maintenance of the controls throughout the contract period, and removal upon completion of the earthworks inclusive of the defects liability period.		
2.01	Sediment Retention Ponds (SRP)		
2.01.1	Construct sediment retention pond as detailed including excavation/formation, embankments, primary MH riser/outlet, tee decants, sediment forebay, level spreader, emergency spillway, safety fencing and warning signage, provision of as built etc. complete incl. all maintenance for the duration of the contract incl. maintenance pumping. (20% Portion of existing SRP cost)	L.S	$ 12,500.00
2.02	SRP Decommissioning		
2.02.1	Decommissioning of SRPs at end of earthworks/site stabilisation including supply and compaction of engineered earth fill removal and disposal of all bunds, waste etc. complete. (20% Portion of existing SRP cost)	L.S	$ 9,000.00
2.03	Diversion Drains, Bunds, Silt Fences & Contour Drains		
2.03.1	Install, maintain, phase and remove all additional erosion and sediment control measures in accordance with WRC TR0902 including dirty water/clean water diversion BUNDS (incl sourcing and bunding of topsoil), temporary contour drains, silt fences for the duration of the contract works.	LS	$ 6,285.71
2.04	Stabilised Construction Entrance		
2.04.1	Construct stabilised construction entrance to WRC TR0902 standard measures as the Contractor deems necessary to ensure all roadways are kept clean (direct runoff to onsite E&SC measures). Includes removal. Includes maintenance of stabilised entrance over duration of contract.	L.S	$ 1,912.33
2.05	Straw Mulching (m^2)		
2.04.1	Supply and spread Mulch to areas as directed with unrotted small grain straw applied at a minimum 4000kg per ha Rate (Provisional Item)	m^2	$ 0.92
3	EARTHWORKS		
	All works to be in accordance with Geotechnical Specification/GIR and Civil Specification. Includes all on site Dust Management for duration of contract.		
3.01	Clearing		
3.01.1	Allow all costs to clear remaining vegetation, hedges including stumps and root removal, mulching and removal offsite as necessary. Mulch only to stockpile onsite for later reuse as directed.	LS	$ 5,820.00
3.01.2	Removal of trees including stumps and root removal, mulching and removal offsite as necessary. Mulch only to stockpile onsite for later reuse as directed. (Provisional Item)	LS	
3.02	Topsoil (m^3)		

Item	Description	Ut	Rate
3.02.1	Strip topsoil from earthworks areas (average depth 200mm) to designated onsite stockpile location in a position agreed with the Engineer/Geotechnical Engineer. (Solid Measure)	m3	$ 6.14
3.02.2	Respread stockpiled topsoil to completed earthworks areas to min. 150mm depth. (Solid Measure)	m³	$ 15.44
	Removal and Disposal of Surplus Topsoil (m³)		
3.02.4	Allow all costs to remove and dispose of all excess topsoil from site. (Solid Measure) Provisional Item	m³	$ 26.20
3.03	Bulk Cut to Fill (m³)		
3.03.1	Bulk cut to fill from cut areas (including, drainage/service trench surplus, trimming etc. using plant other than prime mover and placement), compaction to the required standards and design levels including benching as necessary. Rate to include for discing, conditioning, wetting or drying of material as required to achieve the required compaction standards. (Solid Measure in Cut) (Provisional Item)	m3	$ 12.32
3.03.2	E/O previous bulk cut to fill for lime/cement (drying) stabilisation as directed with pre blend of cement and lime spread at a rate of 10kg/m2 and hoed to a depth of 300mm to achieve required moisture standards and compaction. (Provisional Item)	m3	
3.04	Surplus Removal & Disposal (m³)		
3.04.1	Bulk cut of excess cut material and dispose of offsite. (Solid Measure in Cut) (Provisional Item)	m3	$ 25.72
3.05	Unsuitable Excavation (m³)		
3.05.1	Bulk cut of unsuitable wet/saturated materials from gully/fill undercut areas and dispose of offsite. (Solid Measure in Cut) (Provisional Item)	m3	$ 35.95
3.06	Preparation and Grassing and planting (m²)		
3.06.1	Prepare, level and rake topsoiled lots and road berms and sow with approved grass seed mix to designated areas and achieve grass cover.	m²	$ 8.45
4	ROADING		
Note	SUBGRADE - defined as 0.5m behind face of kerb & the vertical edge Road alignments and vehicle crossings SUBGRADE TESTING - Proof rolling, string line shape confirmation and Scala penetrometer testing of the subgrade surface		
4.01	Trimming		
4.01.1	Trim and roll subgrade of Road alignments, Right of Ways and Parking Bays to CBR > 15, to 0.5m behind face of kerb, and shape and compact berms to CBR 7.	m²	$ 1.99
4.02	Testing		
4.02.1	Subgrade Testing: Allow for proof rolling and testing with a Scala penetrometer of the subgrade to confirm minimum CBR requirements have been achieved prior to subgrade improvement layer construction. Contractor to provide Scala results to Engineer for REVIEW AND APPROVAL prior to commencing ANY pavement construction	LS	$ 1,500.00

Item	Description	Ut	Rate
4.02.2	Benkelman Beam Test Allow for proof rolling and testing with a Benkelman Beam of the road base to confirm minimum requirements have been achieved prior to further construction. Contractor to provide Benkelman Beam results to Engineer for REVIEW AND APPROVAL prior to commencing ANY further pavement construction	LS	$ 3,000.00
4.03	Subgrade Undercutting & Subgrade Improvement		
4.03.1	Allow to undercut compressible, organic or unsuitable isolated areas (beneath the nominated subgrade improvement layer) as deemed by Engineer or Geotechnical Engineer and dispose offsite to suitable location (Provisional item)	m3	$ 32.61
4.03.2	Replace undercut material with approved pit sand, or hard fill, to subgrade level. Application and compaction to achieve CBR 10. (Compacted quantity) (Provisional Item).	m3	$ 59.74
4.03.3	SUBGRADE IMPROVEMENT Supply, place and compact 600MM Brown Rock (To be confirmed by Geotech) compacted to minimum CBR15 over approved subgrade as per the construction drawings or as directed by Engineer (Compacted quantity)	m3	$ 72.95
4.04	Pavement construction		
	Subbase		
4.04.1	Supply, place and compact 125mm GAP40 sub - base aggregate as per the construction drawings or as directed by Engineer for Pavement construction (Compacted quantity)	m3	$ 111.23
4.04.2	Supply, place and compact 125mm GAP65 sub - base aggregate as per the construction drawings or as directed by Engineer for Pavement construction (Compacted quantity)	m3	$ 89.54
	Basecourse		
4.04.3	Supply, place and compact 125mm GAP40 TNZ M/4 AP40 Basecourse as per the construction drawings or as directed by Engineer for Pavement construction(Compacted quantity)	m3	$ 136.02
4.04.4	Supply, place and compact 100mm NZTA M/4 AP40 basecourse as per the construction drawings or as directed by the Engineer	m3	$ 140.31
	Surfacing & Asphalt		
4.04.5	Supply, lay and finish 35mm NZTA AC10 Asphalt TNZ Mix 10 over First coat chipseal (grade5 chip)	m²	$ 37.82
4.04.6	Supply, lay and finish 25mm Hot laid Asphalt TNZ Mix 10 over First coat chipseal (grade5 chip)	m²	$ 29.59
4.05	Subsoil Field Drainage		
4.05.1	Excavate all materials, supply and install 100mm slotted Nova Flow in 300mm x 500mm metal core under kerb and channel as per drawings and backfill as determined by Geotech Engineer. Note: Design and Dimensions to be confirmed by Geotech Engineer after excavation to subgrade level	lm	$ 30.17
4.06	Tie into Existing Road & Footpath		
4.06.1	Allow all costs to tie - into existing seal, kerb and channel, footpath, berm, saw cutting or milling, over extent of existing edge of seal. Includes subgrade preparation and testing, basecourse preparation, sealing to Entranceway specification	LS	$ 1,250.00
4.07	Kerbing		

Item	Description	Ut	Rate
4.07.1	Construct Slip Form Vertical Kerb and channel laid on 75mm TNZ M4 including preparation of levels, undercutting and recompaction, bedding. Includes the supply and delivery of all materials, plant, and labour necessary to construct the kerb lines set out within the engineering drawings.	lm	$ 72.44
4.07.2	Construct CASE-B COMMERCIAL CHANNEL CROSSING laid on 75mm TNZ M4 including preparation of levels, undercutting and recompaction, bedding. Includes the supply and delivery of all materials, plant, and labour necessary TO CONSTRUCT the kerb lines set out within the engineering drawings.	lm	$ 176.54
4.07.3	Construct Vertical nib Kerb (as per drawings) including preparation of levels, undercutting and recompaction, bedding. Includes the supply and delivery of all materials, plant, and labour necessary to construct the kerb lines set out within the engineering drawings.	lm	$ 80.11
4.07.4	Construct Standard Mountable Kerb and CHANNEL (as per drawings) including preparation of levels, undercutting and recompaction, bedding. Includes the supply and delivery of all materials, plant, and labour necessary TO CONSTRUCT the kerb lines set out within the engineering drawings.	lm	$ 80.12
4.07.5	Construct Flush Edge Restraint (type 2) (as per drawings) including preparation of levels, undercutting and recompaction, bedding. Includes the supply and delivery of all materials, plant, and labour necessary TO CONSTRUCT the kerb lines set out within the engineering drawings.	lm	$ 71.37
4.08	Concrete		
	Vehicle Crossings		
4.08.1	Construct vehicle crossings including kerb cut - out, subgrade preparation, basecourse preparation, boxing, 125mm thick 20 MPa concrete with 665 mesh placed centrally on 75mm sand/GAP20 over subgrade of CBR>10, including sawcuts, expansion joints and broom finish	m²	$ 92.50
	Footpath		
4.08.2	All types include trimming and construction of 20MPa broom finish concrete to widths specified over min. 100mm thick GAP40 basecourse, 75mm Sand/GAP20 compacted to 95% MDD over firm, dry subgrade. Allow sawcuts at 3.0m centres and cross fall as specified.	m²	$ 72.35
	Parking Bays		
4.08.3	Construct Parking bays INCLUDING SUBGRADE preparation, basecourse preparation, boxing, 150mm Concrete (Kiwi review pebble with 5kg black oxide) 28days strength of min.20MPa with Mesh reinforcement centrally placed over subgrade having CBR>10	m²	$ 128.45
4.09	Line marking and Signage		
	Line marking (LS)		
	Complete all road line marking to MOTSAM/Council standards.		
4.09.1	100mm White Centreline as per MOTSAM (Section 3.09)	lm	$ 3.25
4.09.2	Limit line as per Section 3.06of MOTSAM Section 3	lm	$ 8.13
4.09.3	Non-Stopping Orange lines as per Sec.2.11 of MOTSAM Part 2 Section2	lm	$ 2,350.00
4.09.4	GIVEWAY symbol as per MOTSAM (Section 3.09)	Ea.	$ 168.75
	Road Signage (LS)		
	Supply and install all street and intersection signage to MOTSAM/Council standards.		

Item	Description	Ut	Rate
4.09.5	RG-6 GIVEWAY sign as per MOTSAM (Section 2)	Ea.	$ 481.25
4.09.6	TS 377 Road Name Street Sign on Post	Ea.	$ 568.75
4.10	Pram Crossings with Tactile Ground Surface Indicators (TGSI)		
	Supply all material and construct typical pram crossings where required or as directed by Engineer, including vertical profile kerb integration		
4.10.1	Supply and install Tactile warning indicators as per drawings and LTNZ RTS 14 2007 (bolted on after road/island construction) covering full length of crossing and placed square to direction of travel (Set of 6)	Ea.	$ 337.50
4.10.2	Supply and Install Directional indicators as per drawings covering total width of footpath and placed perpendicular to direction of travel to HCC specification (Set of 6)	Ea.	$ 337.50
5	STORMWATER DRAINAGE		
	Refer to Standard Specification on Drainage. All drainage works to comply with WDC current standards.		
5.01	Pipelaying		
	Allow all costs to supply and install pipelines as detailed including excavation, benching, laying on granular bedding, jointing, connections, testing, backfilling and compaction with approved excavated material to Engineer certified standard (except where the drawings indicate that hardfill is required), trench support, dewatering and removal and stockpiling of surplus material to approved onsite fill area.		
	Depths to Invert 0.0m - 1.5m		
5.01.1	Pipelaying 100mmØ U-PVC SN16 (lm)	lm	$ 83.19
5.01.2	Pipelaying 300mmØ U-PVC SN16 (lm)	lm	$ 214.33
5.01.3	Pipelaying 450mmØ RCRRJ (lm)	lm	$ 398.81
5.01.4	Pipelaying 525mmØ RCRRJ (lm)	lm	$ 470.06
5.01.4	Pipelaying 675mmØ RCRRJ (lm)	lm	$ 620.06
5.01.4	Pipelaying 750mmØ RCRRJ (lm)	lm	$ 785.88
5.01.4	Pipelaying 825mmØ RCRRJ (lm)	lm	$ 922.89
5.01.5	Pipelaying 900mmØ RCRRJ (lm)	lm	$ 1,108.26

Item	Description	Ut	Rate
5.01.6	Pipelaying 1050mmØ RCRRJ (lm)	lm	$ 2,825.64
5.01.7	Pipelaying 1200mmØ RCRRJ (lm)	lm	$ 3,148.71
5.02	Hardfill Backfill		
5.02.1	Extra over Pipelaying items to supply place and compact hardfill backfill brown rock or GAP65 in trenches under road/accessway carriageways and at pipe cross overs. (provisional Item)	m3	$ 75.65
5.02.2	Additional Drainage metal to 300mm below base of trench under pipes and manholes. (Provisional Item)	m3	$ 111.93
5.03	Manholes		
	Allow all costs to supply and construct precast concrete manholes with heavy duty DI lid and frame, safety grill as necessary, step irons, benching, connections, etc. complete. Price includes supply of all materials, excavation, backfill, compaction and connection to existing pipes. (including internal droppers as required)		
5.03.1	1050mmØ flanged base precast manhole 0 – 2.0m depth	ea.	$ 5,872.40
5.03.2	1200mmØ flanged base precast manhole 0 – 2.0m depth	ea.	$ 6,254.40
5.03.2	1500mmØ flanged base precast manhole 0 – 2.0m depth	ea.	$ 7,256.14
0.01	Rain Garden		
	Allow to construct raingardens complete incl. all excavation and trimming, removal of surplus materials to onsite approved stockpile area, supply and installation of precast concrete rectangular unit (Hynds raingarden frame or similar approved), on 150mm GAP40 footings, filter fabric(Geotextile cloth bidim A12 or similar approved),perforated draincoil,10/5 drainage material or similar, filter sand, bioretention/planting media (Living Earth or similar approved), floating mulch, rodding point with end cap, scour protection, connection to catchpit and any other features as shown on the drawings.		
5.06.1	Rain Garden 1.2m wide x 1.2m Long precast	ea.	$ 22,440.60
5.06.2	Rain Garden 1.8m wide x 1.8m Long precast	ea.	$ 23,820.40
5.06.3	Rain Garden 2.4m wide x 1.8m Long precast	ea.	$ 29,820.60
5.05.4	Rain Garden 3.0m wide x 1.8m Long precast	ea.	$ 33,610.40
5.05.5	Rain Garden 3.6m wide x 1.8m Long precast	ea.	$ 34,440.60
5.04	Catchpits		
	Allow all costs to supply, excavate, construct and backfill MH, and connect catchpits to RITS. Refer to B.O.P for further detail.		

Item	Description	Ut	Rate
5.04.1	225mmØ uPVC SN16 Catchpit Lead 0 - 2.5m depth	lm	$ 278.40
5.04.2	Vertical Entry catchpit	ea.	$ 4,274.00
	1350 Concrete Wingwall	ea.	$ 7,259.20
	Rip Rap (m3)	m3	$ 161.93
5.05	Undercut/ Additional Excavation		
5.05.1	Additional Undercut to 300mm below base of trench under pipes and manholes. (Provisional Item)	m3	$ 21.85
5.06	Additional Filling – Drainage Trench undercut		
5.06.1	Additional filling to 300mm below base of trench under pipes and manholes. (Provisional Item)	m3	$ 75.39
5.07	Unsuitable Material		
5.07.1	Unsuitable Material - Remove stockpiled unsuitable trench material previously stockpiled from items above and dispose of off-site (Provisional Item).	m3	$ 26.38
5.08	CCTV As-built Inspection		
5.8.1	Arrange and pay for CCTV as-built inspection of the stormwater drainage and provision of copies to the Engineer and Council. Payment only to be made upon acceptance of CCTV inspection by Council.	LS	$ 1,800.00
5.09	Connection to Existing Manhole		
5.09.1	Carry out pressure testing on all pipes and manholes to HDC RITS requirements and provide results and documentation as required by HDC supplied to Engineer	LS	$ 1,900.00
6	WASTEWATER DRAINAGE		
	Refer to Standard Specification on Drainage. All drainage work to comply with RITS current standards.		
6.01	Pipelaying - Trenched		
	Allow all costs to supply and install pipelines as detailed including excavation, benching, laying on granular bedding, jointing, connections, testing, backfilling and compaction with approved excavated material to Engineer certified standard (except where the drawings indicate that hardfill is required), trench support, dewatering and removal and disposal of surplus material to approved onsite fill area.		
	Depths to Invert 0.0m - 2.5m		
6.01.2	150mmØ U-PVC SN16	lm	$ 144.58
6.01.3	100mmØ U-PVC SN16	lm	$ 94.31
6.02	Hardfill Backfill		
6.02.1	Extra over Pipelaying items to supply place and compact hardfill backfill brown rock or GAP65 in trenches under road/accessway carriageways and at pipe cross overs. (provisional Item)	m3	$ 71.65

Item	Description	Ut	Rate
6.02.2	Additional Drainage metal to 300mm below base of trench under pipes and manholes. (Provisional Item)	m3	$ 105.93
6.03	Manholes		
	Allow all costs to supply and construct precast concrete manholes with heavy duty hinged DI lid and frame, safety grill, step irons, benching, connections, etc. complete. Price includes supply of all materials, excavation, backfill, compaction and removal of all excess excavated material and connection to existing pipes.		
	Depths to Invert 0.0m - 2.5m		
6.03.1	1050mmØ Manhole	No.	$ 5,846.12
	Depths to Invert 2.51m - 3.5m		
6.03.2	1050mmØ Manhole	No.	$ 7,365.39
	Depths to Invert 3.51m - 4m		
6.03.3	1200mmØ Manhole	No.	$ 10,105.63
6.04	Undercut/ Additional Excavation		
6.04.1	Additional Undercut to 300mm below base of trench under pipes and manholes. (Provisional Item)	m3	$ 20.55
6.05	Additional Filling – Drainage Trench undercut		
6.05.1	Additional filling to 300mm below base of trench under pipes and manholes. (Provisional Item)	m3	$ 75.48
6.06	Unsuitable Material		
6.06.1	Unsuitable Material - Remove stockpiled unsuitable trench material previously stockpiled from items above and dispose of off-site (Provisional Item).	m3	$ 25.38
6.07	Lot Connections		
	Allow to supply, trench, construct and backfill. Lot connections complete with Boundary kits, fittings, seals, end cap, 100mmØ uPVC SN16 RRJ Connection between main lines or MH and Lot boundary and any other associated incidentals as specified. Refer to design plans		
6.07.1	100mmØ uPVC SN16 RRJ to existing line	ea.	$ 1,822.15
6.07.2	100mmØ uPVC "WYE" connection to 150mmØ uPVC	ea.	$ 1,692.15
6.07.3	100mmØ uPVC SN16 RRJ to MH	ea.	$ 380.89
6.08	CCTV As-built Inspection		
6.08.1	Arrange and pay for CCTV as-built inspection of the wastewater drainage and provision of copies to the Engineer and Council. Payment only to be made upon acceptance of CCTV inspection by Council.	LS	$ 3,148.44
6.09	Connection to Existing		
	Manhole		

Item	Description	Ut	Rate
6.09.1	Cut into Existing manholes for new main line connections along with benching, channels and adjusting lid levels.	LS	$ 3,293.50
7	WATER SUPPLY		
	Refer to Standard Specification on Watermains. All watermains works to comply with HDC current standards.		
7.01	Pipelaying		
	Allow all costs to install watermain in common services trench as detailed. Include laying on granular bedding/backfill. Supply and installation of all bends, adaptors, bolts, flanges, fittings, denso wrapping, thrust blocks, support blocks, undertake all welding, testing, commissioning, and the installation of a tracer wire.		
7.01.1	150mmØ PVC PN12.5 RRJ watermain	lm	$ 74.52
7.01.2	63mmØ PVC PN12.5 RRJ watermain	lm	$ 35.13
7.02	Testing & Sterilisation		
7.04.1	Inspection, pressure testing of new pipelines including supply of necessary water, fittings, and test equipment, disposal of testing water and associated treatment. Provide electronic pressure test data (excel spreadsheets) for Watercare approval. All costs associated with non-compliance to be borne by the Contractor.	LS	$ 4,628.57
7.04.2	Allow all costs to sterilise all new watermains in accordance with Watercare standards and to their satisfaction. Include pigging, swabbing, testing, disinfection of all pipework and fittings carrying potable water including all necessary materials, and equipment, disposal or dechlorination of disinfection water and associated treatment.	LS	$ 1,696.07
7.05	Public Connections		
	Allow to undertake any works required to meet the District Council or as directed by Engineer connection process for approval, and connect to existing water reticulation, including public notifications		
7.05.1	Establish connection to existing 150mm dia Watermain	LS	$ 2,062.32
7.05.2	Establish connection to existing 63mm dia Watermain	LS	$ 1,906.07
8	UTILITY SERVICES		
	Note: Rates are deemed to include all bedding and coverings required by the appropriate authority. Pipe lengths are to be securely locked together by means of purpose made collars, have draw wires installed and the ends are to be capped with suitably tapered plugs. Ducting is to be laid in positions shown on the plans (supplied by authority). All trenches to be filled and compacted to subgrade standard.		
8.01	Excavate and maintain 700mm wide service trench as per drawings for power and fibre optic and arrange laying of services and backfill. Includes liaising with Utility services to ensure all services are installed as required. (Includes supply of Sand 2000 for shading of cables and ducts, hazard and signal tape, MAGSLAB cable protection	lm	
8.02	Supply, trench, lay and backfill assorted 100mmØ duct colours as required and with respect to Utility providers specifications or as directed by Engineer (provisional item) (One for Fibre, Second for LV Power)		
	Power Relocation 100mmØ duct	lm	$ 1,211.93
	Fibre and Copper Relocation 100mmØ duct	lm	$ 1,052.90
	Gas Relocation	lm	$ 1,322.89

WAIKATO DISTRICT COUNCIL

TAUPIRI STRUCTURE PLAN LEVEL 1 STORMWATER DEVICE ASSESSMENT

STORMWATER MASTERPLAN

MORPHUM environmental

TE MIRO WATER

Document Version

Version	Date	Author	Reviewer	Change Description
2	02/05/24	Britta Jensen	Stu Joyce	Final

CONTENTS

1. INTRODUCTION AND PURPOSE OF ASSESSMENT

It is well documented that changes from rural to urban catchments as well as infill development in existing urban spaces produces contaminants, increased runoff volume and larger peak flows that can negatively impact the built environment, waterways and wetlands. The Taupiri Structure Plan presents an opportunity to determine the best practice catchment management solutions, mitigating flood hazard, increased peak flows, volume changes and contaminant loads (including hydrocarbons and heavy metals (zinc/copper)) from existing farm practices, existing unmitigated urban areas and new intensive development. Undertaking the assessment now, enables Council to provide space and funding to achieve positive environmental outcomes for the future.

This report summarises a high-level assessment of the Taupiri future urban zoned area (existing urban areas and future growth areas) as presented in Figure 1, determining the likely stormwater management infrastructure required to ensure stormwater related effects associated with medium density urban development are managed.

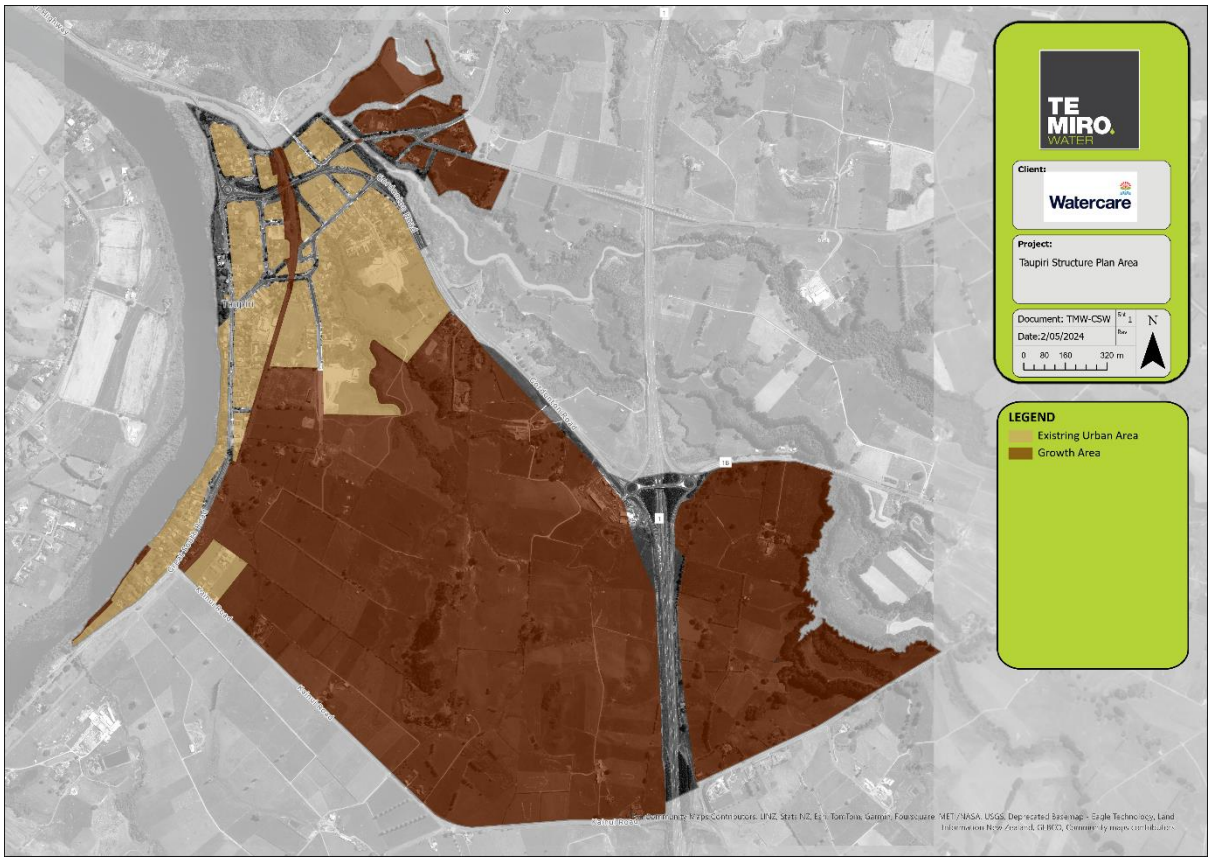

Figure 1. Existing Urban and Future Growth Areas

The assessment has been undertaken utilising the following guidance (Table 1) to ensure the proposed works align with Waikato Regional Council (WRC) and Waikato District Council Comprehensive Stormwater Discharge Consent Requirements.

Table 1: Guidance Document Summary

Guidance Document	Information Contained
WRC TR2018/01 – Stormwater Management Guidelines	Technical guidance and design criteria for stormwater management devices
WRC TR2018/02 – Stormwater Runoff Modelling Guideline	Guideline document for hydrology in the Waikato Region
Regional Infrastructure Technical Specifications (RITS)	Design and construction standards for public infrastructure within the Waikato District. This document gives precedence to WRC's TR201/01 and TR2018/02

This report addresses:

1. An assessment of areas that are at risk of containing natural wetlands areas as defined by the NES over the full structure plan area.
2. An assessment of contaminant risks within the existing urban growth areas.
3. An assessment of erosion and volume risk within the existing urban areas.
4. An assessment of the 1 in 100-year ARI (1% AEP) (RCP 6) flood Impacts resulting from unmitigated MPD as outlined by the currently undeveloped “growth zones”.
5. High level mitigation philosophy to achieve best practise outcomes for water quality, erosion mitigation (both existing urban areas and growth areas) and flood management for areas of growth for the MPD scenario.
6. 50% contingency engineering estimates for all proposed mitigation options.

2. PROPOSED STRUCTURE PLAN AREA

The following stormwater aspects of the Structure Plan areas have been considered, utilising the zoning as provided in Figure 2. It is noted that these zones may be change in the future (as they are still subject to consultation) but are required to be assumed at this stage to allow for an effects assessment. The assumptions associated with the Structure Plan areas are:

1. The percentage impervious assumption for the site aligns with the Medium Density Residential Standards (MDRS) assumptions, assuming 70% for all residential zones, 90% for commercial and 90% for industrial zones. Roading imperious areas are included in Zones at this stage.
2. Modelling is currently undertaken as rain on the grid with losses removed from the rainfall.
3. We have included assets shown in the 2022 LIDAR and Councils asset database provided by the WDC GIS team. It is worth noting that if a subdivision is not currently handed over to the Council, it may not yet be captured.
4. We have used road and lot layouts provided by the Lovell family to guide solution locations.
5. As the pipe and culvert infrastructure with the growth area is limited, the terrain has been altered to remove these obstructions where known.
6. It is assumed that existing landforms are generally maintained; however, in the mitigated scenarios, existing low points will be graded out and drained to stormwater devices.
7. Currently, road, landform, and reserve areas have not been provided, and as such, all stormwater assumptions are based on existing and broad assumptions.

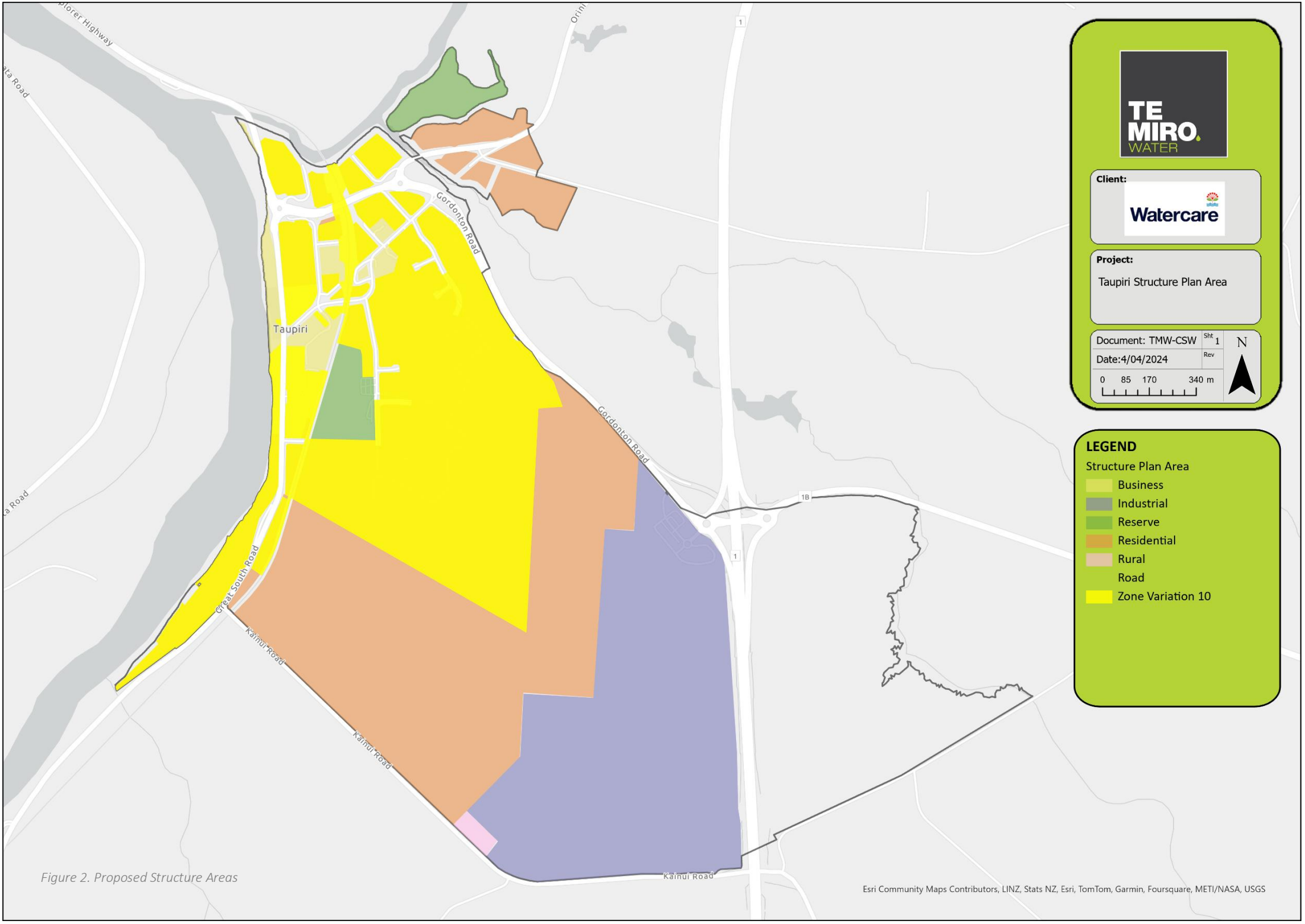

Figure 2. Proposed Structure Areas

3. TECHNICAL RISK ASSESSMENT

A technical risk assessment was undertaken to review:

1. The likelihood and extent of natural wetlands being present as defined by the NES within the growth areas of Taupiri.
2. The likelihood and risk of catchments contributing to contaminant loads to the receiving environment for the existing urban area under an existing development scenario (ED) .
3. The likelihood and risk of catchments contributing to erosion of the receiving environment for the existing urban area an under ED scenario.
4. The likely extent of 100-year ARI (1% AEP) (RCP 6) flooding present within growth areas should they be developed to the MPD.
5. The likely extent of 100-year ARI (1% AEP) (RCP 6) flooding present within some of the existing urban areas should they be developed to the MPD.

It is noted that pipe level of service and 100 year ARI (1% AEP) (RCP 6) flood hazard hasn't been assessed for Taupiri at this stage.

3.1. LIKELIHOOD OF NATURAL WETLAND ASSESSMENT

It has been identified that there is a high likelihood of natural wetlands being present with the new growth areas of the Structure Plan due to the topography and local experience within this area. Whilst the National Policy Statement for Freshwater requires regional authorities to map wetlands, this process has not been completed in in the Waikato.

To determine the potential extent and location of natural wetlands, a desktop assessment has been undertaken utilising the existing 2-year ponded areas new growth areas of the Structure Plan area. The assumptions behind this model can be found in the Model Build Report (Morphum and TMW, 2023). The potential extent and locations of natural wetlands is presented in Figure 3 below.

This assessment considers only wetlands that would be valley bottom and lowland and cannot account for hill seeps or wetlands formed by springs. It is recommended that a wetland specialist is engaged to assess and confirm the wetlands within the indicative areas provided. Any wetland areas will need to be avoided or assessed through the effects management hierarchy to meet the current requirements of the NES:FW. The detail of this assessment is documented in the memo - Desktop Potential Wetland Assessment Methodology – Ngāruawāhia & Taupiri (Morphum and TMW, 2023).

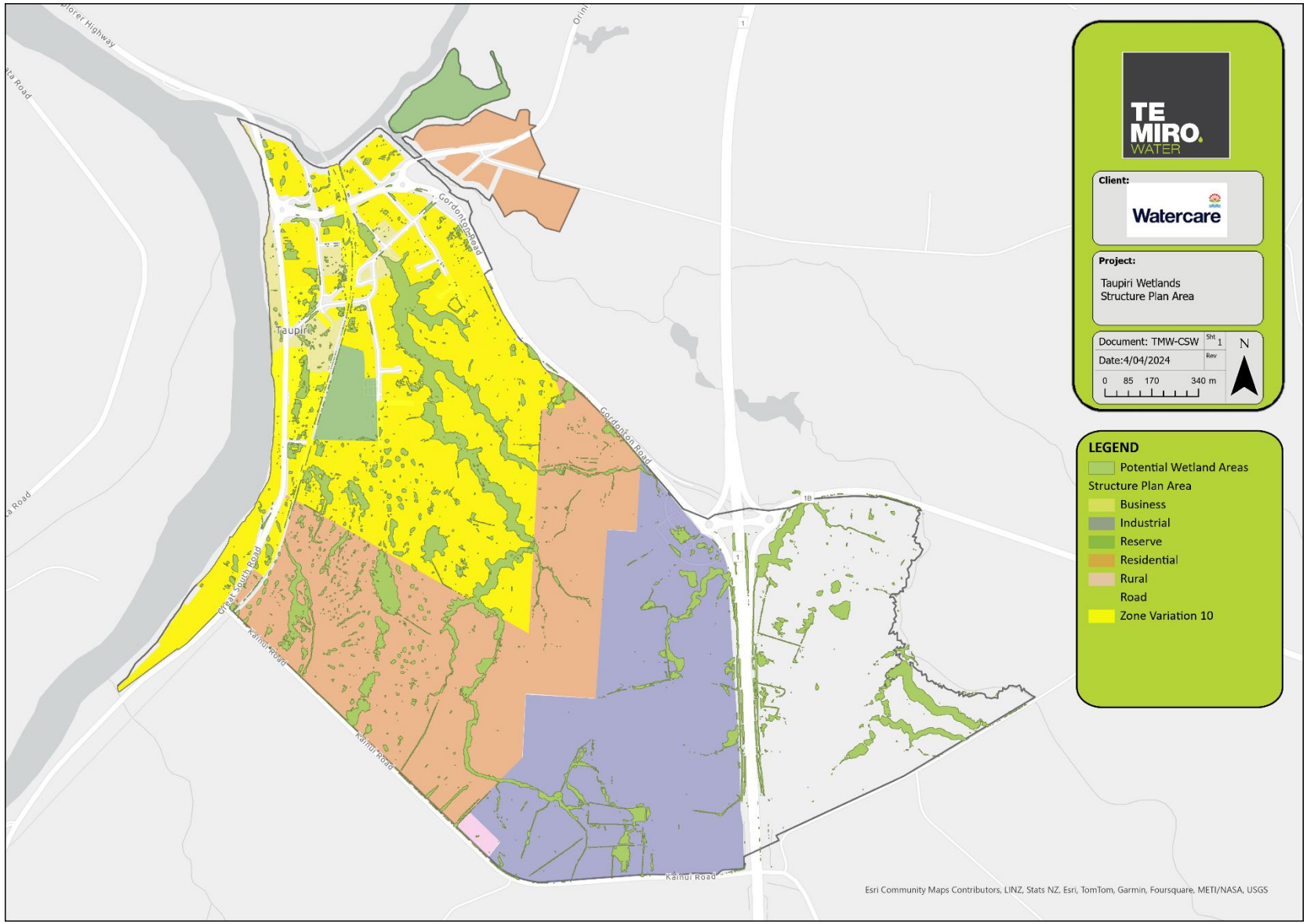

Figure 3. Potential wetland locations – new growth areas

3.2. EXISTING CATCHMENTS WITH HIGH CONTAMINANT AND VOLUME (EROSION) LOAD RISK

It is well documented that contaminants and increased runoff volume from urban areas negatively impact waterways, lakes, and wetlands. The best practice catchment management solutions should mitigate discharge volumes and contaminants (including hydrocarbons and heavy metals (zinc/copper)) from existing and new development.

Contaminant risk modelling and volume risk modelling of the Structure Plan areas under existing development scenarios was undertaken to assess the catchments of risk. Site visits of receiving environments were undertaken as outlined in the Erosion and Water Quality Assessment Report (Morphum and TMW, 2023) to confirm desktop findings. The assessment findings summarise the catchments of risk as presented in Figures 4 & 5 below. In general, volume risk was the greatest within the catchments with small areas but a high percentage impervious. This correlated well to site observations. Additionally, catchments with intensified residential development, and sizeable main road areas produce greater contaminant loads.

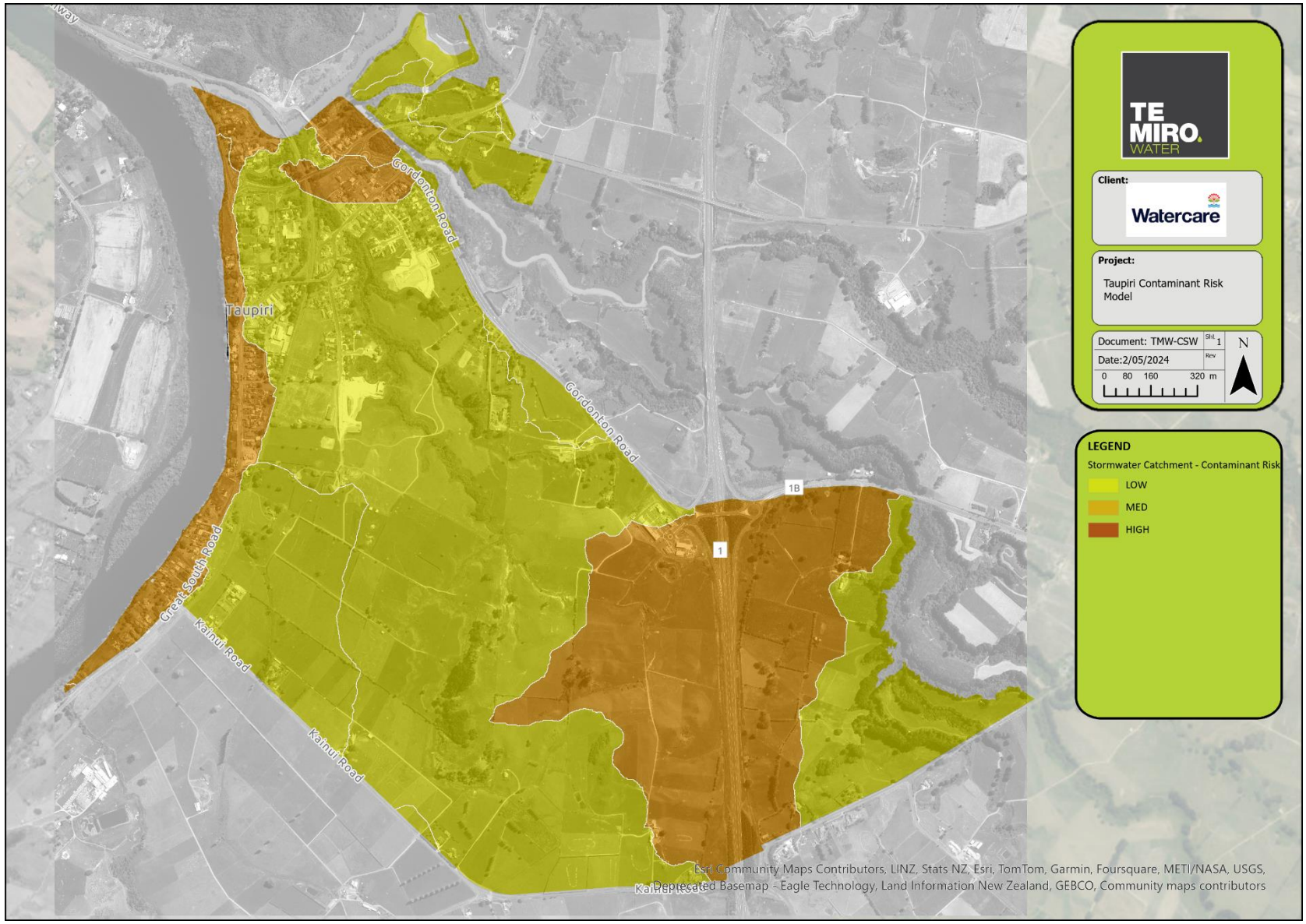

Figure 4. Contaminant Load Risk –Structure Plan Area

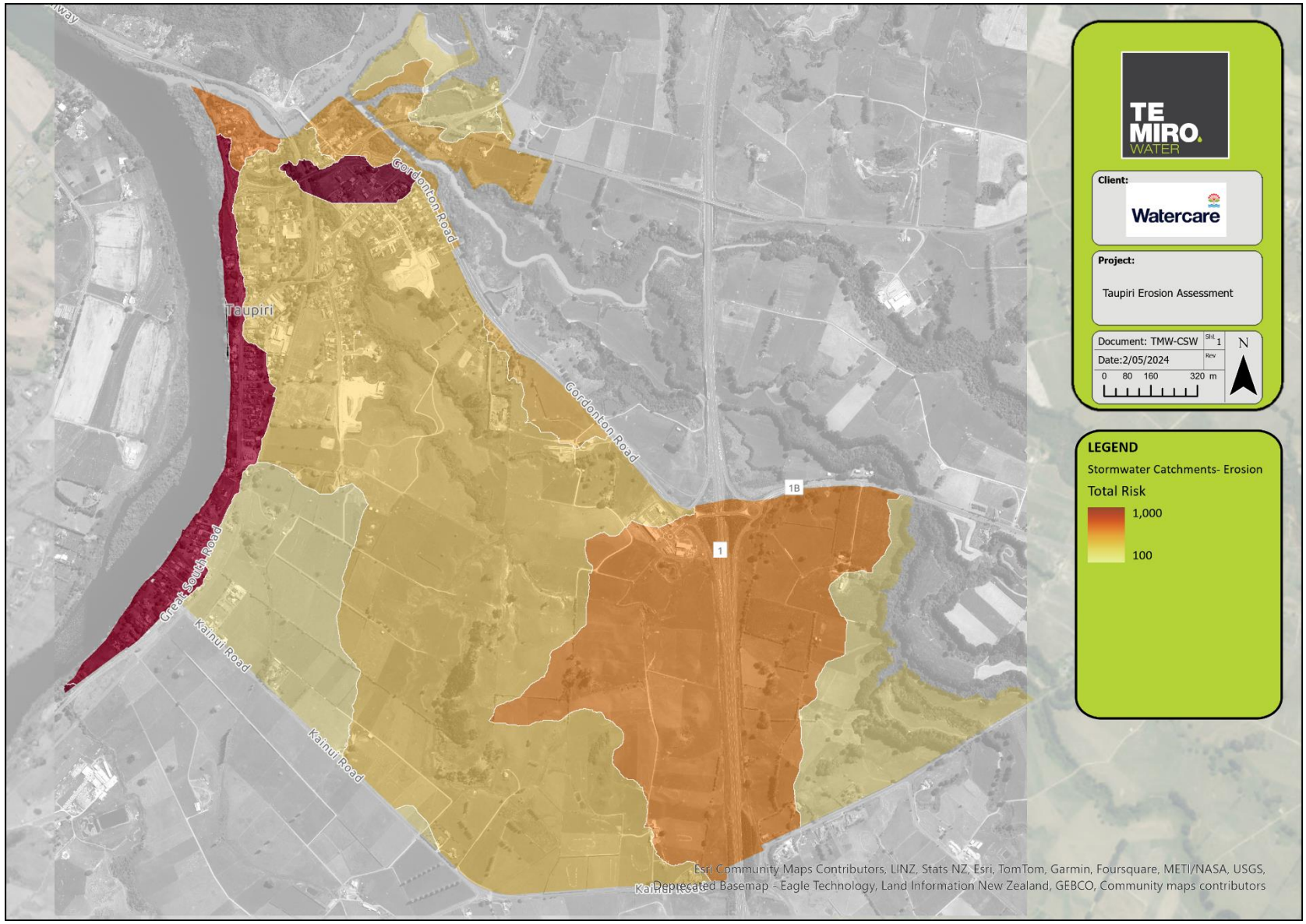

Figure 5 Volume Load Risk –Structure Plan Area

3.3. 100 YEAR ARI UNMITIGATEED FLOOD IMPACTS

An assessment was undertaken to review the likely extent of 100- year ARI (1% AEP) (RCP6) flooding present should the Structure Plan growth areas be developed to the MPD. A 100-year ARI (1% AEP) (RCP6) rain on grid model was developed to provide an indication of the resultant flood extents and depths. It should be noted that the urban pipe network has not been included in this assessment at this stage (within the existing urban area) and therefore results in this region should be indicative only. The assumptions and methodology associated with the modelling results can be found in the Model Build Report (Morphum and TWM, 2023). The MPD 100-year (1% AEP) (RCP 6) flood extents are provided in Figure 6 below. The areas of flooding will need to be offset/moved, or avoided should development occur. It is recommended that a site visit is conducted to confirm farm drains and culverts in these areas as data is currently limited.

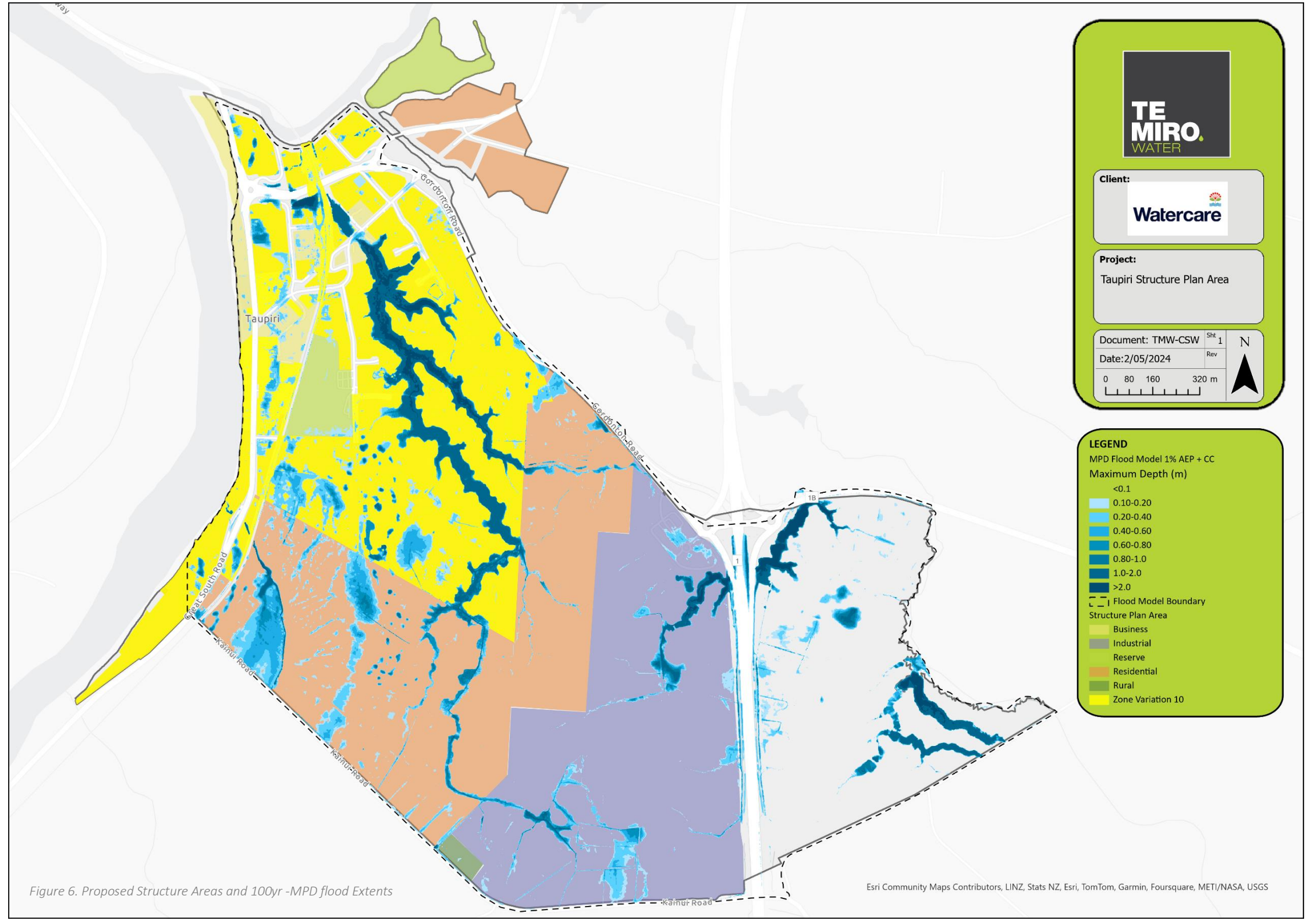

Figure 6. Proposed Structure Areas and 100yr -MPD flood Extents

4. PROPOSED STORMWATER MITIGATION

The proposed stormwater mitigation is separated between:

1. Mitigation proposed to offset the effects of future growth area development on the receiving environment, encompassing peak flow management, conveyance, contaminant load management and the effects of increased volume discharge.
2. Mitigation proposed to offset existing water quality impacts from the existing urban area. At this stage flood hazard and volume has not been considered in the assessment.

Mitigation has been determined through a high-level assessment of the likely receiving environments along with best practice outcomes that reflect likely Waikato Regional and District design requirements. Proposed mitigation options are provided in Figure 7 with a description provided in Table 2 and 3.

Flood Risk Management.

1. 80% 100-year flood mitigation is provided where the downstream environment is constrained and would likely be difficult to upgrade (i.e., an existing culvert, farm drain, or impacted property is present).
2. 100-year flood storage volumes are assessed using the difference between the existing vs. developed runoff volumes, assuming that 10% of the existing volumes remain trapped and cannot discharge into the receiving environment.
3. 100-year flood storage assumes that growth areas catchments are graded towards the proposed device.
4. Swales are sized to convey the maximum 100-year ARI (RCP6) design flows and are assumed to be 1 meter deep.
5. Detention basins are assumed to be 1 metres in depth.
6. Where there is free discharge to a large downstream valley, it is assumed that detention is not required.

Water Quality

1. Wetland area is assumed to be 5% of the contributing area and an average of 1000 mm in depth.
2. The Raingarden area is assumed to be 5% of the contributing area (roads) and treats road runoff only (houses will be managed through on lot treatment).
3. Swales are assumed to be planted, and check dams are required to achieve residence times.
4. It is assumed that on-lot treatment devices may require "top-up" treatment through swales.

Volume Capture:

1. The extended detention and initial abstraction volume are assumed to be managed within detention basins and wetlands. Local experience indicates that soakage may be unviable across much of the catchment.
2. A 2-year detention was investigated for where the receiving environment may be subject to erosion risk, however it is considered that this not required for this area.

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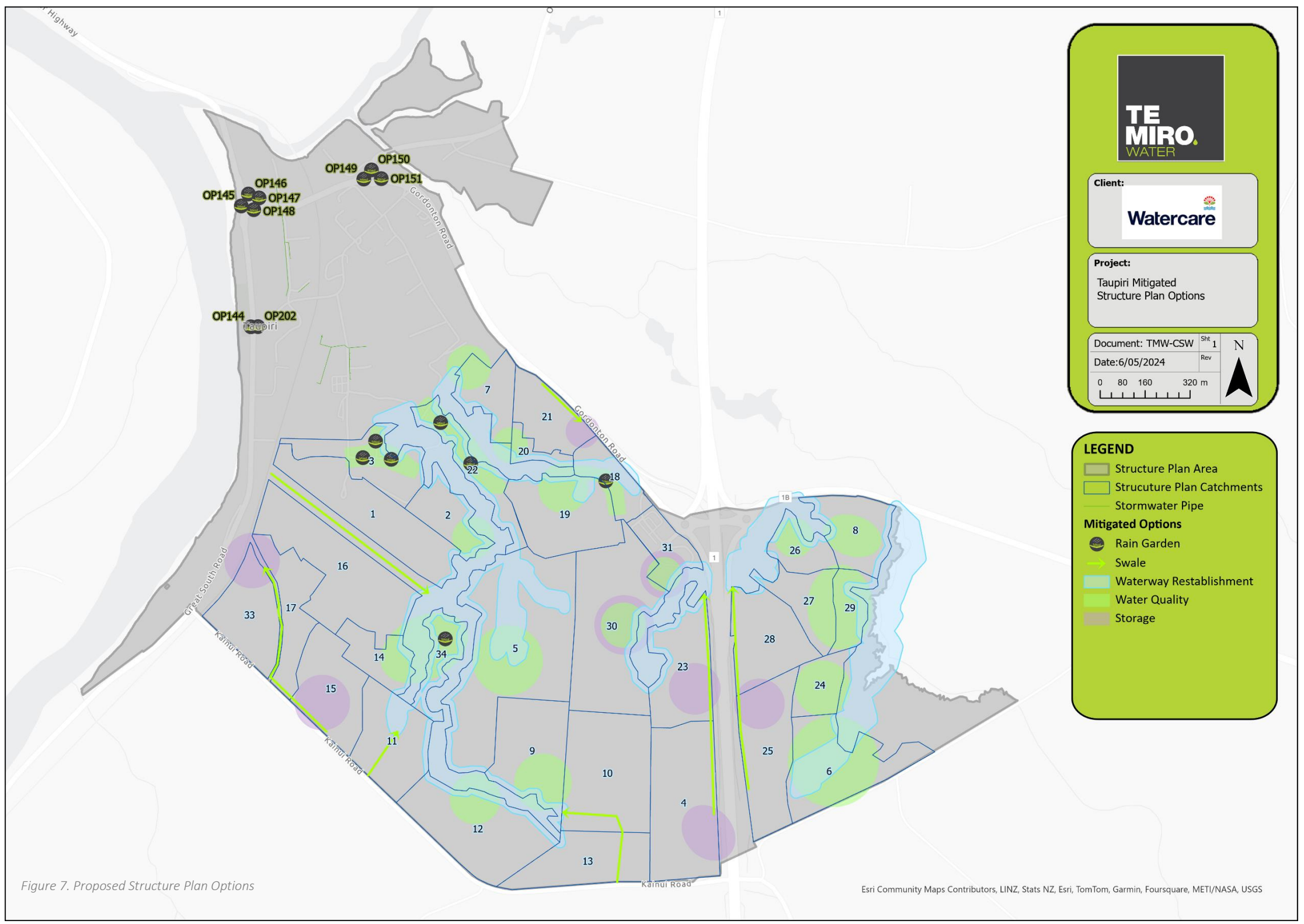


Figure 7. Proposed Structure Plan Options

Table 2. Summary of proposed mitigation – growth areas

Catchment	Description of Mitigation	Approximate 100-year ARI Storage Volume (m3)	Approximate 100-year ARI Storage Area (assume 1 m deep ponds) (m2)	Approximate Wetland Area (m2)	Approximate Raingarden Area (m2)	Approximate Swale Earthworks volumes (m3)	Pipes and Culverts (m)
1	The catchments drain into a large receiving environment, so a swale network is recommended to convey the 100-year development runoff and not need a detention basin before discharging to the gully. Volume mitigation will be incorporated in the larger swale along with the water quality treatment.	0	0	0	0	2550	0
2	The catchment has a sizeable receiving gully on the east and does not require volume or peak flow mitigation. However, the wetland is proposed on the southern edge for W.Q. treatment due to the ability of the catchment to drain through one outlet.	0	0	2150	0	0	0
3	The catchment has a sizeable receiving gully on the east and does not require volume mitigation. However, for W.Q. treatment, rain gardens are proposed along the road due to the catchment flow paths.	0	0	0	250	0	0
4	These catchments will be redirected from low points to the wider gully. A swale network and 100-year detention basin are proposed to manage runoff and direct to the gully through an internal stormwater network.	12100	12100	0	0	1250	12100
5	This catchment is likely made up of a gully network that can undergo restoration. Due to the sizeable receiving environment, volume and peak flow mitigation is not necessary. It is recommended that a wetland is constructed	0	0	11800	0	0	0

	for W.Q. treatment before discharging into the guilty.						
6	These catchments are likely made up of a gully network that can be restored. Due to the sizeable receiving environment, volume and peak flow mitigation is not necessary. It is recommended that a wetland is constructed for W.Q. treatment before discharging into the guilty.	0	0	4900	0	0	0
7	These catchments are likely made up of a gully network that can be restored. Due to the sizeable receiving environment, volume and peak flow mitigation is not necessary. It is recommended that a wetland is constructed for W.Q. treatment before discharging into the guilty.	0	0	2300	0	0	0
8	These catchments are likely made up of a gully network that can be restored. Due to the sizeable receiving environment, volume and peak flow mitigation is not necessary. It is recommended that a wetland is constructed for W.Q. treatment before discharging into the guilty.	0	0	3000	0	0	0
9	These catchments are likely made up of a gully network that can be restored. Due to the sizeable receiving environment, volume and peak flow mitigation is not necessary. It is recommended that a wetland is constructed for W.Q. treatment before discharging into the guilty.	0	0	4600	0	0	0
10	The catchment is likely made up of a gully network that can undergo restoration. Due to the small receiving environment and presence of multiple gullies, it is recommended that the	0	0	0	0	2650	0

	swales be constructed to manage volume 100 yr volumes and WQ.						
11	The catchment has a central drain to carry the runoff. A dual-purpose swale is recommended to manage the 100 yr runoff and WQ.	0	0	0	0	1700	0
12	The catchment is likely made up of a drain network that can undergo restoration. Due to the large downstream gully, it is recommended that a wetland is constructed to treat W.Q. before it discharges into the gully.	0	0	5850	0	0	0
13	The catchment is likely made up of a gully network that can undergo restoration. Due to the small receiving environment and presence of multiple gullies, it is recommended that the swales be constructed to manage volume 100 yr volumes and WQ.	0	0	0	0	1850	0
14	The catchment has a large receiving environment, so volume mitigation is not necessary. It is recommended that a wetland is constructed for W.Q. treatment before discharging into the guilty.	0	0	1950	0	0	0
15	The catchment has a central drain to carry the runoff, so a detention basin is recommended to manage the 100 yr off before discharging to the drains, and a swale is proposed for W.Q. and for carrying the basin discharge	9350	9350	0	0	950	9350
16	The catchments drain into a large receiving environment, so a swale network is recommended to convey the 100-year development runoff and not need a detention basin before discharging to the gully. Volume mitigation will be incorporated in the larger swale along with the water quality treatment.	0	0	0	0	1650	0

17	The catchment has a main drain running along the western boundary, so it is recommended to have a swale to manage and carry the 100-year runoffs to the drain.	0	0	0	0	600	0
18	The catchment has an internal gully, which is large enough, so volume mitigation is not necessary. For W.Q., rain gardens are proposed along the road network.	0	0	0	150	0	0
19	The catchment drains to a large gully, so a wetland for W.Q. treatment would be recommended.	0	0	4700	0	0	0
20	The catchment drains to a large gully, so a wetland for W.Q. treatment would be recommended.	0	0	750	0	0	0
21	The catchment is a small drain that carries the flows under the road to the other side into a more prominent gully. Both a detention basin and a swale are recommended to manage the 100 and W.Q. volumes	4100	4100	0	0	2050	4100
22	Large gullies surround the catchment, so 100-year volume mitigation is not required. Rain gardens can be used to treat W.Q. along the road network.	0	0	0	200	0	0
23	These catchments will be redirected from low points to the wider gully. A swale network and 100-year detention basin are proposed to manage runoff and direct to the gully through an internal stormwater network.	7850	7850	0	0	950	7850

24	Large gullies surround the catchment, so 100-year volume mitigation is not required. Wetlands can be used to treat W.Q. before it discharges into the stream.	0	0	1750	0	0	0
25	The catchment is likely made up of a gully network that can undergo restoration. Due to the small receiving environment and flat flood-impacted terrain, it is recommended that a swale network convey the development runoff to a 100-year detention basin before discharge to the gully.	8750	8750	0	0	800	8750
26	Large gullies surround the catchment, so 100 yr volume mitigation is not required. Wetlands can be used to treat W.Q. before it discharges into the stream.	0	0	1600	0	0	0
27	Large gullies surround the catchment, so 100 yr volume mitigation is not required. Wetlands can be used to treat W.Q. before it discharges into the stream.	0	0	2300	0	0	0
28	The catchment is likely made up of a drain network that can undergo restoration. Due to the small receiving environment and flat flood-impacted terrain, it is recommended that a dual-purpose swale network convey the yr development runoff and also do WQ	6850	6850	0	0	1100	6850
29	The catchment discharges into a large gully, so 100-year volume mitigation is unnecessary. Wetlands can be used to treat W.Q. before it discharges into the stream.	0	0	1550	0	0	0
30	The catchment is likely made up of a drain network that can undergo restoration. It drains into a large gully. Due to the small receiving environment, it is recommended	14150	14150	7850	0	0	14150

	that a detention basin is constructed to manage the 100 yr volumes with an internal wetland for W.Q. treatment						
31	The catchment drains into a small gully, which enters a culvert. A storage basin is thus recommended for 100-volume management with a wetland for W.Q. treatment	3450	3450	1850	0	0	3450
33	The catchment has a main running on the eastern boundary and receives large flooding from the external catchments. A long swale and detention basin are recommended to manage the external and internal 100 yr flows as well as WQ	8250	8250	0	0	1250	8250
34	Large gullies surround the small catchment, so only W.Q. treatment is required, which can be managed with rain gardens on the road.	0	0	0	150	0	0

Table 3. Summary of proposed mitigation measure for existing urban areas

Project Identifier	Location/Project	Device	Physical location	Approximate Storage Volume (m^3) to reduce flood hazard	Approximate Treatment Area (m^2)	Pipes and Culverts (m)
OP144	Taupiri	Raingardens and associated upgrade works	Great South Road, Opposite Te Putu Street		2.4 by 1.8 metre Rain Garden	22.5
OP145	Taupiri	Raingardens and associated upgrade works	Intersection of Great South Road and Thermal Explorer Highway, west of the Roundabout		2.4 by 1.8 metre Rain Garden	22.5
OP146	Taupiri	Raingardens and associated upgrade works	Corner of Wright Street and Thermal Explorer Highway, North of the Roundabout		2.4 by 1.8 metre Rain Garden	22.5
OP147	Taupiri	Raingardens and associated upgrade works	Corner of Wright Street and Gordonton Road, East of the Roundabout		2.4 by 1.8 metre Rain Garden	22.5
OP148	Taupiri	Raingardens and associated upgrade works	Intersection of Great South Road and Gordonton Road, Southeast of the Roundabout		2.4 by 1.8 metre Rain Garden	22.5
OP149	Taupiri	Raingardens and associated upgrade works	East exit of the Gordonton Road Roundabout		2.4 by 1.8 metre Rain Garden	22.5
OP150	Taupiri	Raingardens and associated upgrade works	Orini Road, on the North exit of the Gordonton Road Roundabout		2.4 by 1.8 metre Rain Garden	22.5
OP151	Taupiri	Raingardens and associated upgrade works	West exit of the Gordonton Road Roundabout		2.4 by 1.8 metre Rain Garden	22.5
OP202	Taupiri	Raingardens and associated upgrade works	Te Putu Street, on the intersection of Great South Road		2.4 by 1.8 metre Rain Garden	22.5

5. PRELIMINARY ESTIMATE OF COSTS

The engineering estimate of costs for each mitigation opportunity is provided in Table 4. The estimates are provided with the following assumptions.

- **Estimates Only:** The cost estimates provided are for the preliminary structure plan are for informative purposes only and are not final or binding quotes. Actual project costs may vary based on further investigation.
- **Accuracy:** The estimate is based on available information and assumptions at the time of preparation. It does not guarantee the accuracy of the final costs.
- **Scope of Work:** The estimate is based on the defined scope of work and may not include costs for unforeseen items or changes to the project scope.
- **Contingencies:** The estimate includes a 50% contingency to account for unforeseen conditions or changes in project requirements
- **Inflation:** The estimate may not account for inflation, and the costs are expressed in current value terms.
- **Local Conditions:** The estimate considers general market conditions, and actual costs may vary depending on specific regional or local conditions.
- **Availability of Materials and Labour:** The estimate assumes the availability of materials and labour at the time of the estimate. Delays or changes in availability may impact costs.
- **Approval Process:** The estimate may not include costs associated with permit fees, regulatory approvals, or other administrative expenses.
- **Assumptions:** The estimate is based on certain assumptions, and any changes to these assumptions may impact the final cost.
- **Design Development:** The estimate is based on preliminary or conceptual design and may not account for detailed design changes.
- **Currency:** The estimate is expressed in a specific currency (New Zealand Dollars) and may not consider fluctuations in exchange rates.
- **Change Orders:** The estimate does not account for potential change orders or variations that may arise during the course of the project.

5.1. RATES AND ASSOCIATED ASSUMPTIONS

All items and detailed rate assumptions associated with the mitigation opportunities are described within the schedule provided in Appendix A.

The following assumptions are applied to the engineering estimate of costs for each opportunity.

- Pricing is considered high-level, and all rates are based on similar projects from May 2023.
- All pricing should be used for the purposes of preliminary and conceptual planning costs only. These prices may change subject to design changes.
- A 15% design budget has been applied to all total mitigation opportunities.
- Costs associated with consenting have not been applied.
- Costs associated with maintenance access or landscaping have not been applied.
- All rates assume that mitigation opportunities will be undertaken as small to medium size projects. For example, two different construction activities and consultation with up to 10 landowners/stakeholder groups.

Table4. Preliminary estimate of costs – Strcuture plan area

				PRELIMINARY & GENERAL	EROSION AND SEDIMENT CONTROL	EARTHWORKS	STORMWATER	UTILITY SERVICES	TOTAL		
PROJECT NUMBER	LOCATION/PROJECT	DEVICE	PHYSICAL ADDRESS	ESTIMATE COST OF PRELIMINARY GENERAL	ESTIMATE THE COST OF EROSION SEDIMENT CONTROL	ESTIMATE COST OF EARTHWORKS	ESTIMATE COST OF STORMWATER	ESTIMATE COST OF UTILITY SERVICES	DETAIL DESIGN	ESTIMATED TOTAL COST	CONTINGENCY 50%
CATCHMENT 1	Taupiri - Structure Plan	Swale	Taupiri	$105,900	$19,550	$88,600	$182,500	$0	$60,000	$457,000	$685,500
CATCHMENT 2	Taupiri - Structure Plan	Wetland	Taupiri	$105,900	$22,700	$75,600	$182,500	$0	$59,000	$446,000	$669,000
CATCHMENT 3	Taupiri - Structure Plan	Raingardens	Taupiri	$61,450	$2,150	$14,950	$1,361,350	$0	$216,000	$1,656,000	$2,484,000
CATCHMENT 4	Taupiri - Structure Plan	Basin	Taupiri	$105,900	$40,850	$398,650	$182,500	$0	$110,000	$838,000	$1,257,000
CATCHMENT 4	Taupiri - Structure Plan	Swale	Taupiri	$105,900	$18,350	$46,400	$182,500	$0	$53,000	$407,000	$610,500
CATCHMENT 5	Taupiri - Structure Plan	Wetland	Taupiri	$105,900	$31,550	$388,900	$179,100	$0	$106,000	$812,000	$1,218,000
CATCHMENT 6	Taupiri - Structure Plan	Wetland	Taupiri	$105,900	$25,200	$164,900	$182,500	$0	$72,000	$551,000	$826,500
CATCHMENT 7	Taupiri - Structure Plan	Wetland	Taupiri	$105,900	$22,800	$80,500	$179,100	$0	$59,000	$448,000	$672,000
CATCHMENT 8	Taupiri - Structure Plan	Wetland	Taupiri	$98,900	$23,450	$103,200	$182,500	$0	$62,000	$471,000	$706,500
CATCHMENT 9	Taupiri - Structure Plan	Wetland	Taupiri	$105,900	$24,950	$72,250	$182,500	$0	$58,000	$444,000	$666,000

PROJECT NUMBER	LOCATION/PROJECT	DEVICE	PHYSICAL ADDRESS	PRELIMINARY & GENERAL	EROSION AND SEDIMENT CONTROL	EARTHWORKS	STORMWATER	UTILITY SERVICES	TOTAL		
				ESTIMATE COST OF PRELIMINARY GENERAL	ESTIMATE THE COST OF EROSION SEDIMENT CONTROL	ESTIMATE COST OF EARTHWORKS	ESTIMATE COST OF STORMWATER	ESTIMATE COST OF UTILITY SERVICES	DETAIL DESIGN	ESTIMATED TOTAL COST	CONTINGENCY 50%
CATCHMENT 10	Taupiri - Structure Plan	Swale	Taupiri	$105,900	$19,650	$260,700	$182,500	$0	$86,000	$655,000	$982,500
CATCHMENT 11	Taupiri - Structure Plan	Swale	Taupiri	$105,900	$18,750	$47,450	$182,500	$0	$54,000	$409,000	$613,500
CATCHMENT 12	Taupiri - Structure Plan	Wetland	Taupiri	$105,900	$26,100	$24,500	$179,100	$0	$51,000	$387,000	$580,500
CATCHMENT 13	Taupiri - Structure Plan	Swale	Taupiri	$105,900	$18,900	$148,800	$182,500	$0	$69,000	$526,000	$789,000
CATCHMENT 14	Taupiri - Structure Plan	Wetland	Taupiri	$105,900	$22,500	$90,250	$179,100	$0	$60,000	$458,000	$687,000
CATCHMENT 15	Taupiri - Structure Plan	Basin	Taupiri	$105,900	$38,300	$78,750	$182,500	$0	$61,000	$467,000	$700,500
CATCHMENT 15	Taupiri - Structure Plan	Swale	Taupiri	$105,900	$18,050	$184,400	$182,500	$0	$74,000	$565,000	$847,500
CATCHMENT 16	Taupiri - Structure Plan	Swale	Taupiri	$105,900	$18,700	$65,400	$182,500	$0	$56,000	$429,000	$643,500
CATCHMENT 17	Taupiri - Structure Plan	Swale	Taupiri	$105,900	$17,750	$66,000	$182,500	$0	$56,000	$429,000	$643,500
CATCHMENT 18	Taupiri - Structure Plan	Raingardens	Taupiri	$61,450	$2,050	$288,050	$829,850	$0	$178,000	$1,360,000	$2,040,000

PROJECT NUMBER	LOCATION/PROJECT	DEVICE	PHYSICAL ADDRESS	PRELIMINARY & GENERAL	EROSION AND SEDIMENT CONTROL	EARTHWORKS	STORMWATER	UTILITY SERVICES	TOTAL		
				ESTIMATE COST OF PRELIMINARY GENERAL	ESTIMATE THE COST OF EROSION SEDIMENT CONTROL	ESTIMATE COST OF EARTHWORKS	ESTIMATE COST OF STORMWATER	ESTIMATE COST OF UTILITY SERVICES	DETAIL DESIGN	ESTIMATED TOTAL COST	CONTINGENCY 50%
CATCHMENT 19	Taupiri - Structure Plan	Wetland	Taupiri	$105,900	$25,000	$45,350	$182,500	$0	$54,000	$413,000	$619,500
CATCHMENT 20	Taupiri - Structure Plan	Wetland	Taupiri	$105,900	$21,400	$57,300	$182,500	$0	$56,000	$424,000	$636,000
CATCHMENT 21	Taupiri - Structure Plan	Basin	Taupiri	$105,900	$33,450	$33,400	$182,500	$0	$54,000	$410,000	$615,000
CATCHMENT 21	Taupiri - Structure Plan	Swale	Taupiri	$105,900	$19,100	$15,700	$182,500	$0	$49,000	$373,000	$559,500
CATCHMENT 22	Taupiri - Structure Plan	Raingardens	Taupiri	$61,450	$2,100	$148,000	$1,095,600	$0	$197,000	$1,505,000	$2,257,500
CATCHMENT 23	Taupiri - Structure Plan	Basin	Taupiri	$105,900	$36,900	$46,600	$182,500	$0	$56,000	$428,000	$642,000
CATCHMENT 23	Taupiri - Structure Plan	Swale	Taupiri	$105,900	$18,050	$131,650	$182,500	$0	$66,000	$505,000	$757,500
CATCHMENT 24	Taupiri - Structure Plan	Wetland	Taupiri	$105,900	$22,300	$71,700	$182,500	$0	$58,000	$441,000	$661,500
CATCHMENT 25	Taupiri - Structure Plan	Basin	Taupiri	$105,900	$37,750	$32,900	$182,500	$0	$54,000	$414,000	$621,000
CATCHMENT 25	Taupiri - Structure Plan	Swale	Taupiri	$105,900	$17,950	$244,350	$182,500	$0	$83,000	$634,000	$951,000

PROJECT NUMBER	LOCATION/PROJECT	DEVICE	PHYSICAL ADDRESS	PRELIMINARY & GENERAL	EROSION AND SEDIMENT CONTROL	EARTHWORKS	STORMWATER	UTILITY SERVICES	TOTAL		
				ESTIMATE COST OF PRELIMINARY GENERAL	ESTIMATE THE COST OF EROSION SEDIMENT CONTROL	ESTIMATE COST OF EARTHWORKS	ESTIMATE COST OF STORMWATER	ESTIMATE COST OF UTILITY SERVICES	DETAIL DESIGN	ESTIMATED TOTAL COST	CONTINGENCY 50%
CATCHMENT 26	Taupiri - Structure Plan	Wetland	Taupiri	$105,900	$22,150	$38,150	$182,500	$0	$53,000	$402,000	$603,000
CATCHMENT 27	Taupiri - Structure Plan	Wetland	Taupiri	$105,900	$22,800	$63,900	$182,500	$0	$57,000	$433,000	$649,500
CATCHMENT 28	Taupiri - Structure Plan	Basin	Taupiri	$105,900	$36,000	$285,500	$182,500	$0	$92,000	$702,000	$1,053,000
CATCHMENT 28	Taupiri - Structure Plan	Swale	Taupiri	$105,900	$18,200	$32,500	$182,500	$0	$51,000	$391,000	$586,500
CATCHMENT 29	Taupiri - Structure Plan	Wetland	Taupiri	$105,900	$22,100	$57,650	$182,500	$0	$56,000	$425,000	$637,500
CATCHMENT 30	Taupiri - Structure Plan	Basin	Taupiri	$105,900	$42,700	$107,950	$182,500	$0	$66,000	$506,000	$759,000
CATCHMENT 30	Taupiri - Structure Plan	Wetland	Taupiri	$105,900	$27,900	$230,550	$182,500	$0	$83,000	$630,000	$945,000
CATCHMENT 31	Taupiri - Structure Plan	Basin	Taupiri	$105,900	$32,850	$47,000	$182,500	$0	$56,000	$425,000	$637,500
CATCHMENT 31	Taupiri - Structure Plan	Wetland	Taupiri	$105,900	$22,400	$56,850	$182,500	$0	$56,000	$424,000	$636,000
CATCHMENT 33	Taupiri - Structure Plan	Basin	Taupiri	$105,900	$37,300	$451,550	$182,500	$0	$117,000	$895,000	$1,342,500

PROJECT NUMBER	LOCATION/PROJECT	DEVICE	PHYSICAL ADDRESS	PRELIMINARY & GENERAL	EROSION AND SEDIMENT CONTROL	EARTHWORKS	STORMWATER	UTILITY SERVICES	TOTAL		
				ESTIMATE COST OF PRELIMINARY GENERAL	ESTIMATE THE COST OF EROSION SEDIMENT CONTROL	ESTIMATE COST OF EARTHWORKS	ESTIMATE COST OF STORMWATER	ESTIMATE COST OF UTILITY SERVICES	DETAIL DESIGN	ESTIMATED TOTAL COST	CONTINGENCY 50%
CATCHMENT 33	Taupiri - Structure Plan	Swale	Taupiri	$105,900	$18,350	$112,750	$182,500	$0	$63,000	$483,000	$724,500
CATCHMENT 34	Taupiri - Structure Plan	Raingardens	Taupiri	$61,450	$2,050	$242,850	$829,850	$0	$171,000	$1,308,000	$1,962,000

Table 5. Preliminary estimate of costs for the existing urban areas.

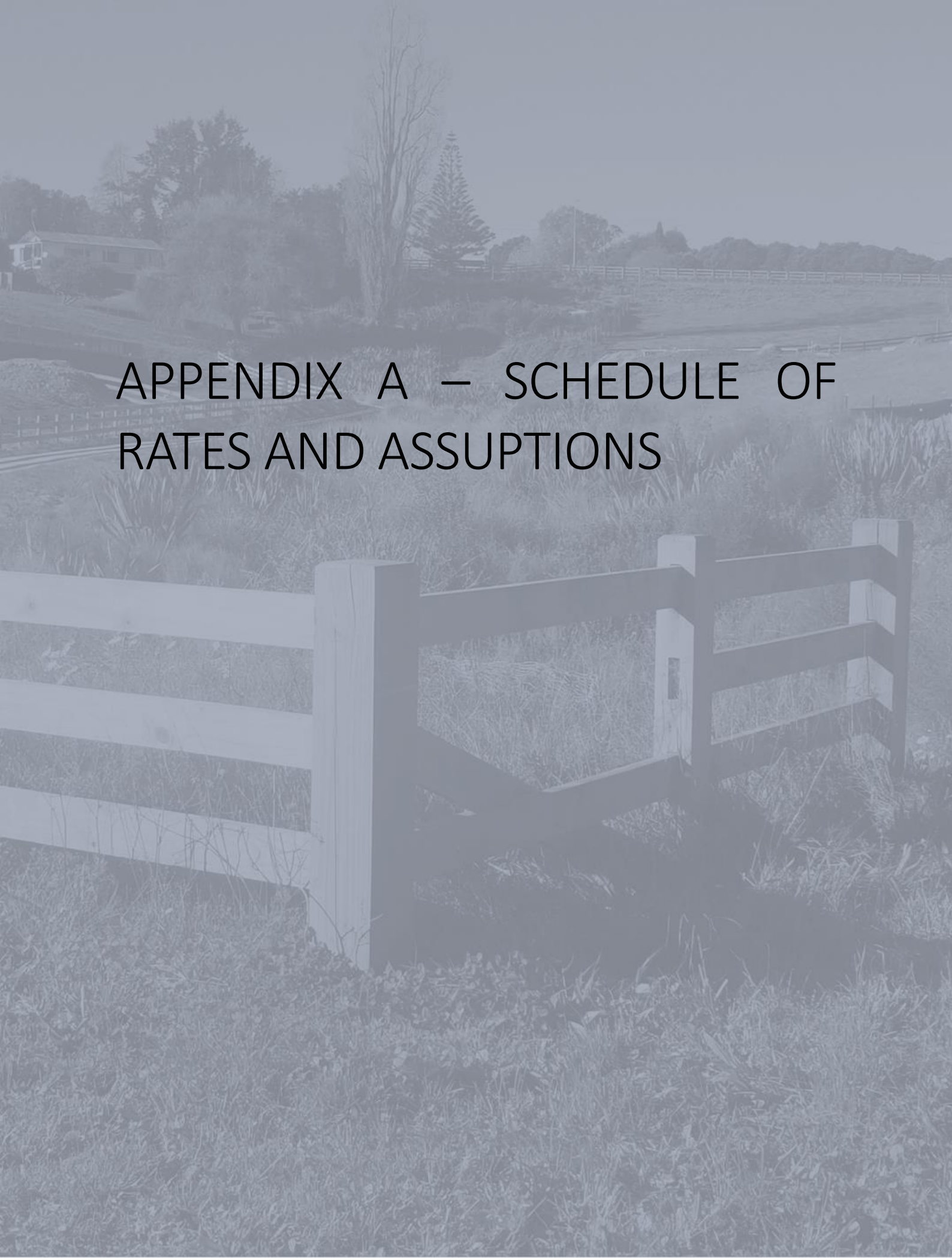
PROJECT NUMBER	LOCATION/PROJECT	DEVICE	PRELIMINARY & GENERAL	EROSION & SEDIMENT CONTROL	EARTHWORKS	STORMWATER	UTILITY SERVICES	TOTAL		
			ESTIMATE COST OF PRELIMINARY & GENERAL	ESTIMATE COST OF EROSION & SEDIMENT CONTROL	ESTIMATE COST OF EARTHWORKS	ESTIMATE COST OF STORMWATER	ESTIMATE COST OF UTILITY SERVICES	DETAILED DESIGN	ESTIMATED TOTAL COST	50% CONTINGENCY
OP144	TAUPIRI	RAINGARDENS	$15,000.00	$184.00	$1,608.86	$34,737.68	$7,937.34	$9,000.00	$69,000.00	$103,500.00
OP145	TAUPIRI	RAINGARDENS	$15,000.00	$184.00	$1,608.86	$34,737.68	$7,937.34	$9,000.00	$69,000.00	$103,500.00
OP146	TAUPIRI	RAINGARDENS	$15,000.00	$184.00	$1,608.86	$34,737.68	$7,937.34	$9,000.00	$69,000.00	$103,500.00
OP147	TAUPIRI	RAINGARDENS	$15,000.00	$184.00	$1,608.86	$34,737.68	$7,937.34	$9,000.00	$69,000.00	$103,500.00
OP148	TAUPIRI	RAINGARDENS	$15,000.00	$184.00	$1,608.86	$34,737.68	$7,937.34	$9,000.00	$69,000.00	$103,500.00
OP149	TAUPIRI	RAINGARDENS	$15,000.00	$184.00	$1,608.86	$34,737.68	$0.00	$8,000.00	$60,000.00	$90,000.00
OP150	TAUPIRI	RAINGARDENS	$15,000.00	$184.00	$1,608.86	$34,737.68	$7,937.34	$9,000.00	$69,000.00	$103,500.00
OP151	TAUPIRI	RAINGARDENS	$15,000.00	$184.00	$1,608.86	$34,737.68	$0.00	$8,000.00	$60,000.00	$90,000.00
OP202	TAUPIRI	RAINGARDENS	$15,000.00	$184.00	$1,608.86	$34,737.68	$7,937.34	$9,000.00	$69,000.00	$103,500.00

6. NEXT STEPS

It is recommended that the "level 1" (first cut) mitigation device sizing and locations are workshopped with the wider infrastructure team (roading, parks, and urban design). Once device locations and typology are confirmed, along with an indication of roads, lot densities, and reserve infrastructure, further modelling and device design can be worked through along with determining existing infrastructure and wetlands.

7. REFERENCES

1. RITS (2018)
2. Waikato Stormwater Management Guideline (2020). Technical Report 2020/07
3. Waikato Stormwater Runoff Guideline (2020). Technical Report 2020/07



APPENDIX A – SCHEDULE OF RATES AND ASSUPTIONS

Schedule of rates and assumptions

Item	Description	Ut	Rate
1	PRELIMINARY & GENERAL		
1.01	Establishment and Disestablishment		
1.01.1	Allow for establishment onsite of all work facilities, equipment, etc. and the removal of the same upon completion of the construction works (SMALL to MEDIUM projects)	L.S.	$ 42,500.00
1.01.2	Allow for establishment onsite of all work facilities, equipment, etc. and the removal of the same upon completion of the construction works. Include Insurances, setting out, temporary traffic control, Services locations, construction Management plans, dust management plans, liaison, temporary fencing, as built data, H and S and the contract quality plan and erosion and sediment control as outlined in the descriptions below (RAIN GARDENS ONLY))	L.S.	$ 15,000
1.02	Insurances		
1.02.1	Allow to effect and maintain all insurances as stipulated in the contract documentation for the duration of the contract.	L.S.	$ 2,500.00
1.03	Setting Out of the Works and Site Surveying		
1.03.1	Allow for all costs for setting out the construction work in the specified position and to the specified level as detailed on the design drawings. Refer contract documentation for the information that will be provided by the Engineer for the construction set out.	L.S.	$ 23,496.00
1.04	Temporary Traffic Control		
1.04.1	Prepare and implement Traffic Management Plan, submit a C.A.R. in accordance with latest version of NZTA COPTTM and W.D.C. requirements, achieve approved Works Approval Notice including all signage, cones, barriers, vehicles, personnel etc. for the duration of the contract.	L.S.	$ 2,500.00
1.05	Services Location		
1.05.1	Liaise with service providers, obtain utility service plans and locate all existing services within the extents of the contract works. Includes all potholing as necessary and reinstatement.	L.S.	$ 1,500.00
1.06	Construction Management Plan		
1.06.1	Prepare, submit and implement C.M.P. including site management details, inspection, testing and quality plan to achieve compliance with the specifications/requirements of the Contract including all requisite testing, hold points, monitoring, sampling, analysis etc. Includes Construction Management Plan.	L.S.	$ 4,500.00
1.07	Dust Management Plan		
1.07.1	Prepare, submit and implement D.M.P. including site management details, inspection and compliance WITH THE Contract.	L.S.	$ 2,500.00
1.08	Liaison		
1.08.1	Liaison with all utility providers for protection of services and all subdivision diversions/services installation works, liaison with Council officers for consent compliance/inspections and liaison with adjacent Contractors for duration of the works.	L.S.	$ 2,000.00
1.09	Temporary Fencing (lm)		
1.09.1	Supply and install temporary security fencing. Includes dismantle and return. (Provisional Item)	lm	$ 36.89
1.10	As-built Information and Data Supply		
1.10.1	Prepare and supply as-built information/plans in specified format for the preparation of as built by the Engineer and all code compliance certification.	L.S.	$ 2,250.00
1.11	Health and Safety Management Plan		
1.11.1	Prepare and maintain Health and Safety Management Plan, including onsite Hazard Board, J.S.A., toolbox meeting and coordination with respective Hauraki District Council representatives and Engineer	LS	$ 1,800.00

Item	Description	Ut	Rate
1.12	Contract Quality Plan		
1.12.1	Prepare, maintain and IMPLEMENT CONTRACT Quality Plan (C.Q.P.). All Quality Assurance Testing, to be in accordance with the Waikato District Council Development Manual and Earthworks Specification and results provided to the Engineer and/or Geotech Engineer as appropriate.	L.S.	$ 1,900.00
2	EROSION & SEDIMENT CONTROL		
	Allow all costs to construct erosion and sediment control measures in accordance with WRC TR0902 and as detailed on the drawings or as directed by the Engineer/Council Representative. All rates are to allow for the phasing of controls as required throughout the contract works, inspection and maintenance of the controls throughout the contract period, and removal upon completion of the earthworks inclusive of the defects liability period.		
2.01	Sediment Retention Ponds (S.R.P.)		
2.01.1	Construct sediment retention pond as detailed including excavation/formation, embankments, primary M.H. riser/outlet, tee decants, sediment forebay, level spreader, emergency spillway, safety fencing and warning signage, provision of as built etc. complete incl. all maintenance for the duration of the contract incl. maintenance pumping. (20% Portion of existing S.R.P. cost)	L.S	$ 12,500.00
2.02	SRP Decommissioning		
2.02.1	Decommissioning of S.R.P.s at end of earthworks/site stabilisation including supply and compaction of engineered earth fill removal and disposal of all bunds, waste etc. complete. (20% Portion of existing S.R.P. cost)	L.S	$ 9,000.00
2.03	Diversion Drains, Bunds, Silt Fences & Contour Drains		
2.03.1	Install, maintain, phase and remove all additional erosion and sediment control measures in accordance with WRC TR0902 including dirty water/clean water diversion BUNDS (incl sourcing and bunding of topsoil), temporary contour drains, silt fences for the duration of the contract works.	L.S.	$ 6,285.71
2.04	Stabilised Construction Entrance		
2.04.1	Construct stabilised construction entrance to WRC TR0902 standard measures as the Contractor deems necessary to ensure all roadways are kept clean (direct runoff to onsite E&SC measures). Includes removal. Includes maintenance of stabilised entrance over duration of contract.	L.S	$ 1,912.33
2.05	Straw Mulching (m^2)		
2.04.1	Supply and spread Mulch to areas as directed with unrotted small grain straw applied at a minimum 4000kg per ha Rate (Provisional Item)	m^2	$ 0.92
3	EARTHWORKS		
	All works to be in accordance with Geotechnical Specification/G.I.R. and Civil Specification. Includes all on site Dust Management for duration of contract.		
3.01	Clearing		
3.01.1	Allow all costs to clear remaining vegetation, hedges including stumps and root removal, mulching and removal offsite as necessary. Mulch only to stockpile onsite for later reuse as directed.	L.S.	$ 5,820.00
3.01.2	Removal of trees including stumps and root removal, mulching and removal offsite as necessary. Mulch only to stockpile onsite for later reuse as directed. (Provisional Item)	LS	
3.02	Topsoil (m^3)		
3.02.1	Strip topsoil from earthworks areas (average depth 200mm) to designated onsite stockpile location in a position agreed with the Engineer/Geotechnical Engineer. (Solid Measure)	m3	$ 6.14

Item	Description	Ut	Rate
3.02.2	Respread stockpiled topsoil to completed earthworks areas to min. 150mm depth. (Solid Measure)	m³	$ 15.44
	Removal and Disposal of Surplus Topsoil (m³)		
3.02.4	Allow all costs to remove and dispose of all excess topsoil from site. (Solid Measure) Provisional Item	m³	$ 26.20
3.03	Bulk Cut to Fill (m³)		
3.03.1	Bulk cut to fill from cut areas (including, drainage/service trench surplus, trimming etc. using plant other than prime mover and placement), compaction to the required standards and design levels including benching as necessary. Rate to include for discing, conditioning, wetting or drying of material as required to achieve the required compaction standards. (Solid Measure in Cut) (Provisional Item)	m3	$ 12.32
3.03.2	E/O previous bulk cut to fill for lime/cement (drying) stabilisation as directed with pre blend of cement and lime spread at a rate of 10kg/m2 and hoed to a depth of 300mm to achieve required moisture standards and compaction. (Provisional Item)	m3	
3.04	Surplus Removal & Disposal (m³)		
3.04.1	Bulk cut of excess cut material and dispose of offsite. (Solid Measure in Cut) (Provisional Item)	m3	$ 25.72
3.05	Unsuitable Excavation (m³)		
3.05.1	Bulk cut of unsuitable wet/saturated materials from gully/fill undercut areas and dispose of offsite. (Solid Measure in Cut) (Provisional Item)	m3	$ 35.95
3.06	Preparation and Grassing and planting (m²)		
3.06.1	Prepare, level and rake topsoiled lots and road berms and sow with approved grass seed mix to designated areas and achieve grass cover.	m²	$ 8.45
4	ROADING		
Note	SUBGRADE - defined as 0.5m behind face of kerb & the vertical edge Road alignments and vehicle crossings SUBGRADE TESTING - Proof rolling, string line shape confirmation and Scala penetrometer testing of the subgrade surface		
4.01	Trimming		
4.01.1	Trim and roll subgrade of Road alignments, Right of Ways and Parking Bays to C.B.R.> 15, to 0.5m behind face of kerb, and shape and compact berms to C.B.R. 7.	m²	$ 1.99
4.02	Testing		
4.02.1	Subgrade Testing: Allow for proof rolling and testing with a Scala penetrometer of the subgrade to confirm minimum C.B.R. requirements have been achieved prior to subgrade improvement layer construction. Contractor to provide Scala results to Engineer for REVIEW AND APPROVAL prior to commencing ANY pavement construction	L.S.	$ 1,500.00
4.02.2	Benkelman Beam Test Allow for proof rolling and testing with a Benkelman Beam of the road base to confirm minimum requirements have been achieved prior to further construction. Contractor to provide Benkelman Beam results to Engineer for REVIEW AND APPROVAL prior to commencing ANY further pavement construction	L.S.	$ 3,000.00
4.03	Subgrade Undercutting & Subgrade Improvement		
4.03.1	Allow to undercut compressible, organic or unsuitable isolated areas (beneath the nominated subgrade improvement layer) as deemed by Engineer or Geotechnical Engineer and dispose offsite to suitable location (Provisional item)	m3	$ 32.61

Item	Description	Ut	Rate
4.03.2	Replace undercut material with approved pit sand, or hard fill, to subgrade level. Application and compaction to achieve C.B.R. 10. (Compacted quantity) (Provisional Item).	m3	$ 59.74
4.03.3	SUBGRADE IMPROVEMENT Supply, place and compact 600MM Brown Rock (To be confirmed by Geotech) compacted to minimum CBR15 over approved subgrade as per the construction drawings or as directed by Engineer (Compacted quantity)	m3	$ 72.95
4.04	Pavement construction		
	Subbase		
4.04.1	Supply, place and compact 125mm GAP40 sub - base aggregate as per the construction drawings or as directed by Engineer for Pavement construction (Compacted quantity)	m3	$ 111.23
4.04.2	Supply, place and compact 125mm GAP65 sub - base aggregate as per the construction drawings or as directed by Engineer for Pavement construction (Compacted quantity)	m3	$ 89.54
	Basecourse		
4.04.3	Supply, place and compact 125mm GAP40 TNZ M/4 AP40 Basecourse as per the construction drawings or as directed by Engineer for Pavement construction(Compacted quantity)	m3	$ 136.02
4.04.4	Supply, place and compact 100mm NZTA M/4 AP40 basecourse as per the construction drawings or as directed by the Engineer	m3	$ 140.31
	Surfacing & Asphalt		
4.04.5	Supply, lay and finish 35mm NZTA AC10 Asphalt T.N.Z. Mix 10 over First coat chipseal (grade5 chip)	m²	$ 37.82
4.04.6	Supply, lay and finish 25mm Hot laid Asphalt T.N.Z. Mix 10 over First coat chipseal (grade5 chip)	m²	$ 29.59
4.05	Subsoil Field Drainage		
4.05.1	Excavate all materials, supply and install 100mm slotted Nova Flow in 300mm x 500mm metal core under kerb and channel as per drawings and backfill as determined by Geotech Engineer. Note: Design and Dimensions to be confirmed by Geotech Engineer after excavation to subgrade level	lm	$ 30.17
4.06	Tie into Existing Road & Footpath		
4.06.1	Allow all costs to tie - into existing seal, kerb and channel, footpath, berm, saw cutting or milling, over extent of existing edge of seal. Includes subgrade preparation and testing, basecourse preparation, sealing to Entranceway specification	L.S.	$ 1,250.00
4.07	Kerbing		
4.07.1	Construct Slip Form Vertical Kerb and channel laid on 75mm T.N.Z. M4 including preparation of levels, undercutting and recompaction, bedding. Includes the supply and delivery of all materials, plant, and labour necessary to construct the kerb lines set out within the engineering drawings.	lm	$ 72.44
4.07.2	Construct CASE-B COMMERCIAL CHANNEL CROSSING laid on 75mm T.N.Z. M4 including preparation of levels, undercutting and recompaction, bedding. Includes the supply and delivery of all materials, plant, and labour necessary TO CONSTRUCT the kerb lines set out within the engineering drawings.	lm	$ 176.54
4.07.3	Construct Vertical nib Kerb (as per drawings) including preparation of levels, undercutting and recompaction, bedding. Includes the supply and delivery of all materials, plant, and labour necessary to construct the kerb lines set out within the engineering drawings.	lm	$ 80.11

Item	Description	Ut	Rate
4.07.4	Construct Standard Mountable Kerb and CHANNEL (as per drawings) including preparation of levels, undercutting and recompaction, bedding. Includes the supply and delivery of all materials, plant, and labour necessary TO CONSTRUCT the kerb lines set out within the engineering drawings.	lm	$ 80.12
4.07.5	Construct Flush Edge Restraint (type 2) (as per drawings) including preparation of levels, undercutting and recompaction, bedding. Includes the supply and delivery of all materials, plant, and labour necessary TO CONSTRUCT the kerb lines set out within the engineering drawings.	lm	$ 71.37
4.08	Concrete		
	Vehicle Crossings		
4.08.1	Construct vehicle crossings including kerb cut - out, subgrade preparation, basecourse preparation, boxing, 125mm thick 20 MPa concrete with 665 mesh placed centrally on 75mm sand/GAP20 over subgrade of C.B.R.>10, including sawcuts, expansion joints and broom finish	m²	$ 92.50
	Footpath		
4.08.2	All types include trimming and construction of 20MPa broom finish concrete to widths specified over min. 100mm thick GAP40 basecourse, 75mm Sand/GAP20 compacted to 95% M.D.D. over firm, dry subgrade. Allow sawcuts at 3.0m centres and cross fall as specified.	m²	$ 72.35
	Parking Bays		
4.08.3	Construct Parking bays INCLUDING SUBGRADE preparation, basecourse preparation, boxing, 150mm Concrete (Kiwi review pebble with 5kg black oxide) 28days strength of min.20MPa with Mesh reinforcement centrally placed over subgrade having C.B.R.>10	m²	$ 128.45
4.09	Line marking and Signage		
	Line marking (L.S.)		
	Complete all road line marking to MOTSAM/Council standards.		
4.09.1	100mm White Centreline as per MOTSAM (Section 3.09)	lm	$ 3.25
4.09.2	Limit line as per Section 3.06of MOTSAM Section 3	lm	$ 8.13
4.09.3	Non-Stopping Orange lines as per Sec.2.11 of MOTSAM Part 2 Section2	lm	$ 2,350.00
4.09.4	GIVEWAY symbol as per MOTSAM (Section 3.09)	Ea.	$ 168.75
	Road Signage (L.S.)		
	Supply and install all street and intersection signage to MOTSAM/Council standards.		
4.09.5	RG-6 GIVEWAY sign as per MOTSAM (Section 2)	Ea.	$ 481.25
4.09.6	TS 377 Road Name Street Sign on Post	Ea.	$ 568.75
4.10	Pram Crossings with Tactile Ground Surface Indicators (TGSI)		
	Supply all material and construct typical pram crossings where required or as directed by Engineer, including vertical profile kerb integration		
4.10.1	Supply and install Tactile warning indicators as per drawings and LTNZ RTS 14 2007 (bolted on after road/island construction) covering full length of crossing and placed square to direction of travel (Set of 6)	Ea.	$ 337.50
4.10.2	Supply and Install Directional indicators as per drawings covering total width of footpath and placed perpendicular to direction of travel to H.C.C. specification (Set of 6)	Ea.	$ 337.50

Item	Description	Ut	Rate
5	STORMWATER DRAINAGE		
	Refer to Standard Specification on Drainage. All drainage works to comply with W.D.C. current standards.		
5.01	Pipelaying		
	Allow all costs to supply and install pipelines as detailed including excavation, benching, laying on granular bedding, jointing, connections, testing, backfilling and compaction with approved excavated material to Engineer certified standard (except where the drawings indicate that hardfill is required), trench support, dewatering and removal and stockpiling of surplus material to approved onsite fill area.		
	Depths to Invert 0.0m - 1.5m		
5.01.1	Pipelaying 100mmØ U-PVC SN16 (lm)	lm	$ 83.19
5.01.2	Pipelaying 300mmØ U-PVC SN16 (lm)	lm	$ 214.33
5.01.3	Pipelaying 450mmØ RCRRJ (lm)	lm	$ 398.81
5.01.4	Pipelaying 525mmØ RCRRJ (lm)	lm	$ 470.06
5.01.4	Pipelaying 675mmØ RCRRJ (lm)	lm	$ 620.06
5.01.4	Pipelaying 750mmØ RCRRJ (lm)	lm	$ 785.88
5.01.4	Pipelaying 825mmØ RCRRJ (lm)	lm	$ 922.89
5.01.5	Pipelaying 900mmØ RCRRJ (lm)	lm	$ 1,108.26
5.01.6	Pipelaying 1050mmØ RCRRJ (lm)	lm	$ 2,825.64
5.01.7	Pipelaying 1200mmØ RCRRJ (lm)	lm	$ 3,148.71
5.02	Hardfill Backfill		
5.02.1	Extra over Pipelaying items to supply place and compact hardfill backfill brown rock or GAP65 in trenches under road/accessway carriageways and at pipe cross overs. (provisional Item)	m3	$ 75.65
5.02.2	Additional Drainage metal to 300mm below base of trench under pipes and manholes. (Provisional Item)	m3	$ 111.93
5.03	Manholes		
	Allow all costs to supply and construct precast concrete manholes with heavy duty DI lid and frame, safety grill as necessary, step irons, benching, connections, etc. complete. Price includes supply of all materials, excavation, backfill, compaction and connection to existing pipes. (including internal droppers as required)		
5.03.1	1050mmØ flanged base precast manhole 0 – 2.0m depth	ea.	$ 5,872.40
5.03.2	1200mmØ flanged base precast manhole 0 – 2.0m depth	ea.	$ 6,254.40
5.03.2	1500mmØ flanged base precast manhole 0 – 2.0m depth	ea.	$ 7,256.14
0.01	Rain Garden		
	Allow to construct raingardens complete incl. all excavation and trimming, removal of surplus materials to onsite approved stockpile area, supply and installation of precast concrete rectangular unit (Hynds raingarden frame or similar approved), on 150mm GAP40 footings, filter fabric(Geotextile cloth bidim A12 or similar approved),perforated draincoil,10/5 drainage material or similar, filter sand, bioretention/planting media (Living Earth or similar approved), floating mulch, rodding point with end cap, scour protection, connection to catchpit and any other features as shown on the drawings.		

Item	Description	Ut	Rate
5.06.1	Rain Garden 1.2m wide x 1.2m Long precast	ea.	$ 22,440.60
5.06.2	Rain Garden 1.8m wide x 1.8m Long precast	ea.	$ 23,820.40
5.06.3	Rain Garden 2.4m wide x 1.8m Long precast	ea.	$ 29,820.60
5.05.4	Rain Garden 3.0m wide x 1.8m Long precast	ea.	$ 33,610.40
5.05.5	Rain Garden 3.6m wide x 1.8m Long precast	ea.	$ 34,440.60
5.04	Catchpits		
	Allow all costs to supply, excavate, construct and backfill M.H., and connect catchpits to RITS. Refer to B.O.P for further detail.		
5.04.1	225mmØ uPVC SN16 Catchpit Lead 0 - 2.5m depth	lm	$ 278.40
5.04.2	Vertical Entry catchpit	ea.	$ 4,274.00
	1350 Concrete Wingwall	ea.	$ 7,259.20
	Rip Rap (m3)	m3	$ 161.93
5.05	Undercut/ Additional Excavation		
5.05.1	Additional Undercut to 300mm below base of trench under pipes and manholes. (Provisional Item)	m3	$ 21.85
5.06	Additional Filling – Drainage Trench undercut		
5.06.1	Additional filling to 300mm below base of trench under pipes and manholes. (Provisional Item)	m3	$ 75.39
5.07	Unsuitable Material		
5.07.1	Unsuitable Material - Remove stockpiled unsuitable trench material previously stockpiled from items above and dispose of off-site (Provisional Item).	m3	$ 26.38
5.08	CCTV As-built Inspection		
5.8.1	Arrange and pay for CCTV as-built inspection of the stormwater drainage and provision of copies to the Engineer and Council. Payment only to be made upon acceptance of CCTV inspection by Council.	L.S.	$ 1,800.00
5.09	Connection to Existing Manhole		
5.09.1	Carry out pressure testing on all pipes and manholes to HDC RITS requirements and provide results and documentation as required by H.D.C. supplied to Engineer	LS	$ 1,900.00
6	WASTEWATER DRAINAGE		
	Refer to Standard Specification on Drainage. All drainage work to comply with RITS current standards.		
6.01	Pipelaying - Trenched		
	Allow all costs to supply and install pipelines as detailed including excavation, benching, laying on granular bedding, jointing, connections, testing, backfilling and compaction with approved excavated material to Engineer certified standard (except where the drawings indicate that hardfill is required), trench support, dewatering and removal and disposal of surplus material to approved onsite fill area.		
	Depths to Invert 0.0m - 2.5m		
6.01.2	150mmØ U-PVC SN16	lm	$ 144.58
6.01.3	100mmØ U-PVC SN16	lm	$ 94.31
6.02	Hardfill Backfill		

Item	Description	Ut	Rate
6.02.1	Extra over Pipelaying items to supply place and compact hardfill backfill brown rock or GAP65 in trenches under road/accessway carriageways and at pipe cross overs. (provisional Item)	m3	$ 71.65
6.02.2	Additional Drainage metal to 300mm below base of trench under pipes and manholes. (Provisional Item)	m3	$ 105.93
6.03	Manholes		
	Allow all costs to supply and construct precast concrete manholes with heavy duty hinged DI lid and frame, safety grill, step irons, benching, connections, etc. complete. Price includes supply of all materials, excavation, backfill, compaction and removal of all excess excavated material and connection to existing pipes.		
	Depths to Invert 0.0m - 2.5m		
6.03.1	1050mmØ Manhole	No.	$ 5,846.12
	Depths to Invert 2.51m - 3.5m		
6.03.2	1050mmØ Manhole	No.	$ 7,365.39
	Depths to Invert 3.51m - 4m		
6.03.3	1200mmØ Manhole	No.	$ 10,105.63
6.04	Undercut/ Additional Excavation		
6.04.1	Additional Undercut to 300mm below base of trench under pipes and manholes. (Provisional Item)	m3	$ 20.55
6.05	Additional Filling – Drainage Trench undercut		
6.05.1	Additional filling to 300mm below base of trench under pipes and manholes. (Provisional Item)	m3	$ 75.48
6.06	Unsuitable Material		
6.06.1	Unsuitable Material - Remove stockpiled unsuitable trench material previously stockpiled from items above and dispose of off-site (Provisional Item).	m3	$ 25.38
6.07	Lot Connections		
	Allow to supply, trench, construct and backfill. Lot connections complete with Boundary kits, fittings, seals, end cap, 100mmØ uPVC SN16 RRJ Connection between main lines or M.H. and Lot boundary and any other associated incidentals as specified. Refer to design plans		
6.07.1	100mmØ uPVC SN16 RRJ to existing line	ea.	$ 1,822.15
6.07.2	100mmØ uPVC "WYE" connection to 150mmØ uPVC	ea.	$ 1,692.15
6.07.3	100mmØ uPVC SN16 RRJ to MH	ea.	$ 380.89
6.08	CCTV As-built Inspection		
6.08.1	Arrange and pay for CCTV as-built inspection of the wastewater drainage and provision of copies to the Engineer and Council. Payment only to be made upon acceptance of CCTV inspection by Council.	L.S.	$ 3,148.44
6.09	Connection to Existing		
	Manhole		
6.09.1	Cut into Existing manholes for new main line connections along with benching, channels and adjusting lid levels.	L.S.	$ 3,293.50
7	WATER SUPPLY		
	Refer to Standard Specification on Watermains. All watermains works to comply with H.D.C. current standards.		

Item	Description	Ut	Rate
7.01	Pipelaying		
	Allow all costs to install watermain in common services trench as detailed. Include laying on granular bedding/backfill. Supply and installation of all bends, adaptors, bolts, flanges, fittings, denso wrapping, thrust blocks, support blocks, undertake all welding, testing, commissioning, and the installation of a tracer wire.		
7.01.1	150mmØ PVC PN12.5 RRJ watermain	lm	$ 74.52
7.01.2	63mmØ PVC PN12.5 RRJ watermain	lm	$ 35.13
7.02	Testing & Sterilisation		
7.04.1	Inspection, pressure testing of new pipelines including supply of necessary water, fittings, and test equipment, disposal of testing water and associated treatment. Provide electronic pressure test data (excel spreadsheets) for Watercare approval. All costs associated with non-compliance to be borne by the Contractor.	L.S.	$ 4,628.57
7.04.2	Allow all costs to sterilise all new watermains in accordance with Watercare standards and to their satisfaction. Include pigging, swabbing, testing, disinfection of all pipework and fittings carrying potable water including all necessary materials, and equipment, disposal or dechlorination of disinfection water and associated treatment.	L.S.	$ 1,696.07
7.05	Public Connections		
	Allow to undertake any works required to meet the District Council or as directed by Engineer connection process for approval, and connect to existing water reticulation, including public notifications		
7.05.1	Establish connection to existing 150mm dia Watermain	LS	$ 2,062.32
7.05.2	Establish connection to existing 63mm dia Watermain	LS	$ 1,906.07
8	UTILITY SERVICES		
	Note: Rates are deemed to include all bedding and coverings required by the appropriate authority. Pipe lengths are to be securely locked together by means of purpose made collars, have draw wires installed and the ends are to be capped with suitably tapered plugs. Ducting is to be laid in positions shown on the plans (supplied by authority). All trenches to be filled and compacted to subgrade standard.		
8.01	Excavate and maintain 700mm wide service trench as per drawings for power and fibre optic and arrange laying of services and backfill. Includes liaising with Utility services to ensure all services are installed as required. (Includes supply of Sand 2000 for shading of cables and ducts, hazard and signal tape, MAGSLAB cable protection	lm	
8.02	Supply, trench, lay and backfill assorted 100mmØ duct colours as required and with respect to Utility providers specifications or as directed by Engineer (provisional item) (One for Fibre, Second for LV Power)		
	Power Relocation 100mmØ duct	lm	$ 1,211.93
	Fibre and Copper Relocation 100mmØ duct	lm	$ 1,052.90
	Gas Relocation	lm	$ 1,322.89