



Whangarei District Council

Ruakaka Wastewater Long-Term Consents Project: Assessment of Effects on the Environment and Resource Consent Applications

Application Edition - May 2011





Ruakaka Wastewater Long-Term Consent Project: Assessment of Effects on the Environment and Resource Consent Applications Application Version

AUTHORS		
Jim Bradley	MWH New Zealand Ltd	Technical and Overall Approach
Sonja Bury	MWH New Zealand Ltd	Planning Assessment
David Cameron	MWH New Zealand Ltd	Environmental Science Water
Sue Bennett	MWH New Zealand Ltd	Public Health Risk Assessment, Rama Road Environmental Science
Amos Kamo	Boffa Miskell Ltd	Tangata Whenua
David Voss	Voss Infrastructure Consulting Ltd	Land Application / Hydrogeology
Paula Hunter	MWH New Zealand Ltd	Applications Forms
Fraser Campbell	Campbell Consulting Limited	Wastewater Assessment

REVIEWERS		
Paula Hunter	MWH New Zealand Ltd	Planning Reviewer
Sue Bennett	MWH New Zealand Ltd	Effects of Ocean Discharge
Garrett Hall	MWH New Zealand Ltd	Alternatives Assessment and Proposed Scheme
Peter Loughran	MWH New Zealand Ltd	Public Health Risk Assessment
David Cameron	MWH New Zealand Ltd	Rama Road Block Effects
Anthony Olsen	Boffa Miskell Ltd	Tangata Whenua
Sonja Bury	MWH New Zealand Ltd	Part Review
Jim Bradley	MWH New Zealand Ltd	Overall Reviewer
Fraser Campbell	Campbell Consulting Limited	Overall Reviewer
Curt Martin	Whangarei District Council	Overall Reviewer

This AEE Report is supported by 41 Support Documents. Information included in this AEE has been sourced by many of those documents. Accordingly, the authors of the Support Documents have also contributed to this AEE. A full list of the Support Documents is included in the Contents Pages of this document.

Report Signed and Released by:

.....
 Simon Weston, Group Manager Infrastructure & Services
 Whangarei District Council

Acknowledgement of photographs on front and back covers – North Holdings and Hopper Developments.



WHANGAREI DISTRICT COUNCIL

Ruakaka Wastewater Long-Term Consents Project: Assessment of Effects on the Environment and Resource Consent Applications Application Edition

CONTENTS

Executive Summary.....	xviii
Cross-Reference to the Provisions of the Fourth Schedule of the Resource Management Act	xxxvi
Resource Consent Application Forms.....	xl
Summary Table: Existing Resource Consents and Resource Consents Applied for	lviii
Cross-Reference to the Provisions of the Fourth Schedule of the Resource Management Act	lx
1 Introduction.....	3
1.1 Purpose of this Document	3
1.2 Structure of the Application Documentation	4
1.3 Context and Background	6
1.3.1 Existing Wastewater Scheme.....	6
1.3.2 Growth	6
1.3.3 Whangarei District Council Growth Strategy: Sustainable Futures 30/50.....	6
1.3.4 Marsden Point - Ruakaka Structure Plan.....	9
1.3.5 Whangarei District Council – District Plan.....	9
1.3.6 Whangarei District Council’s Strategic Plans, Long-Term Council Community Plan and Other Relevant Documents.....	11
1.3.7 Guiding Principles for the Project and Setting of Project Objectives	13
1.4 Existing Resource Consents, Designations and Other Approvals	13
1.4.1 Existing Resource Consents	13
1.4.2 Existing Designation	14
1.4.3 Existing Department of Conservation Concessions.....	15
1.5 Resource Consents and Other Approvals Being Applied For	15
1.5.1 Resource Consents Being Applied For	16
1.5.2 Designations.....	17
1.5.3 Other Approvals.....	17
1.5.4 Other Resource Consents.....	17
2 Project Structure, Objectives and Development	18
2.1 Project Structure and Processes Followed.....	18
2.1.1 Project Advisory Group and Project Management Group	18
2.1.2 Project Structure and Inputs.....	20
2.2 Project Inputs and Supporting Documents	23



2.3	Project Objectives	27
2.4	'Ruakaka Wastewater Strategy' and Integrated Development Approach	30
2.5	Drivers and Rationale for the 'Ruakaka Wastewater Strategy' and 'Proposed Scheme' ..	31
3	Ruakaka's Wastewater - Current Context.....	32
3.1	Background.....	32
3.2	Existing Wastewater Treatment Plant and Wastewater Disposal	32
3.3	Existing Resource Consents, Designations and Other Approvals	35
3.4	Performance and Consent Compliance.....	35
4	Description and Rationale for 'Ruakaka Wastewater Strategy' and 'Proposed Scheme'	39
4.1	Introduction	39
4.2	Area to be Served by the 'Proposed Scheme'	39
4.3	Predicted Wastewater Volumes, Flows and Loads	39
4.4	'Ruakaka Wastewater Strategy'	42
4.4.1	Background	42
4.4.2	'Ruakaka Wastewater Strategy' Components.....	42
4.4.3	On Going Development and Periodic Review of the Ruakaka Wastewater Strategy	46
4.5	'Proposed Scheme'	48
4.5.1	Background	48
4.5.2	'Proposed Scheme' Outline and Components	48
4.6	Wastewater Operation and Management Procedures	58
4.6.1	General Management.....	58
4.6.2	Wastewater Treatment Operational Philosophy.....	59
4.6.3	Inflow / Infiltration (Wet Weather Flow) Management	59
4.6.4	Trade Waste Management.....	60
4.6.5	Energy Management	60
4.6.6	Sustainable Wastewater Management	61
4.6.7	Financial Management	61
4.6.8	Risk Management	62
4.6.9	Extreme Wet Weather and Abnormal Conditions	62
4.7	Resource Consent (Permits) and Other Approvals Sought Including Consent Durations	62
4.8	Staged Development of the 'Proposed Scheme'	63
4.8.1	Introduction.....	63
4.8.2	Modular Staging of Development.....	66
4.8.3	Sequencing of Resource Consents.....	66
4.8.4	New Wastewater Treatment Plant Construction Staging of Development.....	71
4.8.5	Ocean Outfall Timing.....	71
4.8.6	Beneficial Reuse Facilities	71
4.9	Estimated Costs and Financial Planning	72
4.10	Infrastructure Procurement Procedures	73
4.11	Rationale for 'Ruakaka Wastewater Strategy' and 'Proposed Scheme'	74
5	Legal Position, Planning Instruments and Guidelines.....	81
5.1	Statutory Context	81
5.2	Resource Management Act	81



5.2.1	Purpose and Principles of the RMA	81
5.2.2	Part 3 – Duties and Restrictions.....	81
5.2.3	Matters for Consideration	81
5.2.4	Meaning of Effect.....	82
5.3	Planning Instruments	82
5.3.1	Consents	82
5.4	Statutory Criteria and Restrictions	83
5.5	Resource Consents and Designation	84
5.5.1	Existing Designations	84
5.5.2	Existing Resource Consents	84
5.5.3	Other Consents (land use) and Approvals (concessions) Being Applied For	85
5.5.4	Activities Not Requiring Resource Consent	85
5.6	Relevant Planning Instruments.....	86
5.6.1	New Zealand Coastal Policy Statement.....	86
5.6.2	Regional Policy Statement for Northland	86
5.6.3	Regional Coastal Plan for Northland.....	88
5.6.4	Regional Water and Soil Plan for Northland	90
5.6.5	Regional Air Quality Plan for Northland	91
5.6.6	New Zealand National Environmental Standard for Air Quality	92
5.7	Other Relevant Legislation	92
5.7.1	Local Government Act 2002.....	92
5.7.2	Health Act 1956.....	92
5.7.3	The Reserves Act 1977.....	92
5.8	Information Requirements (4 th Schedule Requirements)	93
5.9	Whangarei District Council’s Relevant Plans, Policies and Bylaws	94
5.9.1	Waste Disposal 25 Year Strategic Plan (1995).....	94
5.9.2	Trade Wastes Bylaw 2008	94
5.9.3	Whangarei District Council Waste Management Plan 2002	94
5.9.4	Long-Term Council Community Plan	94
5.10	Relevant Guidelines.....	95
5.10.1	Ministry for the Environment and Ministry of Health – Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas (MfE 2003)	95
5.10.2	Australian and New Zealand Guidelines for Fresh Water and Marine Water Quality (ANZECC 2000)	95
5.10.3	New Zealand Municipal Wastewater Monitoring Guidelines (NZWERF 2002) ..	96
5.10.4	New Zealand Biosolids Guidelines 2003 (MfE and NZWWA).....	96
5.10.5	New Zealand Waste Strategy 2002.....	96
5.10.6	Ministry of Health Guidelines for Safe Use of Sewage Effluent and Sewage Sludge on Land, Department of Health, 1992.....	96
5.10.7	New Zealand Food Safety Authority – Animal Products (Specifications for Bivalve Molluscan Shellfish) Notice 2006	96
6	Alternatives Considered	97
6.1	Background.....	97
6.2	Categories of Alternatives Considered	102
6.3	Resource Consent Application 2004 – Alternatives Considered.....	104
6.4	Interim Scheme Investigations.....	105
6.5	Stage 1 Ruakaka Wastewater Long-Term Wastewater Consent Project.....	105
6.6	Stage 2 Ruakaka Wastewater Long-Term Wastewater Consent Project.....	107
6.6.1	Task 2B Investigations and Hydro-geological Appraisal of Land Disposal	107



6.7	Task 2C Stage 1 Shortlisted Option: Initial Technical Studies (Support Document 19)..	109
6.8	Alternative Sites for the Ruakaka Wastewater Treatment Plant (Support Document 24)	110
6.8.1	Approach	110
6.8.2	Existing Site Findings (Site 4)	111
6.8.3	Conclusion.....	111
6.9	Task 2G Detailed Options Evaluation Report (Support Document 22)	111
6.9.1	Overview.....	111
6.9.2	Key Considerations and Comparisons of Options	112
6.9.3	Multi-Criteria Analysis (MCA) Decision Workshops of Short-Listed Options ...	113
6.9.4	Summary of Positive and Negative Attributes of the Four Generic Schemes .	114
6.10	Identification and Reasons for the ‘Preferred Scheme’	116
6.10.1	Comparison of the Four Generic Options with the Project Objectives.....	116
6.10.2	Identification and Reasons	121
6.11	Council’s Adoption of a ‘Ruakaka Wastewater Strategy’ and the ‘Preferred Scheme’ ...	122
6.12	Development of the ‘Preferred Scheme’ Into the ‘Proposed Scheme’ and the Ruakaka Wastewater Strategy	123
6.13	Ocean Outfall Alternatives Investigations (Support Documents 30, 31, 32, 33, 39)	123
6.13.1	Overall Approach.....	123
6.13.2	Phase 1 – DHI Investigations (Support Documents 31, 32)	125
6.13.3	Phase 2 (Support Document 33).....	125
6.13.4	Outfall Construction Alternatives	125
6.13.5	Outfall Location Conclusion.....	126
6.14	Other Alternatives Considered During the Stage 2 Study	130
6.14.1	Conveying Untreated Wastewater Back to the Whangarei City Wastewater Treatment Plant.....	130
6.14.2	Residential Grey Water Recycling.....	131
6.15	Rationale for the Alternatives Selected in the Ruakaka Wastewater Strategy and the ‘Proposed Scheme’.....	131
7	Description of the Environment.....	132
7.1	Ruakaka and Bream Bay – General.....	132
7.1.1	General.....	132
7.1.2	Land Use and Development.....	134
7.1.3	Climate	134
7.2	Social and Economic Environment.....	135
7.2.1	Economic Environment	135
7.2.2	Social Environment	136
7.3	Recreation and Tourism	138
7.3.1	Ruakaka Surf Life Club	138
7.3.2	Ruakaka Reserve Motor Camp	138
7.3.3	Ruakaka Wildlife Refuge	138
7.3.4	Recreational Swimming and Beach Activities	138
7.3.5	Whangarei Racing Club – Ruakaka Race Course	138
7.3.6	Recreational Fishing.....	138
7.4	Bream Bay Aquaculture Park	139
7.5	Commercial Fishing and Shellfish Collection	139
7.6	Marsden Point Oil Refinery.....	139
7.7	Archaeological Elements in Bream Bay	140
7.8	Tangata Whenua Context and Cultural Values	141



7.8.1	The Cultural Landscape – Te Poupouwhenua	141
7.8.2	Patuharakeke Settlement in Te Poupouwhenua – Marsden Point	141
7.8.3	Schedule of Significant Sites – Te Poupouwhenua	143
7.8.4	Tangata Whenua View of the Environment.....	144
7.8.5	Cultural Values	144
8	Assessment of Effects of the Discharge of Treated Wastewater to Bream Bay.....	146
8.1	Introduction	146
8.2	Characterisation of the Treated Wastewater Discharge.....	146
8.2.1	Location	146
8.2.2	Rate of Discharge.....	148
8.2.3	Quality of Discharge	148
8.3	Nature of Coastal Receiving Environment.....	149
8.3.1	Coastal Character	149
8.3.2	Hydrodynamics.....	149
8.3.3	Water Quality of Bream Bay	149
8.3.4	Marine Sediment Quality	153
8.3.5	Marine Ecology Values.....	153
8.3.6	Marine Ecology Values.....	154
8.3.7	Marine Mammals	154
8.3.8	Recreational and Commercial Fishing	154
8.3.9	Bream Bay Aquaculture Park	155
8.3.10	Avifauna.....	155
8.4	Assessment Criteria.....	155
8.4.1	Water Quality.....	155
8.4.2	Reasonable Mixing	156
8.5	Dilution and Dispersion	157
8.5.1	Investigations.....	157
8.5.2	Initial Dilution	158
8.5.3	Far Field Dilution	159
8.6	Potential Effects	160
8.6.1	Background	160
8.6.2	Effects on Suspended Solids, Colour and Clarity	160
8.6.3	Effects on Oil and Grease	161
8.6.4	Objectionable Odour	161
8.6.5	RCP Contact Recreation and Shellfish Gathering Criteria.....	162
8.6.6	Microbiological Risk Assessment.....	163
8.6.7	NZFA Specifications for Bivalve Molluscan Shellfish	165
8.6.8	Effects on Recreational Values	166
8.6.9	Effects on Temperature.....	166
8.6.10	Effects on Dissolved Oxygen	166
8.6.11	Effects on pH	167
8.6.12	Nutrients	167
8.6.13	Effects on Aquatic Ecology.....	169
8.6.14	Effects on Marine Mammals.....	173
8.6.15	Effects on Commercial Aquaculture	174
8.6.16	Tangata Whenua Effects.....	175
8.6.17	Cumulative Effects.....	175
8.6.18	Mitigation	176
8.6.19	Summary of Effects	176
9	Assessment of Effects of Construction and Occupation of the Ocean Outfall in the Coastal Marine Area.....	178



9.1	Introduction	178
9.2	Description of Outfall Materials, Pre-Design Considerations and Construction Methods	178
9.3	Nature of Existing Environment	183
9.4	Proposed Construction Management Plan Approach	184
9.5	Assessment of Effects of Proposed Outfall Pipeline	185
9.5.1	Introduction	185
9.5.2	Effects on Terrestrial Ecology	185
9.5.3	Effects on Marine Ecology.....	186
9.5.4	Effects on Recreational Values	186
9.5.5	Effects of the Ocean Outfall Occupation of the Coastal Marine Area (CMA) ..	186
9.5.6	Mitigation	186
9.5.7	Summary	186
10	Assessment of Effects of Subsurface Irrigation of Treated Wastewater on the Roger Hall Memorial Park (Ruakaka Sports Park)	188
10.1	Introduction	188
10.1.1	Rainfall.....	189
10.1.2	Evapotranspiration	189
10.1.3	Soils and Geology	190
10.1.4	Surface Water.....	190
10.1.5	Groundwater.....	190
10.2	Description of Proposal.....	190
10.3	Assessment of Effects	191
10.3.1	Effects on Groundwater.....	191
10.3.2	Effects on Surface Water	192
10.3.3	Effects on Soil.....	192
10.3.4	Microbiological Risk Assessment and Public Health Assessment.....	192
10.3.5	Odour and Noise Effects	192
10.3.6	Recreational Use.....	193
10.3.7	Tangata Whenua Cultural Effects	193
10.4	Mitigation.....	193
10.5	Summary of Effects.....	193
11	Assessment of Effects of Irrigation of Treated Wastewater on the Rama Road Block.....	195
11.1	Introduction	195
11.2	Description of Proposal.....	195
11.3	Description of Receiving Environment.....	200
11.3.1	Rainfall and Evapotranspiration	200
11.3.2	Soils and Geology	200
11.3.3	Surface Water and Groundwater.....	201
11.3.4	Vegetation	207
11.4	Wastewater Irrigation Assessment	207
11.4.1	Wastewater Application Modelling Approach.....	207
11.4.2	Wastewater Application Rates	208
11.4.3	Groundwater Migration Pathways.....	209
11.5	Assessment of Effects	213
11.5.1	Effects on Water Quality.....	213
11.5.2	Effects on Soil.....	214
11.5.3	Effects on Vegetation	214
11.5.4	Microbiological Risk Assessment and Public Health Assessment.....	215



11.5.5	Odour, Aerosol and Noise Effects	216
11.5.6	Recreational and Coastal Reserve.....	216
11.5.7	Tangata Whenua Cultural Effects	216
11.6	Mitigation.....	216
11.7	Summary of Effects.....	217
12	Assessment of Effects Discharge to Air for Ruakaka Wastewater Treatment Plant	219
12.1	Introduction	219
12.2	Nature of Air Discharges.....	219
12.2.1	Nature and Composition of Odours in Relation to Source	219
12.2.2	Other Air Discharges	219
12.2.3	Sensitivity of the Receiving Environment	219
12.2.4	Odour Modelling	220
12.2.5	Odour Surveys and Community Odour Perceptions	221
12.2.6	Tangata Whenua Effects.....	221
12.2.7	Summary of Environmental Effects.....	221
12.3	Alternatives Considered.....	222
12.4	Odour Mitigation Measures and Safeguards	222
12.4.1	Existing Mitigation Measures.....	222
12.4.2	Proposed Mitigation Measures.....	222
12.4.3	Proposed Odour Management Plan.....	223
12.5	Summary of Effects.....	223
13	Assessment of Effects of Discharge to Air for Rama Road Block	224
13.1	Introduction	224
13.2	Description of the Proposal.....	224
13.3	Nature of Air Discharges and Environment	224
13.3.1	Nature of Aerosols and Odours in Relation to the Source	224
13.3.2	Description and Sensitivity of the Receiving Environment.....	227
13.4	Alternatives Considered.....	227
13.5	Effects Assessment	228
13.5.1	Effects on Surrounding Environment Including the Human and Animal Environment	228
13.5.2	Tangata Whenua Effects.....	228
13.6	Mitigation Measures and Safeguards	229
13.6.1	Proposed Mitigation Measures.....	229
13.6.2	Proposed Air Discharge Management Plan	229
13.7	Summary of Effects.....	230
14	Assessment of Effects of Discharge from the Ground Soakage at the Ruakaka Wastewater Treatment Plant Site.....	231
14.1	Introduction and Background References	231
14.1.1	Introduction.....	231
14.1.2	Proposal	231
14.1.3	Approach for this Section of the AEE	231
14.1.4	Background References.....	232
14.2	Description of Receiving Environment.....	232
14.3	Characteristics of Discharge.....	232



14.4	Assessment of Effects	233
14.4.1	Effects on Groundwater Quality	233
14.4.2	Microbiological Risk Assessment.....	233
14.4.3	Effects on Vegetation	233
14.4.4	Effects on Recreational and Coastal Reserve	233
14.4.5	Tangata Whenua Effects.....	233
14.5	Mitigation.....	234
14.6	Summary of Effects.....	234
15	Assessment of Effects of Wastewater Seepage to Groundwater from Contingency Storage Ponds.....	235
15.1	Introduction and Ruakaka Wastewater Treated Plant Facilities.....	235
15.2	Description of Receiving Environment.....	235
15.3	Characteristics of Groundwater Seepage.....	236
15.3.1	Location	236
15.3.2	Rate of Discharge.....	236
15.3.3	Quality of Discharge	239
15.4	Assessment of Potential Effects	240
15.4.1	Effects on Groundwater Quality and the Adjacent Coastal Environment.....	240
15.4.2	Microbiological Risk Assessment.....	240
15.5	Mitigation.....	241
15.6	Summary of Effects.....	241
16	Assessment of Effects to Tangata Whenua.....	242
16.1	Tangata Whenua	242
16.2	Assessing the Impacts on Tangata Whenua Values.....	244
16.3	Patuharakeke Trust Board (Inc) Cultural Impact Assessment Report.....	245
16.4	Matauranga Maori.....	245
16.5	Assessing Cultural Health Impacts	247
16.5.1	Mauriora (Maintaining a Strong Cultural Identity).....	247
16.5.2	Waiora (Water Quality).....	248
16.5.3	Taiora (Physical Health and Wellbeing)	249
16.5.4	Te Oranga – Participation and Engagement in Decision Making	251
16.5.5	Treaty Claims Settlements	252
16.5.6	Patuharakeke Cultural Redress	252
16.5.7	Tangata Whenua Economic Development.....	252
16.5.8	Aquaculture	252
16.5.9	Ecotourism.....	253
16.6	Mitigation – Tangata Whenua Cultural Values	253
16.7	Summary.....	257
17	General Matters, Climate Change, Positive and Cumulative Effects.....	258
17.1	Positive Effects	258
17.2	Best Practicable Option Considerations	258
17.3	Affordability and Overall Social and Economic Effects.....	259
17.4	Technological Capability.....	259
17.5	Energy Considerations	260



17.6	Climate Change	260
17.7	Sustainable 'Approaches' to Wastewater Management	261
17.8	Cumulative Effects Generally	261
18	Consultation	263
18.1	Introduction	263
18.2	Consultation Approach	264
18.3	Who Was Consulted?	264
18.3.1	Tangata Whenua	264
18.3.2	Wider Community	268
18.3.3	Key Stakeholders	269
18.3.4	Statutory Bodies	269
18.4	Consultation Activities.....	270
18.5	Consultation Input to the Development of the Proposed Scheme and Ruakaka Wastewater Strategy Up to the Issue of the Consultation Draft AEE.....	280
18.6	Pre-lodgement Consultation Based on the Consultation Draft Assessment of Effects on the Environment.....	283
18.7	Issues and Responses from Prelodgement Consultation of Draft Assessment of Effects on the Environment.....	284
19	Conclusions and Suggested Resource Consent Conditions	292
19.1	General Conclusion	292
19.2	Suggested Consent Conditions	293
19.2.1	General and Special Resource Consent Conditions.....	293
19.2.2	Suggested Specific Consent Conditions	295
	Acknowledgements	308
	Glossary of Terms and Abbreviations	310
	References	318

APPENDICES

- Appendix A: Whangarei District Council, Works and Services Committee Report dated 30 July 2008 and Committee Meeting Resolution dated 13 August 2008
- Appendix B: Whangarei District Council, Infrastructure and Services, Committee Report, December 2010 and Resolution of Draft Proposed Scheme
- Appendix C: Project Objectives
- Appendix D: Existing Resource Consents
- Appendix E: Ruakaka Wastewater Consent 0415501 Monitoring Reporting
- Appendix F: CH2M Beca High Level Peer Review Stage 2 Study June 2008
- Appendix G: Whangarei District Council, Infrastructure and Services Committee Report dated 21 April 2011 titled Proposed Scheme and Final AEE For Lodgement, and Committee Meeting Resolution dated 11 May 2011



COMPANION DOCUMENTS IN SEPARATE COMPANION VOLUME

- 1 Ruakaka Wastewater Long-Term Resource Consents Project Cultural Impact and Assessment Report, prepared by Patuharakeke Te Iwi Trust Board (Inc), commissioned by Whangarei District Council 3 May 2009.
- 2 Kepa M and Pirihi, L – ‘Convincing a Marae-Based Organisation in a Rural Area to Support a Government Agency’s Application for Resource Consents to Itself’ – presented at the ‘Critical and Sensitive Research Issues Symposium’, Christchurch, 15-16 November 2010.

SUPPORT DOCUMENTS – CHRONOLOGICAL ORDER

- 1 The Final ‘Ruakaka/One Tree Point Wastewater Options Study, Stage 1 Future Wastewater Quantity and Quality Projections’ by GHD/URS 20 April 2007
- 2 The Final ‘Issues and Options Investigations Ruakaka/One Tree Point Wastewater Options Stage 1 Study Report’ and accompanying Planning and Consultation Reports by GHD / URS 15 May 2007
- 3 Public Health, Microbial/Viral Risk Assessment, Stage 1 by GHD / URS 15 May 2007
- 4 Stage 2 Study Task 2A - Future Wastewater Quantity and Quality Projections, by MWH November 2007
- 5 Stage 2 Study Task 2B Part 1 Indicative Cost Estimates, Option Schematics and Key Issues, by MWH November 2007
- 6 Stage 2 Study Task 2B Part 3 Alternative Wastewater Treatment Process, by MWH November 2007
- 7 Stage 2 Study Task 2B Part 4 Investigate Feasibility of Split Industrial and Domestic Wastewater Schemes, by MWH November 2007
- 8 Ruakaka Wastewater Treatment Plant Discharge Options – Initial Assessment of Dilutions, by NIWA October 2007
- 9 Whangarei District Council Ruakaka Wastewater Project ‘Discussion Paper on Draft Project Objectives’, By Whangarei District Council November 2007
- 10 Stage 2 Study Task 2B Part 2 Reuse of Treated Effluent, by MWH December 2007
- 11 Whangarei District Council, Ruakaka/One Tree Point, Options for Wastewater Treatment, by MWH 7 November 2007
- 12 Whangarei District Council, Ruakaka/One Tree Point, Options for Wastewater Treatment – Supplementary Information, by MWH 28 November 2007
- 13 Ruakaka Coastal Environment Recreational Survey, by MWH/WDC December 2007/ January 2008
- 14 Whangarei District Council, Ruakaka/One Tree Point, Options for Wastewater Treatment, – Supplementary Information, Part 2 by MWH 20 December 2007
- 15 Stage 2 Study Task 2C - Hydro-Geological Appraisal of Land Disposal Options and Consultation Information/Overheads, by Voss Infrastructure Consulting December 2007
- 16 Stage 2 Study Task 2B Part 5 Sludge and Biosolids Management, by MWH February 2008
- 17 Stage 2 Study Task 2C – Preliminary Assessment of Terrestrial Ecology Associated with the Options, by MWH February 2008
- 18 Stage 2 Study Task 2C – Preliminary Odour and Air Emissions Report, by MWH February 2008
- 19 Stage 2 Study Task 2C – Short-listed Options: Initial Technical Studies Report, by MWH February 2008
- 20 Stage 2 Study Task 2E – Qualitative Public Health Risk Assessment, by MWH February 2008
- 21 Stage 2 Study Task 2F – Planning Risk and Consentability Assessment, by MWH February 2008



- 22 Stage 2 Study Task 2G – Detailed Options Evaluation Report, by MWH February 2008
- 23 Whangarei District Council, Ruakaka/One Tree Point, Options for Wastewater Treatment, Summary BTF and SBR Comparison Table, by MWH April 2008
- 24 Consideration of Alternative Sites for the Ruakaka Wastewater Treatment Plant, by MWH May 2008
- 25 Stage 2 Study: Development of the ‘Proposed Scheme’ and a ‘Ruakaka Wastewater Strategy’, by MWH June 2008
- 26 Whangarei District Council, Ruakaka/One Tree Point, Options for Wastewater Treatment– Supplementary Information, Part 3, by MWH June 2008
- 27 Assessment of Effects of Endocrine Disrupting Compounds and Microbiological Pathogens on the Fish and Marine Mammals of Bream Bay, by Cawthron Institute January 2009
- 28 Review of potential effects of endocrine disrupting compounds on marine species at Bream Bay Aquaculture Park by NIWA July 2009
- 29 Ecotoxicity information on species cultured at NIWA Bream Bay Aquaculture Park July 2009
- 30 Bream Bay Water Quality 2008-2009 prepared for Whangarei District Council, by MWH December 2009
- 31 Bream Bay Dilution and Dispersion Study, Phase One: Comparative Assessment, Final Report, by DHI January 2010
- 32 Bream Bay Dilution and Dispersion Study, Phase One: Comparative Assessment – Addendum, by DHI February 2010
- 33 Bream Bay Dilution and Dispersion Study, Phase Two: Comparative Assessment, Final Report, by DHI May 2010
- 34 Coastal Vegetation Assessment for the Whangarei District Council, Irrigation of Wastewater Suitability Study, Rama Road Block, Ruakaka, by Alastair Jamieson - Wild Earth Media & Harley Spence - Coastline Consultants May 2010
- 35 Bream Bay Environmental Assessment, Bream Bay Outfall and Benthic Survey and Assessment by Golder Associates July 2010
- 36 Ruakaka long-term Wastewater Consents Project, Quantitative Public Health Risk Assessment, by MWH August 2010
- 37 Ruakaka Ocean Outfall Report, Constructability Assessment and Estimated Costs, by OCEL Consultants and Preliminary Assessment January 2008 – August 2010 – Rev. 2
- 38 Odour Management for Ruakaka Wastewater Treatment: long-term Resource Consent Project, by MWH August 2010
- 39 Bream Bay Dilution and Dispersion Study, Nutrient Modelling, Final Report, by DHI November 2010
- 40 Study, Task 2I – The Proposed Scheme Outline Concept Design, by MWH September 2010
- 41 Consultation Record by MWH May 2011

LIST OF TABLES

Table 1.1 Existing Resource Consents	14
Table 1.2 Resource Consents Being Applied For	16
Table 2.1 List of Support Documents	25
Table 3.1 Existing Treatment - Wetland Discharge Monitoring Results from 8 August 2008 to 9 September 2010	35
Table 4.1 Combined Wastewater (ADWF) ² Volume and Load Characteristics	40
Table 4.2 Combined Residential and Business / Industrial Medium and High Growth Scenarios – (ADWF)41	



Table 4.3 Development of Flow.....	66
Table 5.1 Summary of Consents and Activity Status	83
Table 5.2 Cross-Reference to Provisions of the Fourth Schedule RMA 1991	93
Table 6.1 Support Document Summary of Alternatives Assessed	100
Table 6.2 Refined Stage 2 Short-Listed Options.....	112
Table 6.3 Indicative Cost Estimates of the Four Generic Schemes.....	113
Table 6.4 Comparison of the Four Generic Options with the Project Objectives.....	117
Table 6.5 Comparison of Outfall Locations 17 and 22 against the Project Objectives	126
Table 8.1 Ruakaka Proposed Treated Wastewater Quality (based on 52 samples per quarter, i.e. 4 samples per week collected over a 13 week compliance period)	148
Table 8.2 Concentrations of Metals and Other Constituents (µg/l) in Treated Wastewater from Seaview, Hamilton and Tauranga WWTPs (combined data, 2001 to 2009).....	148
Table 8.3 Freshwater Inputs to Bream Bay (calculated from NRC data in DHI 2010).....	149
Table 8.4 Summary of Water Quality Results for Ruakaka Beach (near Surf Club).....	151
Table 8.5 Summary of Water Quality Results for Urquharts Bay at Beach (Harbour Entrance)	151
Table 8.6 Predicted Minimum Plume Dilutions at Edge of Initial Mixing and 100m Mixing Zones	158
Table 8.7 Predicted Minimum Plume Dilutions from the Scenario Assessment at Sensitive Receptor Sites in Bream Bay (DHI 2010).....	159
Table 8.8 Predicted Minimum Plume Dilutions from the Year-Long Simulation at Sensitive Receptor Sites at Bream Bay (DHI 2010)	159
Table 8.9 Predicted Total Suspended Solids Concentrations (mg/l) in Bream Bay Receiving Waters	161
Table 8.10 Predicted Mean Nutrient Concentrations in Wider Bream Bay (mg/l) – ADWF 244 L/s (from DHI 2010) (Support Document 37).....	168
Table 8.11 Predicted Mean Nutrient Concentrations 1 km from the Outfall Diffuser (mg/l) – ADWF 244 L/s (from DHI 2010)	168
Table 8.12 Predicted Toxicant and EDC Concentrations in Receiving Water at Edge of 100m Mixing Zone and at NIWA Intake.....	171
Table 8.13 Predicted EDC Concentrations (mg/l) in Treated Wastewater from the Proposed Ruakaka WWTP and Available Information on the 'no observed effects concentration' (NOEC), 'lowest observed effects concentration' (LOEC) and 'predicted no effects concentration' (PNEC) (from Gadd 2009, Young et al 2002 & Caldwell <i>et al</i> 2008)	173
Table 8.14 Predicted Worst Case Faecal Coliform Content (MPN/100ml) at NIWA Intake.....	175
Table 10.1 Summary of ET and Wet Days Analysis	190
Table 10.2 Estimated Turf Demands and Potential Irrigation Volumes, By Month	191
Table 10.3 Proposed Soil Limits for Metals.....	192
Table 11.1 Summary of Driller's Log for Investigation Boreholes, Rama Road Block	200
Table 11.2 Surface Water Monitoring Results (WDC Monitoring).....	203
Table 11.3 Groundwater Monitoring Results (WDC Monitoring).....	204
Table 11.4 Summary of Results from Northland Regional Council Monitoring of Bercich Drain	204
Table 11.5 Summary of Results from Northland Regional Council Monitoring in Bream Bay Opposite Discharge from Bercich Drain (NRC Sampling Site: 100269)	205
Table 11.6 Estimated Maximum Discharge Rates in m ³ /d, by Month	209
Table 11.7 Minimum Travel Times to the Receiving Environment, According to Drainage Network and Recharge Case	210
Table 11.8 Characteristics of the Treated Wastewater and RO Reject Water.....	215
Table 11.9 Summary of Effects of the Proposed Irrigation of Treated Wastewater to the Rama Road Block218	
Table 12.1 Summary of Effects of the Proposed Irrigation of Treated Wastewater to the Rama Road Block223	
Table 13.1 : Taupo Land Application Scheme Consented Buffer Distances	226
Table 13.2 Summary of Effects of the Proposed Irrigation of Treated Wastewater to the Rama Road Block230	
Table 14.1 Summary of Effects of the Proposed Irrigation of Treated Wastewater to the Rama Road Block234	
Table 15.1 Key Values for Contingency Storage Ponds Discharge to Ground.....	239
Table 15.2 Summary of Effects of Wastewater Seepage from the Contingency Storage Ponds	241
Table 18.1 - Consultation Register.....	271
Table 18.2 Key Issues Raised by Tangata Whenua	280
Table 18.3 Key Issues Raised by Other Stakeholders.....	281
Table 18.4 Key Issues Raised by Statutory Organisations	282
Table 18.5 Key Issues Raised and Whangarei District Council Responses – Pre-Lodgement Consultation	285



LIST OF FIGURES

Figure 1.1 Aerial Photograph Showing the Wastewater Treatment Plant Site and Land Application Zones and Areas.....	3
Figure 1.2 Satellite Town / Rural and Coastal Villages	8
Figure 1.3 Ruakaka Structure Plan 2008 - Plan 6 Land Use Proposal	10
Figure 1.4 Location of Existing Designations from the Whangarei District Plan	15
Figure 2.1 Ruakaka Wastewater Project Schematic and Programme - Schematic Diagram No. 1	21
Figure 2.2 Ruakaka Wastewater Programme - Schematic Diagram No. 2.....	22
Figure 2.3 Inputs Diagram.....	24
Figure 4.1 Development of a the Ruakaka 'Wastewater Strategy' and 'Proposed Scheme'	45
Figure 4.2 Ruakaka Wastewater Strategy and Scheme Implementation – Activities to be Undertaken within the Duration of Consents.....	47
Figure 4.3 Graphical Presentation of Long-Term 'Proposed Scheme'.....	49
Figure 4.4 Proposed Ruakaka Wastewater Treatment Plant – Indicative Layout.....	51
Figure 4.5 Sequencing Batch Reactor Process Flow Diagram – Intermittent Decant Aerated Lagoon (IDAL) WWTP	52
Figure 4.6 Schematic of the SBR Wastewater Treatment Process	53
Figure 4.7 Proposed Ocean Outfall Location – Location 22	57
Figure 4.8 Short- and Medium-Term Beneficial Reuse and Disposal Schematic.....	65
Figure 4.9 Long-Term Beneficial Reuse and Discharge Schematic	65
Figure 4.10 Overview of Wastewater Land Application Zones and Areas.....	67
Figure 4.11 Schematic Diagram Detailing Wastewater Land Application together with NZRC Reuse Sequencing Through to Ocean Outfall Implementation.....	68
Figure 4.12 Wastewater Growth Prediction and Sequence of Use of Consents	69
Figure 4.13 Consent Durations Applied and Given Effect To	70
Figure 6.1 Schematic of Alternatives Identification and Evaluation Process	98
Figure 6.2 Location of Possible Outfalls at Points 1 to 22.....	124
Figure 7.1 Location of Ruakaka and Environs	133
Figure 7.2 Mean Data for the Last 10 Years for Rainfall, Potential Evapotranspiration (PET) and Dry Days.....	135
Figure 7.3 Recorded Archaeological Sites - Ruakaka (NZAA Site Recording Scheme 2008)	140
Figure 8.1 Bream Bay Water Quality Sampling Locations (Sites 1-9)	152
Figure 9.1 Indicative Plan of Pipestring Assembly Area – For Trenched Shore Crossing Option.....	181
Figure 9.2 Possible Alternative Sites to Assemble and Launch the Ocean Outfall for Float and Sink Option.....	182
Figure 9.3 Outfall Pipeline Construction Typical Arrangement Prior to Launching for Float and Sink Option	183
Figure 9.4 Christchurch Outfall Construction – Float and Sink	184
Figure 10.1 Indicative Footprint of Irrigable Area, Roger Hall Memorial Park.....	188
Figure 10.2 Comparison of Mean Monthly Rainfall Depths at Marsden Power Station and Whangarei Airport	189
Figure 11.1 Aerial Plan Showing the WDC Rama Road Block Outlined in Red	197
Figure 11.2 General Location of Rama Road Block.....	198
Figure 11.3 Short- and Medium-Term Beneficial Reuse and Disposal Schematic.....	199
Figure 11.4 Surface Water and Groundwater Monitoring Locations.....	202
Figure 11.5 Rama Road Block Vegetation Map (Source: Wild Earth Media and Coastline Consult, May 2010).....	206
Figure 11.6 Plan View of the Model Realm Showing Flow paths (brown lines with ticks) from Points around the Perimeter of the WDC Block as Determined for the November 2009 Calibrated Model.....	211
Figure 11.7 Predicted Flow Patterns for Irrigation Onto the WDC Block in a 10% AEP Season Following Development of an Extended Drainage Network (marked in red).....	212
Figure 12.1 Proposed Ruakaka WWTP Stage 3 Odour Modelling Results	220
Figure 15.1 Seepage Rate from Ponds as a Function of Pondered Depth.....	237
Figure 15.2 Variation in Pond Depth and Daily Pump-Out Volumes if the Contingency Ponds had been in Service from 1 January 2006; Inflows from Incident Rainfall Only (i.e. no contingency flow).....	238
Figure 15.3 Variation in Discharge to Ground by Seepage from Contingency Ponds.....	239



Whangarei District Council



Figure 16.1 Patuharakeke Traditional Rohe.....243
Figure 17.1 The Generic Model for an Integrated Holistic Approach.....261