

SUBMISSION ON PROPOSED TE TAI O POUTINI PLAN (TTPP)

1.0 SUBMITTER DETAILS

Submitter Name:	Griffen & Smith Ltd
Address for Service:	C/- Davis Ogilvie & Partners Ltd Level 1, 42 Oxford Street Richmond 7020 Attention: Pauline Hadfield, Senior Planner Email: pauline@do.nz
Submitter Contact Details:	David Smith Managing Director Griffen & Smith Ltd Email: dave.smith@mitre10.co.nz

2.0 SUBMISSION DETAILS

The specific provisions of the proposed Te Tai o Poutini Plan that the following submission relates to are:

- Hazards and Risks
- General District Wide Matters
- Zones

We do wish to speak to this submission.

We will not gain any advantage in trade competition through this submission.

If others make a similar submission, we would consider presenting a joint case with them at a hearing.

3.0 SUBMISSION

Introduction / Background

1. Griffen & Smith Ltd own and operate the Mitre 10 Mega store located on Waterwalk Road, Greymouth. Under the operative Grey District Plan, the site is zoned Rural Environmental Area; under the proposed Te Tai o Poutini Plan, the site is to be rezoned as COMZ – Commercial Zone.

2. The original Mitre 10 Home & Trade operation was granted resource consent (LUN 977/03) in November 2003 under the Transitional and Proposed Grey District Plans governing the site at the time. The store was opened in November 2005.
3. Resource consent LUN 1999/09 was granted in March 2010 for the expansion of the operation to become a Mitre 10 Mega store. A minor variation was granted later that year (LUC 2094/10) in respect of changes to the site plans at the time of building consent. A further variation (LU 2094/10-2) was granted in April 2018 to amend the drive-through layout and cover an outdoor storage area.
4. Griffen & Smith support the rezoning of their site as COMZ – Commercial Zone.
5. Griffen & Smith object to the Coastal Hazard Alert overlay which affects their site.
6. Griffen & Smith also have concerns about some land use rules in the proposed TTPP.

Zoning

7. As stated above, Griffen & Smith support the rezoning of their site (Lot 1 DP 3493 and Sections 444 to 457 Town of Greymouth) as COMZ – Commercial Zone, as it most accurately reflects the existing use of the site. This more appropriate zoning will significantly reduce the chances of requiring further resource consent if they ever seek to expand or change the layout of the Mitre 10 Mega store.
8. Griffen & Smith also support the rezoning of the land along Cowper Street (containing Westland Work gear, Ngāi Tahu Forestry and Coastal Health Clinic) as COMZ – Commercial Zone.
9. However, the extent of the COMZ zoning across Raleigh Street to Sawyers Creek is queried. Northeast of Raleigh Street and west of the railway line, the land shown in the COMZ Zone is extremely unlikely to ever be developed. It is outside the protection of the Greymouth Flood Wall and would be at serious risk of inundation. Griffen & Smith submit that the COMZ boundary west of the railway line would more appropriately finish at their site i.e., the northeastern boundary of the Mitre 10 carpark on Lot 1 DP 3493.
10. We also question why the legal road at the southwestern end of the Mitre 10 site, Waterwalk Road, the lagoon, Raleigh Street, the railway corridor, and the flood wall have apparently defaulted to the GRUZ General Rural zone. Griffen & Smith submit that these areas should be zoned in keeping with the adjoining zoning. For example, the flood wall and lagoon would more appropriately be zoned as Open Space, and the COMZ zone adjacent to Mitre 10 should include Waterwalk Road and the legal road to the south. This is consistent with the way roads have been zoned in the central business district and residential areas. This may be a wider issue to be considered during the TTPP development process.

Overlays

11. **Appendix 1** contains two printouts from the TTPP mapping system showing potential hazard overlays in the vicinity of the Mitre 10 Mega site:
 - (i) Showing the **Flood Hazard Susceptibility** (solid purple) overlay
 - (ii) Showing the **Coastal Hazard Alert** overlay (horizontal blue hatching) and the **Coastal Tsunami Hazard** overlay (vertical yellow hatching).When viewed at a larger scale, all three overlays appear to model flooding from Erua Moana Blaketown Lagoon rather than directly from the coast.
12. The **Flood Hazard Susceptibility** overlay excludes the buildings on the Mitre 10 site, and is therefore generally acceptable to Griffen & Smith.
13. It is noted that in all natural hazard overlay areas, existing buildings can be replaced if destroyed or damaged by fire, natural disaster or Act of God (Rule NH – R1); and that new unoccupied buildings or additions/alterations for buildings for commercial/industrial activities can be constructed as a permitted activity in the Flood Susceptibility and Coastal Alert overlays providing finished floor levels are 300mm above a 1% AEP flood event (Rules NH – R7, R8, R39 and R40). These rules are supported by Griffen & Smith, taking into consideration that the 1% AEP level may change over time.
14. The **Coastal Hazard Alert** overlay covers most of the Mitre 10 Mega site, including the main shop building and the large storage shed in the yard. Griffen & Smith object to this overlay affecting their site. They submit that the boundary of the overlay appears arbitrary, being “straight-lined” through their site, and has potential to unfairly affect their insurance cover in future.
15. Griffen & Smith note that the overlay excludes the buildings on the western side of Waterwalk Road south of the lagoon, and submits that these buildings are more likely to be inundated in the event of a coastal surge due to their location near the lagoon.
16. **Appendix 2** contains a plan showing ground levels along Waterwalk Road extracted from Council’s LIDAR data. The plan shows that ground levels across the Mitre 10 site range between 2.74m (at the car park) and 3.16m (in the trade yard). Ground levels at the “excluded” properties further along Waterwalk Road are considerably lower, at 1.98m and 2.09m.
17. The Mitre 10 Mega buildings are relatively new, and flood risk was considered at the time of construction. The finished floor level of the buildings was constructed to be 500mm above the crest of Waterwalk Road (3.5m AMSL). This minimum floor level was required by Condition 10.1 of LUN 977/03, which states: “*The development shall be completed in a manner which enables a minimum floor level of 3.5 metres AMSL (Lyttelton Datum 1937) to be achieved*”.

18. **Appendix 3** contains correspondence from the West Coast Regional Council dated 19 March 2003, and **Appendix 4** contains a report from Opus International Consultants Ltd dated 20 June 2003. These documents set out the reasoning and recommendations for the design floor levels.
19. Griffen & Smith acknowledge that the Coastal Hazard Alert overlay has been modelled, and mapped based on that modelling; however, we submit that the modelling does not take into account the finished floor levels for the Mitre 10 Mega buildings, which have been designed to avoid inundation effects.
20. Policy NH - P11 in the proposed TTPP states:

Allow development in the Land Instability Alert, Coastal Alert and Flood Susceptibility overlays where:

 - (a) Mitigation measures avoid risk to life and minimise risk to property and the environment;*
 - and*
 - (b) The risk to adjacent properties, activities and people is not increased as a result of the activity proceeding.*
21. Griffen & Smith submit that mitigation measures against inundation have already been implemented at the time of building on their site, in accordance with Regional Council requirements and the site-specific recommendations of suitably qualified engineers.
22. Furthermore, the Coastal Hazard Alert overlay does not appear to account for the protection afforded by the Greymouth Flood Wall, including floodgates designed to stop water from flowing along the railway line and/or backing up through the culvert under Raleigh Street into the lagoon. In the event of a major coastal inundation threat (storm or tsunami), it would be expected that Council would take steps to protect property and minimise inundation. This would include moving the large concrete floodgates into position at the railway line, and closing the lagoon inlet/outlet floodgate; both of which would protect the Mitre 10 Mega site along with other properties on Waterwalk Road.
23. We note that the Coastal Tsunami Hazard overlay does take into consideration the Greymouth Flood Wall system; this overlay does not extend past the flood wall along Raleigh Street (refer printout attached as **Appendix 1**). The two coastal overlays appear inconsistent, when conceivably they should be similar in extent in areas that are protected by the Greymouth Flood Wall.
24. Griffen & Smith request that the Coastal Hazard Alert overlay be removed from their site.

Commercial Zone Rules

25. The description of the COMZ Commercial Zone includes a summary of the types of businesses that can be anticipated within the zone, *“from small stores to supermarkets, service stations, bulk retail and offices”*. The Planning maps also show that the Commercial Zone in Greymouth is typically located at the interface between more intensive business activity (Industrial, Mixed Use and Town Centre zones) and the Residential zones.
26. Griffen & Smith submit that **Rule COMZ - R1(4)** is too restrictive when taking the above matters into consideration. The Zone is designed to accommodate predominately large-format buildings, yet this rule restricts building length to 20m where sites adjoin Residential zones. A significant number of Commercial sites adjoin Residential zones.
27. Although this does not affect the Mitre 10 Mega site, Griffen & Smith consider that a 20m building length would unduly restrict new development in the Commercial Zone. Anything much larger than a standard residential dwelling would require resource consent, and we consider that this would discourage development.
28. COMZ – R1 also requires a 3m setback from Residential zones (R1(2)(i)) which must contain a *“2m wide landscaping strip ... planted with species, which at maturity, will screen the buildings from the adjoining sites”* (R1(3)(2)). Shading effects are also protected by requiring recession planes to be complied with (R1(6)). Taller buildings would require a greater boundary setback to comply with recession planes.
29. Providing the landscaping and recession plane requirements are met, Griffen & Smith submit that building length should not be restricted in the Commercial Zone. This will encourage larger-format commercial businesses to establish in the Zone that is specifically designed to cater for these businesses.
30. The Restricted Discretionary status for non-compliance with the recession plane performance standard (**COMZ – R6**) is supported. It is noted that this rule does not refer to non-compliance with the building length performance standard referred to in its title.
31. As above, the maximum building length requirement set out in Discretionary Rule **COMZ – R8(2)** should be removed to encourage commercial development in the Zone.
32. Rule **COMZ - R3** (Fences, Walls and Retaining Walls) sets a maximum height at 2m. The amenity values of this height restriction are acknowledged; however, in the Commercial Zone, this height limit may not be practical.
33. Griffen & Smith submit that higher fences are likely to be required in this zone for security purposes. Amenity and landscape values/views could be maintained by amending the rule to

require fences (or parts of fences) that are higher than 2m to be permeable e.g., wire or netting when adjoining a Residential zone or fronting onto a road.

Signage Rules

34. Rule SIGN - R1(10) is grammatically incorrect and confusing. The rule sets out a “*minimum*” lettering size but states that sign should not “*exceed*” these dimensions. This rule should be re-worded to clarify that signage lettering should be larger than the minimum size stated.
35. Griffen & Smith further submit that in the Commercial, Mixed Use and Industrial zones, the limit on the number of words and characters required by R1(10)(iii) is too restrictive. This limit may be appropriate for higher-speed areas but is not practical to convey the level of information often displayed on commercial signage.
36. For example, Mitre 10 Mega’s main sign on Raleigh Street reads: “*Mitre 10 Mega; Home Improvement Warehouse*” (6 words, 35 characters) with a supplementary sign below it advertising “*Columbus Coffee*”. This sign conveys the minimum practical information necessary to advertise the store, yet would require consent under Rule SIGN – R1.
37. Griffen & Smith submit that Rule SIGN – R1(10)(iii) should be amended to exclude lower-speed roads within the Commercial, Mixed Use, and Industrial zones.
38. The separation distances required by Rule SIGN – R1(11) are also seriously flawed when considered against typical site sizes in the Commercial and Mixed-Use Zones. The rule requires 60m separation between signs in areas with <70kph speed limits, but almost all sites in the Commercial Zones in Greymouth have less than 60m road frontage. The sponsorship fence along the Westurf hockey stadium would also be non-complying. If implemented as drafted, this rule would force almost all business owners to obtain resource consent for signage under this rule.
39. Signage is an important part of any vibrant commercial area, providing information and advertising for the businesses located in these areas. Restrictions may be appropriate in residential areas and high-speed traffic environments, but the level of restriction set out in Rule SIGN – R1 is not workable for commercial areas. These rules need to be reconsidered.

4.0 CONCLUSION

40. In summary, Griffen & Smith seek the following decisions:
 - Rezoning of the Mitre 10 Mega site as COMZ Commercial Zone, as proposed by the TTPP
 - Rezoning proposed COMZ and GRUZ land in the vicinity to more suitable zoning

- Removal of the Coastal Hazard Alert overlay from the Mitre 10 Mega site on Waterwalk Road
- Removal of the building length restriction in the COMZ Commercial Zone
- Amendment to the maximum fence height rule in the Commercial Zone to accommodate security fencing
- Amendments to the Signage rules to allow practical signage in commercial areas

Signed:

On behalf of Griffen & Smith Ltd



PAULINE HADFIELD

DAVIS OGILVIE & PARTNERS LTD

Senior Planner, Assoc.NZPI

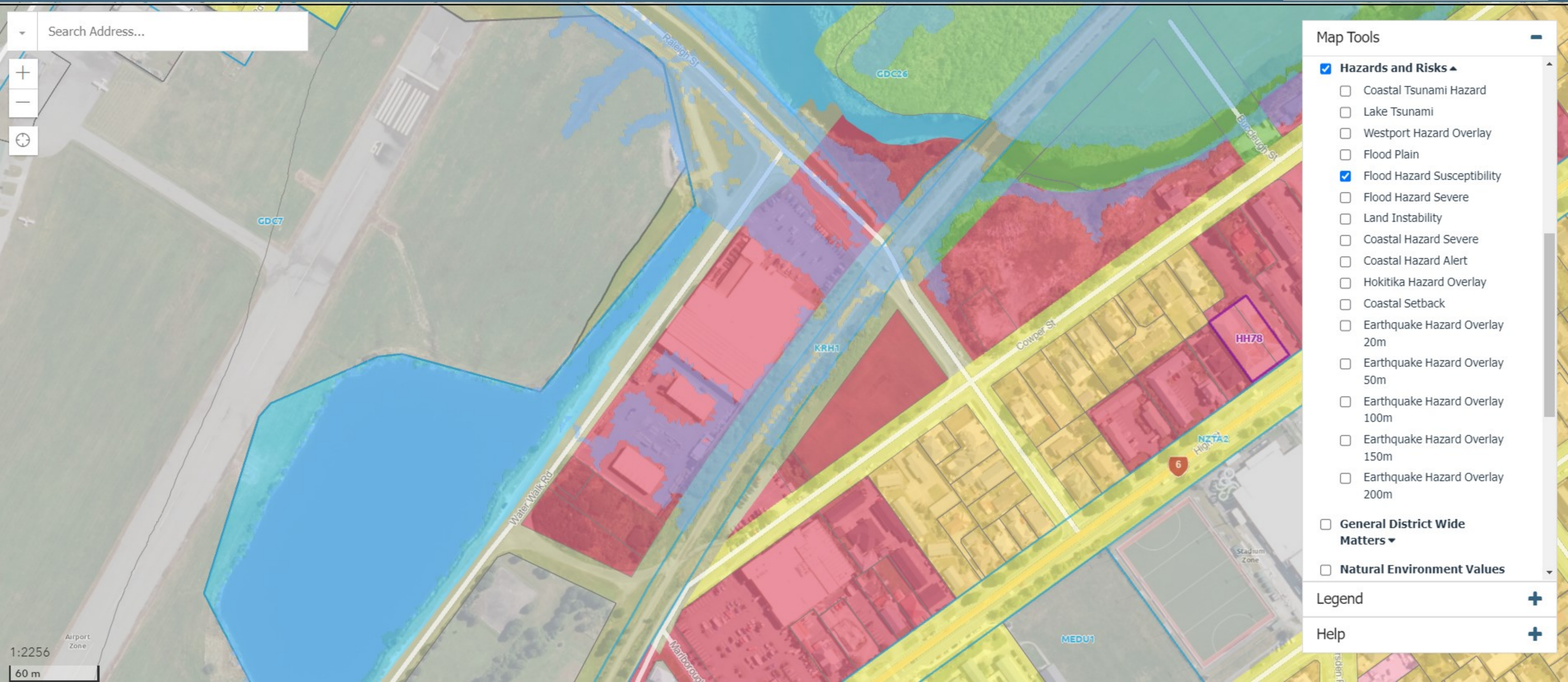
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- Appendix 1** TTPP Overlay Maps (2)
- Appendix 2** LIDAR Elevations Plan
- Appendix 3** WCRC Correspondence
- Appendix 4** Opus Flood Risk Appraisal

APPENDIX 1

TTPP Overlay Maps

Search Address...



Map Tools

- Hazards and Risks ▲
 - Coastal Tsunami Hazard
 - Lake Tsunami
 - Westport Hazard Overlay
 - Flood Plain
 - Flood Hazard Susceptibility
 - Flood Hazard Severe
 - Land Instability
 - Coastal Hazard Severe
 - Coastal Hazard Alert
 - Hokitika Hazard Overlay
 - Coastal Setback
 - Earthquake Hazard Overlay 20m
 - Earthquake Hazard Overlay 50m
 - Earthquake Hazard Overlay 100m
 - Earthquake Hazard Overlay 150m
 - Earthquake Hazard Overlay 200m
- General District Wide Matters ▼
- Natural Environment Values ▼

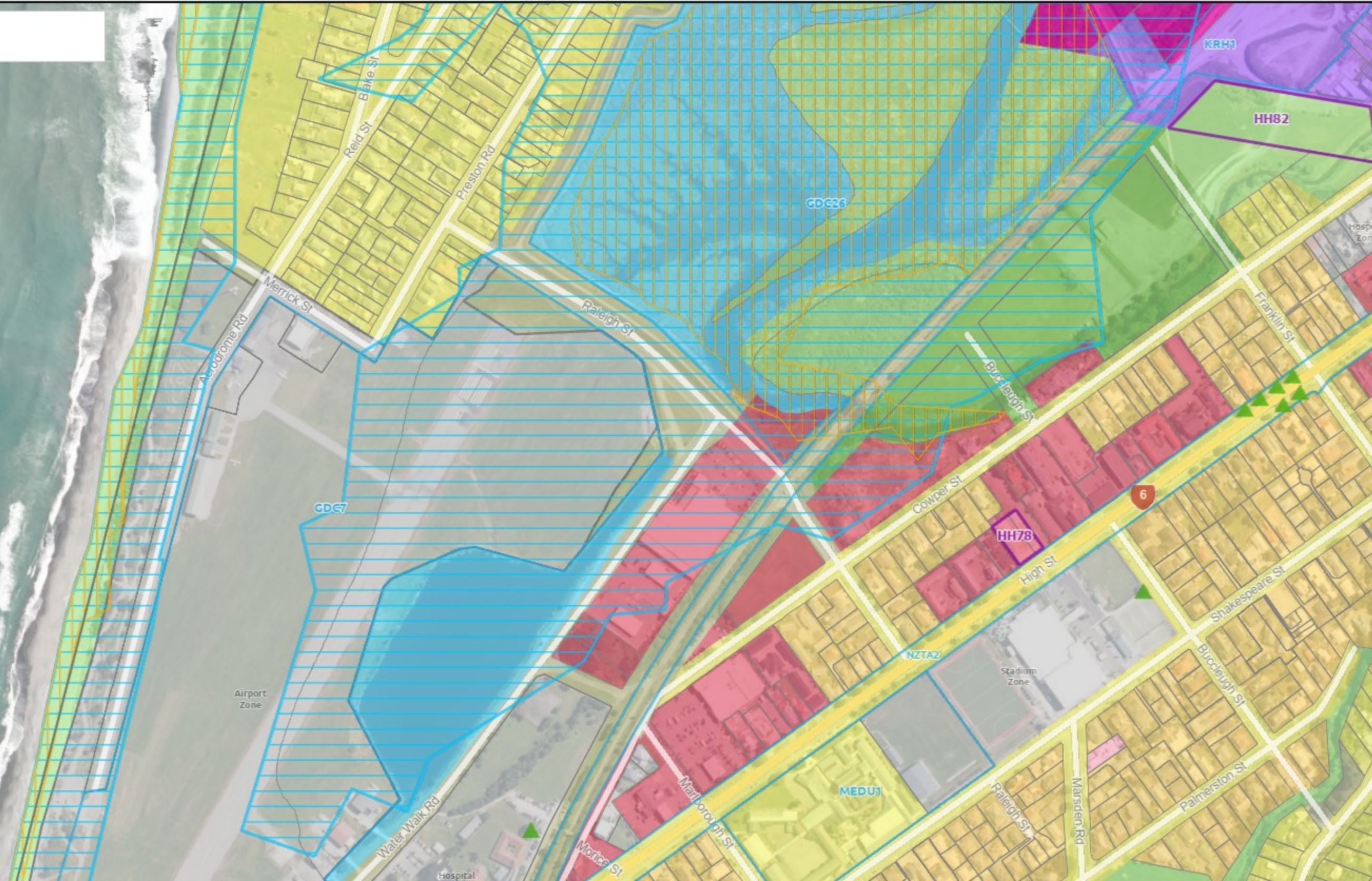
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Search Address...



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100 m



Map Tools

- Hazards and Risks ▲
 - Coastal Tsunami Hazard
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 - Earthquake Hazard Overlay 100m
 - Earthquake Hazard Overlay 150m
 - Earthquake Hazard Overlay 200m
- General District Wide Matters ▼
- Natural Environment Values ▼

Legend +

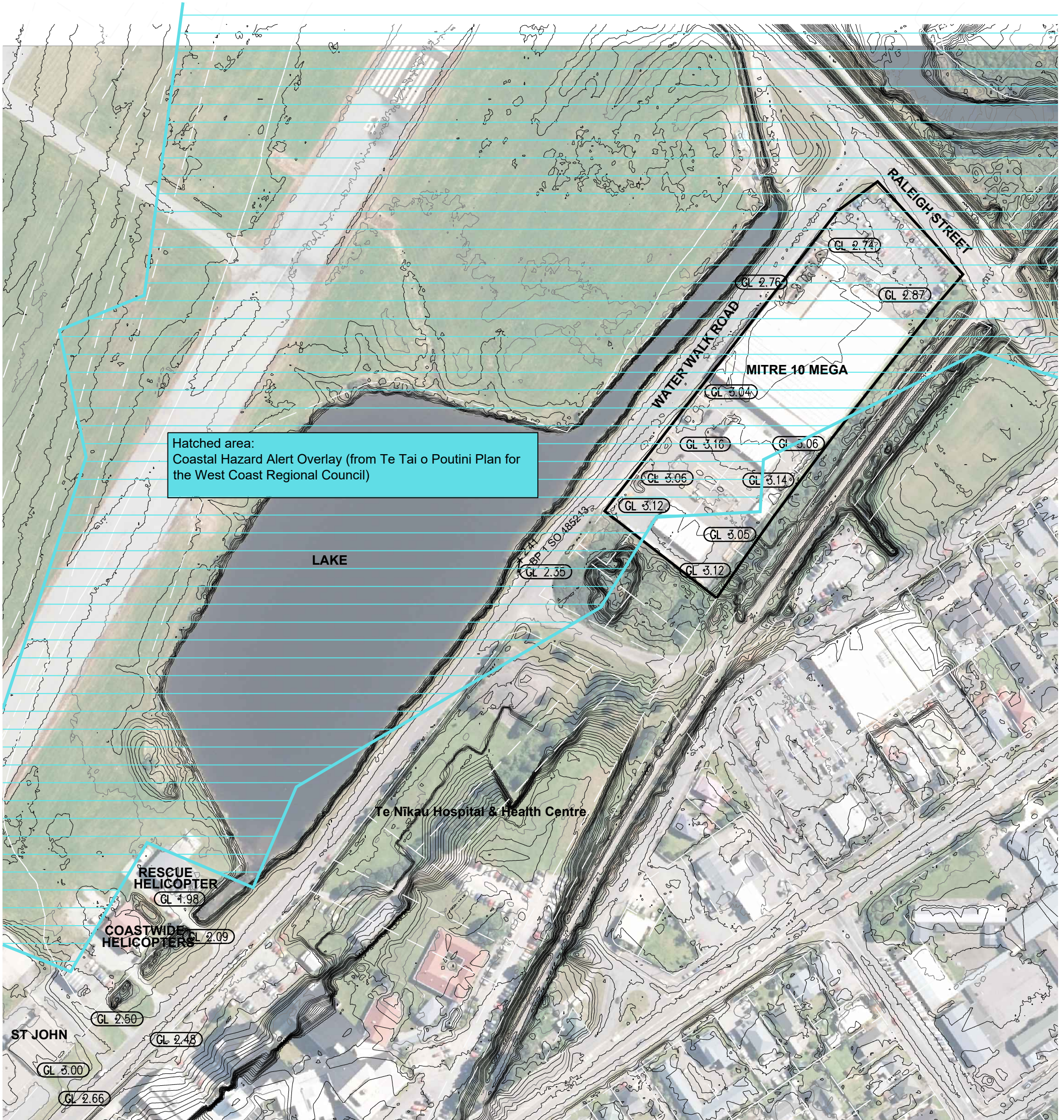
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APPENDIX 2

LIDAR Elevations Plan



/ issue	/ date	/ reason	/ approved
A	10/22	Site Levels	JT



Levels are in terms of: Vertical datum is NZVD2016
Origin of levels from: data.linz.govt.nz/110163-west-coast-lidar-1m
Benchmarks checked: BP 1 SO 485213 (2.41m)

CT: Various
Owner(s): Griffen and Smith Limited (Mitre10)
Area: 1.62ha more or less

CAD ref: 43228 Mitre10 contour and site plan



Site Levels Water Walk Road, Greymouth (Mitre10 - St John; 41-112 Water Walk Road)

/ surveyed SH	/ drawn SH	/ QA check JT	/ dwg S301
/ scale @A3 1:2000	/ date 10/22	/ file 43228	/ issue A

APPENDIX 3

West Coast Regional Council Correspondence



THE WEST COAST
REGIONAL COUNCIL

153 Tainui Street
P.O. Box 66, Greymouth.
The West Coast, New Zealand.
Telephone (03) 768 0466
Toll Free 0508 800 118
Facsimile (03) 768 7133
email: info@wrc.govt.nz

Enquiries to: Wayne Moen
Our ref: 914000

19 March 2003

Mr. Dave Smith
Mitre 10 Ltd.
33 Boundary Street,
GREYMOUTH.

Dear Dave,

INUNDATION POTENTIAL – WATERWALK ROAD

This letter is in response to your enquiry regarding the potential development of your property on Waterwalk Road and the potential effect of flooding on the property.

This property was completely inundated in the flood events of May and September 1988, as was much of the Greymouth Town area.

Since the disastrous floods of 1988, The Westland Catchment Board and The West Coast Regional Council have constructed the Greymouth Flood Protection Scheme, a series of stopbanks, walls and floodgates, designed to prevent a flood of a 50-year return period from entering the Town of Greymouth.

The structures were also designed to have a safety margin of 600mm freeboard over and above the design flood levels.

To this extent, this particular piece of ground, excluding major structure failure or overtopping, is considered to be relatively flood free from the Grey River.

It is expected, that in the situation of a very high flood in the Grey River, that some "back-up" could occur, as a result of controlled flood gates being closed, in the above area, for short periods of time.

Some allowance should be made for this during the planning and construction stages of your development.

I have perused your concept plans and also survey plans to determine approximate levels for the site and would suggest that a minimum floor level of 500mm above the crown of the adjacent Waterwalk Road be allowed for such an event.

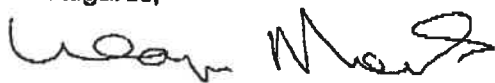
With reference to the contour plans supplied by Cowan & Holmes, surveyors, this would place the minimum floor level at approximately 3.50 metres, which would generally indicate a fill of approximately 100 to 200mm above the existing ground level on the site.

This would obviously save a considerable cost on fill material required for the site.

In suggesting this approximate level, this does not guarantee the site to be flood free in exceptional circumstances and planning for this contingency, should it ever eventuate, would be your responsibility.

I trust this advice has been of some assistance to you and I wish you every success in your venture.

Regards,

A handwritten signature in black ink, appearing to read "Wayne Moen". The signature is fluid and cursive, with the first name "Wayne" written in a larger, more prominent script than the last name "Moen".

Wayne Moen
Senior Engineering Officer,
For
R.J. Lowe
Operations Manager
Mitre100303

APPENDIX 4

Opus Flood Risk Appraisal

20 June 2003

Griffen and Smith Mitre 10
P O Box 385
GREYMOUTH

ATTENTION: Dave Smith

RECEIVED

23 JUN 2003



WGRI0.04

Dear Dave

MITRE 10 DEVELOPMENT: FLOOD RISK APPRAISAL

As per our offer of service of 29 May I present here my appraisal of flood risk and mitigation measures for your proposed Mitre 10 store development in Greymouth.

1 Summary

The likely overall increase in stormwater discharge as a result of development of the Mitre 10 site is considered negligible.

The annual probability of flooding from the Grey River is likely to be less than 1 in 50. It is likely that there is little that can be cost-effectively done at the site to reduce the annual probability of damage to below this level.

To achieve a similar level of protection from local stormwater flooding the site needs to be built up to provide a finished floor level at least 0.5 m above the crest of Water Walk Road. Additional raising may be advisable to counter the effect of further development in the catchment, potential loss of stormwater ponding on the aerodrome land and in order to reduce the overall risk profile. The amount of this additional raising will be determined by cost and issues related to gaining vehicle access and limiting visual intrusion of the building.

2 Terms of Reference

The purpose of this report is to provide evidence and advice related to your proposal for the development of a Mitre 10 store on the corner of Raleigh Street and Water Walk Road, Greymouth.

Items to be addressed by this report are limited to:

- The effect of development on stormwater discharges from the site.
- The risk of surface water inundation of the building foundations.

3 Assessment Methodology

My assessment has been based on:

- Visual assessments made during site visits by myself on 19 May and 18 June 2003.
- Drainage information provided by Karl Jackson of Grey District Council.
- Simple rainfall-runoff estimates made using the "Rational" method.
- Area measurements from Grey District Council ortho-rectified aerial photography and Terralink legal boundary information.

4 Site Description

The Mitre 10 site to be developed is located on the intersection of Raleigh Street and Water Walk Road, Karoro. The Greymouth stopbank runs immediately parallel to Raleigh Street on the side opposite the proposed development and contains Lake Karoro. The Greymouth Aerodrome occupies land on the opposite side of Water Walk Road. A small tidal pond exists on the aerodrome land adjacent to Water Walk Road. This pond is connected to Lake Karoro via an open channel and gated culvert under Raleigh Street and the Greymouth stopbank. From now on I will refer to this pond as Water Walk Pond to distinguish it from Lake Karoro. Stormwater from the site will be drained into Water Walk Pond via culverts under Water Walk Road.

5 Stormwater Discharge

5.1 Catchments Areas

The area of Mitre 10 land to be developed is approximately 1.2 ha in size.

The estimated total area in Greymouth that contributes stormwater to Water Walk Pond is approximately 90 ha. This includes areas such as the aerodrome, Grey Hospital, Rugby Park, Arnott Heights and Karoro Cemetery.

I have excluded from the below analysis any water feeding into the pond from Lake Karoro and its immediate catchments. This is because water from this area will only be relevant for part of the tide cycle (i.e. the upper portion of the tidal cycle when water is flowing from Lake Karoro into Water Walk Pond). Furthermore, because of the hydraulic control formed by the stopbank, lake and culvert system flows from this side will be significantly attenuated. In addition, the water height in the lake, and therefore the flow through the culvert is likely to be significantly more influenced by tidal levels than increased levels as a result of stormwater inflow. Exclusion of this catchment area represents a slightly conservative approach to estimating the effect of the Mitre 10 site on stormwater discharges (i.e. will indicate a slightly higher impact from the Mitre 10 development).

Based on the areas above the Mitre 10 site represents approximately only 1.4% of the total catchment area draining into Water Walk Pond.

5.2 Runoff Estimates

5.2.1 General

I have made an assessment of the effect of development of the Mitre 10 site using the "Rational" method.

I have used rainfall intensity-duration estimates from the HIRDS (High Intensity Rainfall Design System) (Version 2.0) computer package developed by NIWA (National Institute of Water and Atmospheric Research).

5.2.2 Increase of Peak Site Discharge

As a result of development of the Mitre 10 site the peak runoff from the immediate area of the site may increase by a factor of up to 125%. However, as the severity (or rarity) of the rainfall event considered increases this percentage will decrease (to approximately 30% at the 50-year return period event). While this figure appears high, the Mitre 10 area is only a small proportion of the total area draining into the lake and thus the net influence will be small as detailed below.

5.2.3 Overall Discharge Increase

Based on simplistic analysis, considering the broad types of areas contributing flow, the increase in total peak discharge (or flow volume) as a result of development of the site is likely to be 1.4%. The fact that this percentage is the same as the percentage of area the site represents is purely coincidental. As the severity (or rarity) of the rainfall event considered increases, the above percentage will decrease (to approximately 0.4% at the 50-year return period event). This decrease is a result of increased runoff from relatively pervious areas during more extreme events.

This predicted overall increase in peak discharge (or flow volume) is considered negligible. Given the storage available in the pond, its ability to attenuate flows and the nature of the receiving environment (i.e. Lake Karoro and ultimately the sea rather than any limited capacity piped network) it is unlikely that the increased site discharge will have any measurable effect.

6 Flood Risk

6.1 General

The major sources of flood risk at the proposed development site are as follows:

- Overtopping and/or failure of the Greymouth stopbank during a flood event in the Grey River.

- Local stormwater flooding, perhaps exacerbated by the flood control gates on the culvert between Lake Karoro and Water Walk Pond being closed.

Mr Wayne Moen, Senior Engineering Officer, the West Coast Regional Council also raised these issues in his letter of 19 March 2003 (Moen, 2003).

6.2 Stopbank Overtopping / Failure

Mr Moen states in his letter that the stopbank was designed to contain a flood of 50-year return period. It would seem safe to assume that the likelihood of failure of this stopbank during an event of smaller magnitude (more frequent occurrence) is very small.

In the event of a breach of the stopbank, by overtopping or structural failure, the height and volume of water contained will result in rapid and significant depth of flooding. The high water velocities likely to be generated in the breach area, together with the stopbank material dispersed are likely to cause immediate and significant damage to any structure in the immediate vicinity of the breach. In addition, depending on the characteristics of the particular flood event and the stage at which failure happens, water from the Grey River is likely to pond in the area of the aerodrome at a significant depth (in the order of one to two metres or more) for a significant period of time (perhaps in the order of six hours or more).

There is little that can be done to provide a high level of security against such an event. The most obvious solution to provide the greatest certainty of protection would be to elevate the site to at least the crest level of the stopbank and armour the fill slopes to protect against potential scour. However, it is unlikely that this would be an economically justifiable solution given the relative low probability of flooding and high cost of protecting the site. This solution may also cause line-of-sight issues for adjacent landowners and create vehicle access problems. Such a course of action would also seem inconsistent with other development in Greymouth.

However, the more that the site can be raised above the surrounding ground level the lower the risk will become.

6.3 Local Stormwater Flooding

A suitable design scenario for local stormwater flooding is the event equal to the stopbank design standard (i.e. 50-year return period).

It would be reasonable to assume that the Grey River may also be in flood at the time and that therefore the control gates will be closed. I have assumed that the gates may be closed for up to 6 hours (half a tide cycle). Based on a visual inspection of the site it appears reasonable to assume that there would be approximately 1 m freeboard (available storage) in Water Walk Pond. Also, (perhaps conservatively) half the plan area of the aerodrome land would provide a suitable value on which to estimate potential floodwater storage volume and therefore water ponding depth. This last assessment is made on the basis that there

are some limited high areas within the aerodrome site and the fact that the remaining land is not flat. Therefore the volume formula may be closer to two-thirds area times depth than simply area times depth. By taking the 50-year return period 6-hour rainfall intensity estimated by HIRDS, together with a suitable weighted runoff coefficient (0.7) gives a ponding depth estimate of approximately 0.5 m. This concurs with Mr Moen's estimate (Moen, 2003).

7 Discussion

7.1 Flood Risk

Given the nature of the location of the proposed development the risk to life is considered small and certainly no greater than elsewhere in Greymouth.

7.2 Aerodrome Ponding Area

The recommended 0.5 m minimum height for finished floor level assumes that the aerodrome area is available for stormwater ponding during rare events. If, for some reason, the Water Walk Pond were bunded off from the aerodrome area the depth and frequency of flooding from local stormwater at the proposed development site would increase. Given the present nature of the aerodrome area it is probably unlikely that such bunding would be undertaken. In the event that it was proposed, it would presumably require resource consent and Mitre 10 should be considered an effected party whose approval would be required.

7.3 Additional Development

The recommended foundation level also assumes the current level of development. Further development within areas draining into Water Walk Pond will increase stormwater runoff and therefore potential flooding depths. The implication being that the foundation level will need to be marginally higher to cater for increased development in the catchment if a minimum 50-year design standard is to be maintained throughout the predicted life of the site. As an indication of the possible effect of increased development; if all presently undeveloped areas within the present catchment (e.g. the aerodrome and Rugby Park) were developed to the same level as surrounding areas the predicted 50-year flood depth would increase to 0.74 m (c.f. 0.5 m).

7.4 Risk Profile

It is worthy of note the risk profile that is being accepted when building to a 50-year design standard. The following table provides a statistical analysis of the risk of the design event being exceeded over various time spans.

Time Span	5 years	10 years	20 years	50 years
Probability of Exceedence	10%	18%	33%	64%

Note: Probability of exceedence means that an event bigger than the design event will occur. The inference is that this is the probability of some form of damage during that time period.

7.5 Site Drainage

Stormwater drainage from the Mitre 10 site needs to be designed such that water from the site will drain to Water Walk Pond even if the culvert outlets are submerged or if the water level is close to the foundation level.

7.6 Foundation Design

The Mitre 10 site and building foundation design need to consider that local stormwater flooding may inundate the foundations.

7.7 Floor Level

Adopting a minimum finished floor level of 0.5 m above the crest level of Water Walk Road is considered prudent. Additional raising may be advisable to counter the effect of further development in the catchment, potential loss of stormwater ponding on the aerodrome land and in order to reduce the overall risk profile. The amount of this additional raising will be determined by cost and issues related to gaining vehicle access and limiting visual intrusion of the building.

8 Conclusions and Recommendations

As a result of the analysis undertaken in this report the following conclusions are drawn and recommendations made:


- The likely overall increase in stormwater discharge as a result of development of the Mitre 10 site is considered negligible.
- The annual probability of flooding from the Grey River is likely to be less than 1 in 50. It is likely that there is little that can be cost-effectively done at the site to reduce the annual probability of damage to below this level.
- To achieve a similar level of protection from local stormwater flooding the site needs to be built up to provide a finished floor level at least 0.5 m above the crest of Water Walk Road.
- Additional raising of the floor level may be advisable to counter the effect of further development in the catchment, potential loss of stormwater ponding on the aerodrome land and in order to reduce the overall risk profile. The amount of this additional raising will be determined by cost and issues related to gaining vehicle access and limiting visual intrusion of the building.

9 References

- Bowis, S., 2000b. *Hydrometric & Meteorological Data Summary Report to 2000*. June 2000. West Coast Regional Council Regional Monitoring Technical Report #0005. 195 pp.
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I trust that this report has sufficiently presented the information you require. Please contact me on 03 768 7179 if you need to clarify any aspect of this work.

Yours sincerely



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