NORTHLAND REGIONAL COUNCIL

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Please Quote File: 560010
BRH:

21 July 2010

Alan Walker
Manager, CDEM Development
Ministry of Civil Defence & Emergency Management
The Department of Internal Affairs
P.O.Box 5010, Wellington

Dear Alan

KAEO BUSINESS CASE

Please find enclosed a copy of the signed Kaeo Business Case jointly prepared by the Northland Regional Council and Far North District Council.

The business case details the basis for the Kaeo Flood Risk Reduction Strategy and is submitted in support of providing a case to cabinet to consider release of the government's $0.5M funding contribution towards assisting the most vulnerable flood risk homes in Kaeo.

Please liaise with the undersigned in relation to any matters concerning this.

Yours sincerely

Bruce Howse
Land/Rivers Senior Programme Manager

NORTHLAND REGIONAL COUNCIL

Far North District Council

Kaeo Business Case

Introduction

1. Kaeo, a small town located in rural Northland, and surrounding land is subject to flooding from the Kaeo River and its tributaries. Significant flood events are recorded in photographs and newspaper reports from the early 1900's through to recent times (*ref NRC, 2009[1]; p 10 -11*).

2. According to the most recent population census (2006), there are 495 people living in Kaeo and its immediate environs, occupying 171 dwellings. The Kaeo township is the main service centre for the Whangaroa area. Part of the township, the two state schools (Kaeo Primary and Whangaora College) and State Highway 10 are located on the Kaeo River floodplain. The median income for the settlement is $17,200 per annum, which compares with an overall Northland median annual income of $20,900.

3. In November 2008, following the March and July 2007 floods, Cabinet agreed (refer **Attachment 1** for offer of funding support letter) to provide funding support for the most vulnerable flood affected properties in Kaeo, contingent on the following:
   - Assistance for Kaeo would be provided in the context of a strategy being developed for long term flood risk mitigation by the Northland Regional Council.
   - The cost of relocating or raising vulnerable houses should be split four ways between the Regional Council, District Council, the home owners and the government.
   - The government's one quarter share towards these costs would be capped at $500,000 (GST exclusive).

4. This paper describes the unprecedented nature of the 2007 floods, the process for the development of the flood risk reduction strategy, how the strategy addresses current, future and residual risk, community engagement and support, the government funding contribution and funding of the strategy.

The 2007 Floods

5. For the area of Kaeo, the two floods of March and July 2007 were unprecedented and extraordinary in the sense that 100 YR ARI[2] rainfall predictions were exceeded twice in the space of four months[3]. These flood events fundamentally shifted the assessed riskscape for this area of Northland.

6. The March and July two day storm totals for the Kaeo automatic rain gauge were 323mm and 289mm respectively. Rainfall rates during both these storms exceeded the 100 YR ARI estimates. Whilst several river gauges have since been established on the Kaeo river since the 2007 floods, there is no gauged river flow record for these events. The most reliable indication of peak flood flows during these floods is based on flood level data on which the Kaeo computer

[1] Northland Regional Council, 2009. Kaeo Flood Hazard and Flood Risk Reduction Assessment. 62p.
[2] ARI – Average Recurrence Interval (based on Annual Exceedence Probability)
[3] NIWA, McKerchar A, October 2007, Northland Floods: 28-29 March and 9-10 July 2007

model has been calibrated. A peak flow of 330 m^3/s has been estimated by the model for the July event, just upstream of the Kaeo township.

7. The resulting floods inundated dwellings and commercial buildings, particularly in the township, including the school, and downstream along the SH10, Dip Road and the Waikoura flats. The township was inundated both by fast flowing water from the Waikara Creek which runs under the SH10, then by much deeper flood water from the Kaeo river. The flood depth on the SH10 through Kaeo was approximately a metre deep. Following the March floods, many of the property owners invested considerable sums in repairing the damage and renovation, only for the properties to be inundated once again four months later. The floods in Kaeo caught the attention of the national media, and to some extent, the coverage of Kaeo encapsulated how the floods affected Northland as perceived by the public throughout the country.

8. Aside from the substantial damage to individual properties, the floods have had more enduring effects for the owners of flood affected property, especially in terms of loss in property value, difficulty of selling property, and in some cases obtaining insurance cover. Even where properties have been raised, potential issues remain given anticipated loss of access to dwellings, and ground level damage, in times of flood. A number of properties damaged by flooding have remained unoccupied since 2007.

9. The 2007 floods, and high rainfall measured during these events, have also had a bearing on the assessment of flood risk, not only for the Kaeo catchment, but along the East coast of Northland generally. Recent revisions to the NIWA HIRDS[4] database also show marked increases to predicted rainfall depths along the East coast relative to the earlier 1999 version. Although flooding is therefore a known historical risk for Kaeo, the 2007 floods were of overwhelming magnitude and fundamentally shifted the assessed flood risk for this area.

Flood Risk Reduction Strategy Development

Components

10. A Flood Risk Reduction Strategy has been developed in accordance with the NZS9401:2008 *'Managing Flood Risk - A Process Standard'* which provides a best-practice framework for assessing and treating the risks associated with flooding, addressing the following objectives and components:

Objective	Component
Improved understanding and management of flood risk.	Community and stakeholder engagement
Reduce risk from smaller floods.	Remedial river works
Informed decision-making.	Identify and assess risk
Reduce risk from all floods.	Flood warning and community response plan
Reduce risk long term.	Long term risk reduction analysis and implementation of flood-risk modification works.
Avoid creating future/additional risk.	Develop risk management policy and implement land use planning to avoid development that may lead to increased risk.

[4] HIRDS (High Intensity Rainfall Design System) the latest version 3 was released in 2010.

11. The basis for the strategy is documented in the Kaeo Flood Hazard and Flood Risk Reduction Assessment report and the development of the strategy is underpinned by the following:
    - Flood hazard assessment, undertaken through an analysis of hydraulic and hydrologic processes, LiDAR survey and detailed computer modelling of the river flooding (*ref NRC, 2009; p 19 -20)*.
    - Flood risk assessment, based on flood hazard maps of the depth and velocity of flood water and the potential for damage to property and loss of life (*ref NRC, 2009; p 21 -31)*.
    - Multi criteria analysis of flood risk reduction options, based on social, environmental, economic, cultural, technical criteria and degree of flood risk reduction (*ref NRC, 2009; p 32 - 49)*.
    - Community and stakeholder consultation and engagement through the development process (*ref NRC, 2009; p 18)*.

Risk Assessment

12. A detailed hydraulic flood model was developed from which 100 YR ARI and 100 YR ARI climate change design storms[5] were simulated to assess flood hazard and derive flood hazard maps for the Kaeo flood plain. Maps were produced showing maximum depths, speeds, extents and hazard classifications for the two design storm events. The model has been peer reviewed by DHI Water and Environment limited and is considered to be fit for purpose.

13. The two 100 YR ARI design storm scenarios show the entire Kaeo floodplain is affected by flooding. Speed and/or depth of floodwaters are sufficiently high that the majority of the Kaeo floodplain is classified as high risk in terms of potential for damage to buildings and risk to life. Forty-five developed properties, including the schools, are located within a high flood hazard zone, and an additional 3 are located in medium flood hazard areas associated with a 100 YR ARI climate change event.

Assessment Of Options

14. Based on this information a range of potential flood risk reduction options were assessed, including enhanced status quo (river maintenance, planning restrictions, warning system and community response plan), raising dwellings on site, dredging the river channel, modifying bridges and stop banks, flood proofing town, reducing depth and velocity of water through town, flood retention dam and managed retreat.

15. Options were developed to the conceptual stage and a multi criteria assessment undertaken based on community well beings, technical feasibility, degree of flood mitigation and cost. The flood model was also used to assess degree of flood risk reduction where applicable.

16. Through the assessment, and consultation with stakeholders, a combination of the preferred options were selected to form the basis of the flood risk flood risk reduction strategy. Consistent with NZS9401:2008, the strategy focuses on

[5] Based on HIRDS predicted rainfall depths, NIWA. An additional 20% of rainfall has been incorporated as an allowance for climate change, in line with current MfE guidelines (2008)

reducing risk to society as low as reasonably practical in the circumstances that exist.

17. This is to be achieved through initiatives that address current risk, future risk and residual risk. Each of these is explained in the following.

Management Of Current Risk

18. Continuation of minor river management works will be undertaken to reduce risk from smaller more frequent flooding (*ref NRC, 2009; p 13 -15 & 33)*.

19. Stop bank construction and upgrade of existing stop banks is proposed to protect the schools to a 100 year plus climate change design standard. These works will be supplemented by a river spillway designed to reduce the depth and velocity of flooding at the school stop bank location (*ref NRC, 2009; p 41 - 42*). Flood modelling indicates that the impact of the works[6] is to reduce flood depth behind the enclosed stop bank area by up to 3.5 m (refer Attachment 2). There is some residual ponding of water from local surface runoff, but the existing built assets in this area, including the schools, would be above the residual ponding level.

20. This also has the benefit of creating a site protected from flooding that over time can be filled above the flood plain, enabling an opportunity for eventual relocation of the township.

21. Stop bank construction is also proposed to reduce velocity and depth of flood water in Kaeo township and to prevent backflow of flood water from entering the area between the township and schools (*ref NRC, 2009; p 41 - 42*).

22. Flood modelling of the township stop bank works indicates that the banks are effective in reducing the depth and velocity of flood waters in the township by up to 0.25 m, and an average of 0.5 m/s - 1.0 m/s respectively (refer Attachment 2). The predicted flood depth in the township with stop banks in place is in the range 1 m to 2 m, and velocity ranges from 0.5 m/s – 1.5 m/s in most areas (refer Attachment 2). A small area of high velocity is still identified in the middle of the township, resulting from high velocity overflows from the Waikara Creek. It is anticipated that the flood depths associated with Waikara Creek flows are much lower than maximum flood levels resulting from peak flows in the Kaeo River

23. These works also enhance security of access to Kaeo township from SH10 south, with only localised overflow across the highway to a depth of less than 0.5 m.

24. Thirteen high risk dwellings have been identified in the township, downstream floodplain and tributaries. The flood risk assessment has highlighted that the raising of many of these dwellings on site is not practicable, given the potential risk to life and fact that ground level assets will continue to be at risk from flood waters. Retreat from the floodplain, abandonment of dwellings, bunding to divert floodwaters or flood proofing is proposed for these high risk dwellings.

[6] The 100 YR ARI event with climate change was used as a basis for assessing the impact of flood protection works.

Management Of Future Risk

25. Implementation of a land use planning regime that aims to prevent new development that creates future risk and enables the elevation of assets in the township is proposed (*ref NRC, 2009; p 33)*. The detailed flood hazard mapping developed as part of the strategy provides a sound basis for implementing risk-based planning rules.

26. Future risk can also be further reduced over time if the area behind the stop banks is eventually filled above the floodplain enabling the gradual relocation of the township above the floodplain (*ref NRC, 2009; p 43 - 44)*.

Management Of Residual Risk

27. A community response plan has been developed by the Far North District Council with the Kaeo community and stakeholders to enable the community to plan and respond to hazards, including flooding, and if required remain self reliant for a period of 3 days without external assistance (*ref NRC, 2009; p 17)*.

28. A hydrometric network (water level and rainfall monitoring system) has been developed and is also used as a warning system that enables the Northland Regional Council to warn civil defence or emergency services of impending flood events based on the relationship of river levels throughout the network (*ref NRC, 2009; p 15 - 17)*. This provides for some forward warning of when flooding may impact Kaeo and provides an opportunity for implementation of community emergency response plans.

Community Engagement And Support For The Strategy

29. The flood risk reduction strategy for Kaeo has been developed with the engagement of the community and other stakeholders, through the establishment of the Kaeo River – Whangaroa Catchment Management Liaison Committee.

30. The Committee is made up of a range of community and stakeholder representatives, including local ratepayers, business interests, iwi and Far North District Council and Northland Regional Council. The Committee first met on 13 August 2008 and had met on seven occasions as of March 2010. Minutes are recorded from each meeting and distributed to the Committee representatives and other interested stakeholders and reported to the Council's Environmental Management Committee meetings.

31. The Committee resolved its support for the strategy at its meeting of 15 February 2010, confirming that the strategy be presented to the Far North District Council and Northland Regional Council.

32. Subsequent to this, the strategy was presented to meetings of the Northland Regional Council and Far North District Council with both Councils resolving to support the strategy.

Government Funding Contribution

33. The government funding offer is specifically targeted to the cost of raising or relocating the most vulnerable homes.

34. Thirteen homes have been identified as most vulnerable. An offer of funding assistance is proposed to be made to these home owners to encourage retreat from the floodplain or to treat the flood risk on site where this does not increase risk to life.

35. A summary of the proposed risk treatment for these vulnerable homes is provided in the following table:

Proposed Risk Treatment	**Number Of Homes**
Assistance for bunding around home to exclude flood waters	2
Assistance for abandonment or relocation of home (owners choice)	7
Assistance for costs incurred in raising home on site (applies to houses already raised)	2
Assistance to abandon residential use of a mixed business/home property and/or assistance with flood proofing	2

36. Provision of funding assistance would be conditional upon ceasing to use the property in a way that continues current risk or creates future risk.

37. A needs assessment was undertaken by Housing New Zealand to determine the financial circumstances and needs of property owners. The information does not easily assist in determining an appropriate level of financial assistance for individual property owners. Several owners also declined to participate in the needs assessment process. However, the aspirations of property owners was made clear, with a number of residents indicating a willingness to be 'brought out', with others requesting assistance to relocate or requesting assistance to protect their home to enable them to remain on site.

38. No indication has been made to property owners of the likely extent of funding assistance available on an individual basis. Establishing an appropriate level of funding assistance requires an iterative process, as confirmation of the government funding contribution is required before offers of assistance can be made.

39. An approach has been derived to determine an equitable level of funding assistance for individual property owners, as described in the following table:

Proposed Risk Treatment	Proposed Funding Assistance
Bunding around home to exclude flood waters	$60,000 (75% of the $80,000 estimated cost for bunding a house)
Abandonment or relocation of home (owners choice)	75% of the improved value of the property, to a minimum of $60,000 or maximum of $70,000
Assistance for costs incurred in raising home on site (applies to houses already raised)	$37,500 (75% of the $50,000 estimated cost of raising a house on site)
Abandon residential use of a mixed business/home property and/or assistance with flood proofing	75% of half of the improved value of the property, to a minimum of $60,000 or maximum of $70,000

40. The figures in the table are based on an assessment of the flood hazard and the risk to individual properties concerned. In addition, effective community consultation has been undertaken during the process to determine an optimal solution, and, whilst we realise this is a trade-off, the majority of people involved in this decision believe the solution provides the best way of moving forward within the amount of finance available. In our view this position is unique to the situation and there are sound arguments for developing it and to adhering to the proposed solution. In our view the level of input into this solution will not set a precedent where the conditions do not apply.

Funding The Strategy

41. Significant expenditure has been made since the 2007 floods to reduce the risk of flooding to Kaeo and in preparation of the flood risk reduction strategy.

42. To date NRC has contributed $0.885M and FNDC $0.130M. The existing contributions to date are summarised in the following table:

Agency	Element	Funding ($000's)
NRC	Flood modelling and strategy development. Flood monitoring/warning system. River works (via targeted rate). *Subtotal*	$340 $100 $445 *$885*
FNDC	Flood modelling and strategy development. Flood monitoring/warning system. *Subtotal*	$120 $10 *$130*
Total		**$1,015**

43. Key cost elements and funding associated with implementing the rest of the strategy include:
    - Protection of the school through stop banking via a contribution from the Ministry of Education ($250,000) and NRC targeted rate ($50,000).
    - Reducing the depth and velocity of flood waters to Kaeo Township via stop banks via a contribution from NZTA for raising a section of SH10 to link into the stop banks ($150,000) and NRC targeted rate ($150,000).
    - Funding assistance for relocation, abandonment or bunding of high risk dwellings and protection of assets via a FNDC contribution ($275,000) and government contribution ($500,000), with property owners contributing via a substantial loss in value of asset, relocation costs or 25% contribution to individual protection works.

44. These costs, and the existing contributions to date, are summarised in the following table:

Agency	Element	Funding ($000's)
NRC	Town stop banks, spillway construction (via targeted rate). Other costs associated with implementation of the strategy. Existing contribution to date.	$200 To be met by Council $885
FNDC	Funding assistance for relocation, abandonment or bunding of most vulnerable dwellings and protection of assets. Planning/Engineering Support and Consent Processing. Building Works. Existing contribution to date.	$275 $130 $130
Government	Funding assistance for relocation, abandonment or bunding of most vulnerable dwellings and protection of assets.	$500
Home Owners	Relocation, abandonment or bunding of high risk dwellings.	$500 in kind contribution (significant losses of value and relocation costs) or 25% contribution towards bunding and asset protection.
NZTA	Raising a section of SH10. Existing contribution to date.	$150 Nil.
Ministry of Education	Stop banking to protect school. Existing contribution to date.	$250 Nil.
SUM		$3,020

45. NZTA and Ministry of Education funding contributions have been discussed with both agencies.

46. NZTA has been very supportive, indicating that the required contribution to raise the road can be met when required[7].

47. The Ministry of Education has confirmed that they can capitalise on the cost of works that fall on Ministry land and has agreed to contribute to the stop bank construction costs[8]. The overall cost to the Ministry in protecting its assets will be

[7] As confirmed via an email received from NZTA dated 21 May 2010.
[8] As confirmed via an email received from Ministry of Education dated 22 June 2010.

offset by the local funding contribution for stop bank construction on private land which joins the school stop bank.

48. The total cost associated with the flood risk reduction strategy amounts to $3.020M, of which the governments' contribution of $0.5M amounts to 17% of the overall cost of the strategy, or 30% if the NZTA and Ministry of Education contributions ($0.150 and $0.250 respectively) are included as part of the government contribution.

49. It is noted that the NZTA and Ministry of Education contributions are not sourced from the government $0.5M contribution for supporting the most vulnerable properties. These additional government contributions will ensure protection of government assets and improved state highway route security, with the cost of these improvements offset by the local Council and ratepayer contributions.

Flood Risk Reduction Strategy Summary

50. A long-term flood risk reduction strategy has been developed for Kaeo that focuses on reducing risk to society as low as reasonably practical in the circumstances that exist. This is to be achieved through initiatives that address current, future and residual risk.

51. Continuation of minor river management works will be undertaken to reduce risk from smaller more frequent flooding. These works will be funded via an NRC targeted rate.

52. Stop banks will be constructed to protect the Whangaroa College and Kaeo Primary School to a 100 year climate change design standard. These works will be funded via a Ministry of Education contribution ($250k) and NRC targeted rate ($50k).

53. Stop banks will be constructed to reduce the velocity and depth of flood water in Kaeo township and to prevent backflow of flood water from entering the area defended by stop banks between the township and schools. A river spillway will also be constructed to reduce the depth and velocity of flooding at the school stop bank. The defended area will enhance security of access to Kaeo township from SH10 south and also provide an opportunity for future relocation of the township. These works will be funded via a NZTA contribution ($150k for raising a section of SH10) and NRC targeted rate ($200k).

54. Thirteen high risk homes have been identified in the township, downstream floodplain and tributaries. Financial assistance will be offered to these home owners to encourage retreat from the floodplain, abandonment of dwellings, bunding to divert floodwaters or flood proofing. Provision of assistance will be conditional upon the owner ceasing to use the property in a way that continues current risk or creates future risk. The government's proposed $0.5M contribution is required to assist with this aspect of the strategy, with FNDC contributing ($275) and home owners contributing via losses in property values or a 25% contribution to the cost of on-site protection works.

55. Implementation of a land use planning regime that aims to prevent new development that creates future risk and enables the elevation of assets in the township is proposed. These costs will be met by the FNDC and NRC.

56. A community response plan has been developed with the Kaeo community and stakeholders to enable the community to plan and respond to hazards, including flooding. This is complemented by a flood warning system that enables the Northland Regional Council to warn civil defence or emergency services of impending flood events based on river levels. These costs have been met by the FNDC and NRC.

Signed:

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Tony Phipps
Deputy CEO

Ken Paterson

Chief Executive Officer

Northland Regional Council

Dated:

21 / 7 / 2010

W D Edmunds

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David Edmunds

Chief Executive Officer

Far North District Council

21 / 7 /2010

NORTHLAND REGIONAL COUNCIL

Far North District Council

Attachment 1 - Offer Of Funding Support Letter

Ministry of Civil Defence & Emergency Management

NORTHLAND REGIONAL COUNCIL
17 NOV 2008
FILE No. N.R.C. 830.1.2

Chair	
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12 November 2008

Ken Paterson
Chief Executive Officer
Northland Regional Council
Private Bag 9021
WHANGAREI 0140

Dear Ken,

You will be aware that on 4 November 2008 Cabinet agreed to provide funding support for the most vulnerable flood affected properties in Kaeo within the context of a strategy being developed by the Northland Regional Council for long term flood mitigation. The purpose of this letter is to formally convey these decisions to your council and to offer support from the Ministry of Civil Defence and Emergency Management to help facilitate a long term solution.

Cabinet agreed to the following:

1. That the cost of relocating or raising vulnerable houses should be split four ways between the Regional Council, District Council, the home owners (as direct beneficiaries of the proposed hazard mitigation works) and the government.

2. That the government's one- quarter share towards these costs in the Kaeo catchment would be $500,000 (GST exclusive), appropriated through Vote Emergency Management.

3. To invite the Northland Regional Council and the Far North District Council to jointly present an integrated cross council solution once your long-term mitigation plan is completed in early 2009.

4. That no payments will be made against the appropriation until the Minister of Civil Defence has obtained Cabinet's approvable to allocate funding to the Northland Regional Council and the Far District Council upon presentation of your joint long-term mitigation plan.

In practice, this means that the money will be "banked" but will not be available for spending until Cabinet has agreed to the proposals and levels of funding outlined in your long-term mitigation plan. This will require officials to prepare a Cabinet paper making recommendations on the proposals in your joint long-term mitigation plan.

NORTHLAND REGIONAL COUNCIL

Far North District Council

I'm aware that there has already been considerable work done on a range of measures to mitigate the effects of flooding in the Kaeo area and to canvas community support for both immediate relief and longer term solutions. I'm also aware of how challenging these issues are and so I'm offering support to your council from the Ministry of Civil Defence and Emergency Management to assist in facilitating a successful outcome.

Should you wish to take up this offer, I've asked Alan Walker, Manager, CDEM Development, to take overall responsibility and to act as the main contact point in Wellington, with regional support coming from Greg Gallop from our Auckland office. I understand that both Alan and Greg have been in contact with your council.

Yours sincerely

John Hamilton
Director

Attachment 2 - Schools and township stop bank model result plots (difference plots).