REPORT TO DISTRICT PLAN COMMITTEE

DATE: 6th December 2017

ISSUES & OPTIONS: Flood and Coastal Hazard Investigations and Mapping

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EXECUTIVE SUMMARY

Issue	*Confirmation of the scale, timing and cost of technical investigations relating to flood risk and coastal hazards necessary to support the District Plan Review, including mapping of hazard areas.*
Recommended Option	***Flood-risk – Option:*** *To approve a district-wide rain on grid model be developed and run by DHI and that Environment Canterbury be requested to:* • *carry out a revised modelling of flooding from the Halswell/Huritini River as an update to report R12/68* • *agree a programme of flood investigation for the Upper Selwyn, Hawkins, Waianiwaniwa and Hororata Rivers* *as part of the programme of flood risk investigations and associated programme of plan changes/variations to incorporate flood mapping into the Proposed District Plan as agreed by DPC on 22nd February 2017.* ***Coastal hazards – Option:*** *To continue with the option agreed by DPC on 22nd February 2017 that, as an interim measure, the coastal hazard lines contained in Appendix 5 to the Canterbury Regional Policy Statement be incorporated into the Proposed District Plan.* *That the Proposed District Plan manages development seaward of these coastal hazard lines up to the boundary with the Coastal Marine Area instead of the Regional Coastal Environment Plan.*
DPC Decision	*As above*

1.0 Introduction to Issue

1.1 As part of the District Plan Review, Council needs to undertake investigations to understand flood and coastal hazards, and to manage those risks to people and property. This is to give effect to the Canterbury Regional Policy Statement (RPS) and New Zealand Coastal Policy Statement (NZCPS), and is also a matter of national importance under s6(h) to the RMA. This was the subject of an Issues and Options report considered by DPC at its meeting on the 22nd February (Report to DPC 22 Feb 2017). At that meeting DPC agreed to the following:

'That in relation to the scale, timing and cost of the technical investigations relating to flood risk and coastal hazards the Committee Adopts:

Flood-risk – option 2:

- *Environment Canterbury to update the Lower Plains and Te Waihora/Lake Ellesmere flood maps.*
- *A programme of flood risk investigations for other at-risk areas, as guided by Environment Canterbury, plus an associated programme of plan changes to incorporate flood mapping into district plan.*

Coastal hazards – Option 6:

- *Incorporate coastal hazard lines contained in Appendix 5 to the Canterbury Regional Policy Statement into the district plan.*
- *The district plan to manage development seaward of these coastal hazard lines instead of the Regional Coastal Environmental Plan.*

1.2 A key factor in recommending the above options was the anticipation that guidance was due to be published by the Department of Conservation (DoC) on implementing Policy 24 to the NZCPS, including guidance on the scale and methodologies for investigation of coastal hazards and processes. It was also anticipated the Ministry for the Environment's guidance on climate change would also soon be published.

1.3 The 22nd February report to DPC noted that if Council wished to proceed in advance of the DoC and MfE guidance:
"In the absence of guidance from the Department of Conservation on the implementation of Policy 24 to the NZCPS, a methodology for such a study would need to be independently developed. The recent experience in Christchurch highlights the lack of clear direction for Councils trying to implement the requirements of the NZCPS. This option involves greater costs and time implications than Option 6 as well as carrying with it a reputational risk for the Council if the methodology is challenged."

1.4 The DoC guidance on the NZCPS and the MfE guidance on climate change have still to be published and it continues to be unclear as to when they will be (Councillors may be aware that a draft of the MfE guidance was leaked during the national elections). They were both originally due in late 2016.

In the meantime Council has received the draft flood investigation report from Environment Canterbury providing updates to the Lower Plains and Te Waihora/Lake Ellesmere flood maps plus recommendations for further flood investigations. The project team has also discussed with DHI the likely cost and timing of a district-wide rain on grid flood model, something which the Environment Canterbury report recommends be undertaken to improve the understanding of flood risk in the district. DHI are water environment specialists who have developed flood modelling software and undertake flood modelling exercises. They have assisted the Council's Asset team and also undertook modelling work for Christchurch City Council as part of the review of their district plan.

1.5 The purpose of this report is to:

- seek DPC approval to commission DHI to develop and run their rain on grid model (based on the model they developed for Council's Assets team, modelling storm water) as a key tool to implementing the approved flood risk investigation programme; and
- re-affirm the option of incorporating the coastal hazard lines from Appendix 5 to the Canterbury Regional Policy Statement into the Proposed District Plan as an interim measure until further guidance is available from DoC.

2.0 Rain on grid flood modelling

2.1 DHI developed a rain on grid flood model for the Council's Assets team to help model stormwater for 1 in 10 year and 1 in 50 year rainfall events; to aid in the management of the Council's stormwater system. It was primarily restricted to mapping stormwater flows through the settlements rather than a wider understanding of surface water flooding. This modelling work has now been completed. As the name suggests the model is based on modelling an assumed rate of rainfall against a series of grids across the target area. A number of assumptions/parameters therefore need to be included in such a model including the physical boundaries of the target area. For example, do the grids and water flow patterns stop at the administrative boundaries of the district and if not how far should they extend? The other boundary is the sea and so assumptions are needed in relation to sea level, and rainfall duration (for example over a 24 hour period or over a 48 hour period?). Other factors such as infiltration rates and ground conditions also need to be accounted for in such modelling work; for example the existence of culverts and soil drainage rates which will influence water flow pathways.

2.2 The model developed for the stormwater project can be modified and run to test against the 1 in 200 year and 1 in 500 year rainfall events as required by the Canterbury Regional Policy Statement for the purposes of managing natural hazard risk in the district. Some initial testing was carried out for these scenarios and the results sent to Environment Canterbury for review. This review determined that the model needed further refinement to ensure an appropriate level of robustness. Environment Canterbury flood hazard analysts have also provided guidance on assumptions and scenarios that should be included when the model is run.

2.3 The cost to develop and run the model would be in the order of $46,500. This includes providing for additional runs of the model to test differing scenarios and to undertake sensitivity analysis. These are needed to ensure the robustness of the results. Running the model across the district would take appropriately a month to complete. Maps down to property level can be developed from these runs, identifying areas at risk of inundation in the 1 in 200 year event, and high hazard areas (i.e. where flood water depths exceed 1m in a 1 in 500 year event).

2.4 The completion of the modelling within a month is considerably faster than was anticipated at the time of the original issues and options report back in February. However a large amount of data (GIS shapefiles and rasters) and associated mapping work would be generated. This mapping will need to be tested for accuracy and possibly 'ground truthed', as well as investigating to identify and assess the impacts on properties and settlements. There is also the issue of the timing, scale and form of any public engagement that should wrap around this project given the likely high community interest in relation to the results and mapping from this modelling work.

2.5 The DPC has already agreed that the flood modelling for the wider district would sit outside of the district plan review and that any changes required to incorporate the flood hazard maps would be by way of a programme of plan changes. It is still considered appropriate that this continue to be the preferred option given the potential scale of the flood mapping and testing requirements, and the need to consider and develop a community engagement programme as part of this project. In the interim the findings of the Environment Canterbury flood investigation report for the lower plains area of the district would be used to inform other aspects of the Proposed District Plan as well as other activities of Council.

3.0 Coastal Hazard Risks

3.1 At its meeting on the 22nd February 2017, DPC agreed **not to pursue** the following option:

"To identify and map coastal hazard areas by:

• Commissioning a specific study and modelling of coastal processes based on the requirements of Policy 24 to the NZCPS.

• That the use, development and subdivision of land in coastal hazard areas are managed by the district plan, replacing the provisions of the RCEP, as directed by the RPS."

3.2 A key reason for this was the expectation of publication of DoC and MfE guidance being available later in the year, which would help direct the Council at that time to develop a coastal processes study/model for what is a highly technical topic area, and which has proved problematic at other councils. An interim position of using the coastal hazard lines in Appendix 5 to the Canterbury Regional Policy Statement was recommended. The limitations and risks associated with this option were identified in the original issues and options report. Notwithstanding these, this option was still considered appropriate since it enabled the Council to wait until the guidance was available.

3.3 Following that DPC meeting, the overdue DoC and MfE guidance on climate change and implementing Policy 24 to the New Zealand Coastal Policy Statement still has not yet been published. Nor have any dates been provided as to when they might be. Equally no indication has been given of any intention for this guidance not to be issued, which leaves the Council in limbo on this matter. Consequently the project team has sought further guidance from Environment Canterbury on the likely cost of commissioning a coastal hazards study. It has also sought guidance from DoC on what they think should be within the coastal hazard study and what should be the physical extent of such a study. For example should it include Te Waihora and/or the Rakaia River (outwash from the river feeds Kaitorete Spit) which influence or are influenced by coastal processes as well as freshwater processes. Guidance was also sought from DoC regarding what climate change scenarios should be included in the model. These comments will be reported orally to the Committee when they are received.

3.4 Staff at Environment Canterbury have suggested a ball park figure of $70,000 for the commissioning and carrying out of a coastal hazards investigation and model. They consider this is likely to be conservative, but the project team consider it is useful to assume a cost of this order given the uncertainties involved in determining what might need to be included within the model, plus to make allowances for peer review processes. Thus if it is considered that Te Waihora and the processes associated with the Rakaia River need to be included, then the scale and extent of the investigation and modelling required would be increased given the need to then investigate the freshwater processes that influence them. Environment Canterbury have, however, identified published work that has already been undertaken on some coastal processes affecting Selwyn's coast line and Te Waihora, which could be updated at minimal cost, and which would represent key pieces of an overall study. These would help manage the costs of the study.

3.5 Undertaking this investigation/modelling without published guidance from DoC and MfE carries with it the risks identified in the original issues and options paper, plus ballpark costs of $70,000 to Council. Equally the adopted option of using the RPS Appendix 5 coastal hazard lines also involves risk, not least the fact that both Environment Canterbury and DoC do not consider that they give effect to the RPS or NZCPS. This opens up the ability for challenge to the provisions of the Proposed District Plan by way of submissions and/or appeals during the DPR process.

3.6 The project team would nonetheless still recommend the adopted option, but on the basis that Council will undertake the necessary coastal hazard investigations and any associated plan changes when the DoC and MfE guidance is available. It is also recommended that at that time, a team made up of key stakeholders, being Council, Taumutu Runanga, Ngai Tahu, DoC and Environment Canterbury develop the scope for the coastal hazards investigation and oversee this work. The ability to undertake this study and subsequent variations/plan changes post the DPR will also need to be budgeted for by Council.

Stakeholder Interests

3.7 **Environment Canterbury:** Comments received to date indicate that it is difficult to provide an Environment Canterbury position on the interpretation of NZCPS Policy 24 because like Selwyn District Council they are also waiting for the guidance documents to be released. In that respect

they are very supportive of the questions that the Project Team is posing to the Department of Conservation. In terms of the technical aspects of the model, Environment Canterbury are happy to provide as much advice and assistance as they can.

Department of Conservation: Comments still awaited.

4.0 Conclusion

4.1 A rain on grid model has been identified for investigating surface water flood risk in the district at a cost and timing that is reasonable given the scale of the subject being investigated. This modelling and the appropriate incorporation of mapping into the Proposed District Plan is necessary to implement the RPS and S6(h) RMA requirements. It is also considered that the outputs from the model could be used to inform Council planning and responsibilities under the LGA, outside of the district plan review process. There is also a need to engage with Environment Canterbury to address the need to model flood risk from the rivers in the district, as identified in their draft flood investigation report for Selwyn. Both pieces of work are necessary to understand overall flood risk in the district and this needs to be an on-going process.

4.2 The scale of the work including mapping of at-risk areas, plus the need to develop and implement a community engagement process, places the timeline for this work outside of the current DPR schedule.

4.3 The adopted option for coastal hazards continues to provide a pragmatic response to the requirements of the higher order documents (RPS and NZCPS) and the associated uncertainties identified in the DPC report of the 22nd February 2017

5.0 Recommendation to DPC

5.1 The Project Team recommends:

1. That the DHI rain on grid surface water flood model be used to implement the adopted option agreed at DPC on the 22nd February 2017.
2. That Environment Canterbury be asked to undertake a review of the Halswell/Huritini River floodplain report reference R12/68 as recommended in their draft Flood hazard update report for Selwyn District Plan Review report.
3. That Environment Canterbury be asked to include in their work programme flood investigations of the Upper Selwyn, Hawkins, Waianiwaniwa and Hororata Rivers as recommended in the draft Flood hazard update report for Selwyn District Plan Review report to implement the adopted option agreed at DPC on the 22nd February 2017.
4. That a community engagement process be developed for approval by DPC, associated with the district wide flood investigation programme set out in 1. to 3. above.

5. That option 6 (use of RPS Appendix 5 coastal hazard lines) for coastal hazards as agreed at DPC on the 22nd February 2017 continue to be the adopted option. This is to be reviewed as and when DoC and MfE guidance has been issued on the implementation of Policy 24 to the NZCPS and climate change.