UNDER the Resource Management Act 1991 ("**RMA**")

AND

IN THE MATTER of a notice of requirement ("**NoR**") for a designation by KiwiRail Holdings Limited ("**KiwiRail**") for the Palmerston North Regional Freight Hub ("**Freight Hub**") under section 168 of the RMA

STATEMENT OF EVIDENCE OF ALLAN LEAHY
ON BEHALF OF KIWIRAIL HOLDINGS LIMITED

STORMWATER AND FLOODING

1. SUMMARY

1.1 The proposed location for the Freight Hub ("**Site**") is part of the wider Mangaone Stream catchment of around 15,000Ha. The Mangaone Stream continues past the Site through western suburbs of Palmerston North, to join the Manawatu River to the city's southwest. The watercourses draining the northern and central catchments (comprising approximately 1,200Ha) through the Site also include floodplains predominantly associated with the flooding of the Mangaone Stream.

1.2 My stormwater and flooding assessment has been carried out at a reasonably high level for the purposes of identifying and providing preliminary sizing of the key components of the Freight Hub required to provide for appropriate stormwater management systems. I expect that the stormwater management system for the Freight Hub will comprise on-site or at source treatment and low impact design systems, stormwater detention ponds, stormwater treatment wetlands, culverts, on-site pipework and a naturalised stream channel. In coming to this conclusion, I have considered a range of mitigation options for the Site. Further work on the design of the system will be undertaken during the detailed design and regional consenting phases.

1.3 Once operational, the Freight Hub has the potential to result in a number of potential positive effects from a stormwater perspective. In my opinion, there is adequate room within the Site to manage and mitigate the potential adverse

effects relating to both construction and ongoing operation of the Freight Hub. As set out in the proposed conditions for the Freight Hub attached as Appendix 1 to Ms Bell's evidence ("**Proposed Conditions**"), the following outcomes are proposed in the conditions:

(a) a Stormwater Management Report which will demonstrate, through further hydraulic modelling that the size and design of the stormwater detention ponds are appropriate to manage the effects; and

(b) a Stormwater Management and Maintenance Plan which will demonstrate how the hydraulic neutrality and quality of the stormwater discharges will be managed for the Site, including the ongoing operation and maintenance of the stormwater management system.

1.4 I endorse these conditions with respect to stormwater management.

2. INTRODUCTION

2.1 My name is Allan Thomas Leahy. I am Principal - Growth Planning at Auckland Council Healthy Waters. At the time of lodgement of the NoR I was Principal Technical Specialist Stormwater Management at Stantec New Zealand. Since leaving Stantec in May 2021, I have continued my involvement in this project as a contractor to Stantec.

2.2 I hold the qualifications of Bachelor of Engineering (Civil) from the University of Auckland and am a Fellow of Engineering New Zealand (EngNZ), formerly known as the Institution of Professional Engineers New Zealand. I am a member of both the Institute of Public Works Engineering Australasia and WaterNZ. I was a founding committee member for the Stormwater Special Interest Group of WaterNZ. I was named Stormwater Professional of the Year in 2017. I have been a judge for the Association of Consulting and Engineering New Zealand (ACE New Zealand) Awards for over 20 years and am an honorary life member of ACE New Zealand.

Experience

2.3 I have over 30 years of engineering experience predominantly in stormwater management and design. I specialise in planning for, investigating, modelling, managing, designing and consenting systems to manage and mitigate the effects of stormwater discharges from various types of land use change and activities.

2.4 Between 1993 and 2008 I established and led a specialist stormwater management team within a large land development consultancy firm focussing on finding solutions to stormwater quantity and quality issues associated with land development projects, structure planning and rezoning proposals.

2.5 In 2009 I started work with MWH (now Stantec) as Principal Technical Specialist Stormwater Management. In my role at Stantec I advised on stormwater related projects (or parts of projects) throughout New Zealand.

2.6 In 2014 I developed and started delivering 1-day training courses on Stormwater Management and Design for EngNZ. I now deliver two stormwater related training courses (Stormwater Management and Design – An Introduction and The Principles of Stormwater Treatment) at multiple locations around New Zealand annually. I have trained over 1,000 people through these courses. In 2019 I became the lead New Zealand trainer for the American Water Environment Federation's Green Infrastructure Certification Programme – this is a five-day course on Green Infrastructure targeted at those who construct and maintain the infrastructure. The course is licensed in New Zealand by Auckland Council and delivered through WSP's Environmental Training Centre.

2.7 I have worked with a number of New Zealand Councils, from Northland to Southland on their stormwater infrastructure planning, consenting and implementation. I have also worked on the stormwater aspects of projects for private industry, developers and Waka Kotahi New Zealand Transport Agency. I have also worked for both district and regional councils in providing technical review and reporting on stormwater consent applications or NoRs for large and small infrastructure projects, including floodways, major transport projects, land development or zoning projects or individual house developments.

Involvement in the Freight Hub

2.8 My involvement in the Freight Hub project started in April 2020, once the Site had been selected.

2.9 In my role as stormwater and flooding specialist for this NoR, I have had input into the Freight Hub concept plan layout, the Site required for stormwater management and mitigation, and the formation of the upgraded northern stream channel. This involved working with KiwiRail and other technical specialists in the design of the Freight Hub. I have also discussed the stormwater and flooding context of the Freight Hub with Horizons Regional Council ("**HRC**") and Palmerston North City Council ("**PNCC**") officers and

local residents as part of the community engagement that KiwiRail has undertaken.

2.10 I prepared the Stormwater and Flooding Assessment that was appended to the Assessment of Environmental Effects ("**AEE**") for the Freight Hub. I also provided input to KiwiRail's Section 92 response dated 15 February 2021 ("**First Section 92 Response**"). The First Section 92 response included responding to questions relating to the interrelationship between stormwater discharges and ecology, the construction of culverts, the potential for improvements to the existing systems and the Proposed Conditions.

Code of conduct

2.11 I confirm that I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014 and that I agree to comply with it. I confirm that I have considered all the material facts that I am aware of that might alter or detract from the opinions that I express, and that this evidence is within my area of expertise, except where I state that I am relying on the evidence of another person.

3. SCOPE OF EVIDENCE

3.1 This statement of evidence will:

(a) provide an overview of the methodology used and the key conclusions of the Stormwater and Flooding Assessment;

(b) respond to the submissions received that relate to the stormwater and flooding effects on the environment; and

(c) address relevant matters raised in the Council's Section 42A Report ("**Section 42A Report**").

4. METHODS OF ASSESSMENT

4.1 The methodology used for the Stormwater and Flooding Assessment is set out in Section 3 of that document. The key assumptions used in the assessment and agreed with PNCC and HRC officers for that purpose were included in Appendix A to the Stormwater and Flooding Assessment.

4.2 In summary, the assessment considered the following:

(a) the passage of stormwater flows through the Site from upstream catchments;

(b) the potential impact on downstream flood levels caused by the Freight Hub;

(c) the consideration of contaminants being transported from the Site through the stormwater system and affecting downstream environments and the mitigation of these effects;

(d) the potential loss of streams and the mitigation options for this loss as well as options considering fish passage; and

(e) the consideration for the onsite implementation of LID solutions. This includes practices such as volume reduction, onsite reuse, treatment, retention or enhancement of streams and options for the selection of neutral building materials for the Freight Hub.

4.3 The assessment has been carried out at a reasonably high level, to identify the Site and key components of the Freight Hub required to provide for appropriate stormwater management systems. Further work on the design of the system will be undertaken during the detailed design and regional consenting phases.

4.4 The assessment was carried out using a range of existing information sources including:

(a) topographical information for the contributing catchments;

(b) flood models provided by the PNCC and HRC depicting the 200-year flood plain and flood depths for the Mangaone Stream;

(c) existing asset information in particular for the KiwiRail and road culverts in the vicinity of the Site;

(d) topographic information for the site and surrounds from a 2013 LIDAR survey;

(e) subdivision requirements for a recent subdivision downstream of the Site;

(f) consideration of the One Plan and PNCC District Plan requirements for stormwater, in particular within the North East Industrial Zone ("**NEIZ**"); and

(g) the results of discussion with PNCC and HRC officers and local residents following site visits.

4.5 The assessment has included carrying out hydrological calculations using conservative assumptions, to enable an estimate to be made of the quantities (both volumes and peak flow rates) of stormwater runoff from the Freight Hub to be managed. This estimate has formed the basis of the detention pond and treatment wetland footprints required to mitigate the stormwater effects of the Freight Hub.

4.6 Existing flood levels provided by PNCC and HRC for the 200-year event were used to confirm that the Site was free of flooding and to determine the minimum elevations on which to set the Site and the detention and treatment ponds.

4.7 Opportunities to provide for enhanced ecological outcomes were also considered. In particular the opportunity to create or improve watercourses from an aesthetic and ecological perspective were considered in conjunction with KiwiRail, the landscape and ecological specialists.

5. EXISTING ENVIRONMENT

5.1 The existing environment has been considered in terms of:

(a) catchment context;

(b) land use and zoning;

(c) flood plains; and

(d) ecology.

5.2 Further detail on the existing environment is contained within section 4 of the Stormwater and Flooding Assessment and is summarised below.

Catchment context

5.3 The Site is contained within a topographically flat to rolling catchment with predominantly rural pastoral land use. Approximately 1200ha of catchments drain through the Site from the east of Railway Road and the North Island Main

Trunk ("**NIMT**"), draining to the Mangaone Stream to the west of the Site. This comprises three areas:

(a) the Northern Catchment drains just over 600Ha of predominantly farmland, immediately south and east of Bunnythorpe through the northern part of the Site via a series of culverts under Railway Road and the NIMT;

(b) the Central Catchment drains just under 600Ha of predominately farmland through an open channel through the central part of the Site via a culvert under Railway Road and the NIMT; and

(c) the Southern Catchment drains in the order of 20Ha of localised catchment immediately east of the NIMT and north of Roberts Line near the southern extent of the Site, also via culverts under Railway Road and the NIMT.

5.4 The relevant catchments are identified in Figure 2 in the Stormwater and Flooding Assessment. I have included a copy of this Figure in **Appendix 1** to this evidence.

5.5 As can be seen in Figure 2, the site is a part of the wider Mangaone Stream catchment of around 15,000Ha to the most downstream discharge from the Site. The Mangaone Stream continues past the Site through western suburbs of Palmerston North, to join the Manawatu River to the city's southwest.

Land use and zoning

5.6 As set out in Ms Bell's evidence, the Site is zoned as a mixture of rural and industrial land.[1] The industrial land is contained within the NEIZ and comprises approximately the southern third of the Site.

5.7 From a stormwater perspective the NEIZ includes provisions for the implementation of detention, retention, hydraulic neutrality, treatment and low impact design. All of these tools are expected to be used as part of the Freight Hub development and land has been allowed for them.

5.8 The One Plan has provisions around natural hazard management and in particular flood management. These provisions include the avoidance of adverse effects where possible and for developments to have no more than minor effects on adjacent properties as well as on the effectiveness of existing flood mitigation measures.

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1 Evidence of Karen Bell, dated 9 July 2021.

5.9 Figure 3 in the Stormwater and Flooding Assessment shows the Freight Hub site overlain on the PNCC District Plan map of the area, the extent of the NEIZ zoning and the extent of the plotted 200 year flood plains.

Flood plains

5.10 The watercourses draining the northern and central catchments (as shown within **Appendix A**) through the Site also include flood plains predominantly associated with the flooding of the Mangaone Stream.

5.11 These flood plains have been modelled and are shown on both the PNCC District Plan Maps and the HRC flood hazard maps. Some of these flood plains and associated channels will be filled as part of the Freight Hub development.

5.12 Figure 4 of the Stormwater and Flooding Assessment shows the modelled flood extents, based on PNCC data.

Ecology

5.13 The ecological values of water courses within the Site are outlined in the evidence of Mr Garrett-Walker. In summary, the watercourses through the Site are described as being highly modified and having low ecological value.[2]

6. ASSESSMENT OF POTENTIAL STORMWATER EFFECTS

6.1 The potential stormwater effects are discussed in Section 5 of the Stormwater and Flooding Assessment and are summarised below. These effects will be assessed in detail at the regional consenting phase of the Freight Hub, but it was necessary for me to consider them at a high level for the purposes of determining the concept design of the stormwater management system, to inform the area of the Site required to manage stormwater effects.

Positive effects

Operational

6.2 Once operational, the Freight Hub is expected to provide a number of potential positive effects from a stormwater perspective, including:

[2] Evidence of Jeremy Garrett-Walker, dated 9 July 2021, at Section 7.

(a) reduced upstream flooding, due to specific culvert design and the ability to incorporate measures including allowances for climate change in the new culvert design;

(b) the opportunity to provide improved fish passage, if needed, and an improved stream environment (further detail on this is outlined in the evidence of Mr Garrett-Walker);[3]

(c) reduced sediment loads with the change from rural to urban land use and the construction of stormwater treatment systems (which remove sediment);

(d) the on-site collection and use (often called reuse) of captured stormwater. The capture and reuse of stormwater is a low impact design technique which helps runoff mimic natural runoff processes. In these systems regular rainfalls are captured in a tank and used for other purposes on-site (washing, watering, sanitary systems) and thus they do not runoff. This technique mimics natural processes where the regular rainfalls do not contribute to direct runoff (as they are lost to interception, evapotranspiration and infiltration processes). This technique will also reduce the load on the public water supply; and

(e) the scale of the development provides the opportunity to include a comprehensively planned and implemented mitigation package, that can provide better outcomes than a series of small developments will usually provide.

Adverse effects

6.3 The potential adverse effects from the Site without mitigation are described below.

Construction

6.4 Without mitigation, there would be potential stormwater related adverse effects during construction of the Freight Hub, including the generation of high levels of silt in the runoff from exposed earth when it rains.

3 Evidence of Jeremy Garrett-Walker, dated 9 July 2021, at Section 8.

Operational

6.5 Potential adverse effects of the operation of the Freight Hub include:

(a) increased upstream flooding risk for example from constrained flows through poorly designed culverts or blockage of culverts, combined with raised overland flow paths;

(b) loss of stream systems through the Site due to piping or culverting of watercourses;

(c) loss of fish passage due to piping or culverting activities;

(d) increased downstream flooding levels, extents or durations due to:

(i) the more rapid passage of flows from upstream;

(ii) the loss of flood plain storage by filling the Site; or

(iii) increased runoff from impervious or compacted surfaces;

(e) stormwater quality deterioration through the change in land use, including:

(i) chemical changes as a result of spills and runoff from potentially high contaminant generating areas (such as refuelling areas, the log yard or chemical storage areas) and the risk of elevated contaminants from non-stabilised building materials;

(ii) in certain conditions another contaminant can be the increase in temperature of stormwater runoff from urban surfaces; and

(f) erosion of downstream systems caused by greater runoff in regular rainfall events as a consequence of increased runoff from impervious or compacted surfaces.

7. MEASURES TO ADDRESS EFFECTS

7.1 Measures to avoid, remedy or mitigate the potential adverse effects are summarised below. As with the identification of potential effects in section 6 above, these measures are considered in terms of the construction and operation activities of the Freight Hub.

Construction

7.2 The management of silt generation from construction activities is regulated by the HRC and I understand will require regional consents. Management of these activities is well understood and there are a range of standard methods available to mitigate these effects. These include (but are not limited to):

(a) limiting areas of exposed earthworks by staging both earthworks and vegetation clearance;

(b) limiting the duration of exposure of erodible surfaces, including by stabilising exposed areas as soon as possible after earthworks are complete;

(c) carrying out the works during drier seasons;

(d) limiting slopes in exposed areas;

(e) diverting clean water around exposed areas; and

(f) the construction and maintenance of sedimentation facilities (including the use of coagulants to enhance sedimentation).

7.3 The implementation of appropriate sediment and erosion control practices will be the subject of more detailed investigations and design. The HRC in their Erosion and Sediment Control Guidelines refer specifically to their having adopted the Greater Wellington Regional Council *Erosion and Sediment Control Guidelines for the Wellington Region* as a minimum standard for designing an erosion and sediment control plan for earthworks sites. This will be a key process to be carried out as part of the regional consenting stages of the Freight Hub.

7.4 I am comfortable that given the nature of the landforms and the size of the Site that there is adequate room within the Site to allow for staged erosion and sediment control measures, to integrate with the staged Site development.

Operational

7.5 As outlined above, detailed stormwater management design will be assessed at the regional consenting phase. For the purposes of this NoR, the focus of my assessment has been in ensuring that the land required for the Freight Hub is able to accommodate a stormwater management system that can manage the potential effects of the Freight Hub.

7.6 I have considered the types of activities to be carried out as part of the stormwater mitigation for the Site and carried out high level calculations of the likely size and therefore footprint to be required for mitigation to be implemented. This assessment has formed the basis of the stormwater mitigation expected to be required for the Freight Hub. In order to manage the adverse effects described above, I expect the stormwater management system to comprise the following components:

(a) on-site or at source treatment systems;

(b) stormwater detention ponds;

(c) stormwater treatment wetlands;

(d) culverts;

(e) on-site pipework; and

(f) a naturalised stream channel.

On-site or at source treatment systems

7.7 As part of my assessment, I have considered the likely impacts of on-site or at source management systems on the land requirements for the designation.

7.8 On-site systems will be used to both provide treatment to high risk areas and also to allow for hydrological mitigation to minimise impacts of the changed hydrology. These are likely to range from building material controls, to proprietary devices that would usually be located underground, to tanks (either above or below ground to store water), to bespoke treatment systems such as swales or raingardens, possibly with associated infiltration systems. Each of these devices will be located and associated with particular water sources, such as the log yard, refuelling areas, chemical or hazardous substance storage areas, workshops, carparks and potentially on-site roads,

7.9 Given the dispersed nature of the particular sites of interest as shown on the proposed Site layout, I consider that there are ample opportunities to locate at-source treatment systems within the operational areas of the Site and further land is not required nor can sensibly be detailed for them at this time.

7.10 The detail of these systems will be a detailed design matter and will be the subject of the Stormwater Management and Monitoring Plan described in the Proposed Conditions.

Stormwater detention ponds

7.11 The key (and most commonly used) mitigation for managing flooding effects is by the provision for the storage of excess stormwater runoff to reduce peak flow rates from a site so that there is no increase in flooding downstream. This effect will need to be carefully considered in conjunction with hydraulic modelling of the catchment to confirm the final sizing of the storage and outflow controls at the detailed design stage.

7.12 The need for this work has been anticipated in the Proposed Conditions which set out the modelling requirement and the items to be included within a proposed Stormwater Management Report.

7.13 For the purposes of the designation, simplified sizing (as detailed in the Stormwater and Flooding Technical Assessment, Appendix A "Flooding and Stormwater Impacts Assessment Assumptions") of the stormwater detention ponds has been carried out using a technique which is known to slightly over-estimate detention volumes. The technique involves a simple subtraction of runoff hydrograph volumes of the predevelopment hydrograph from the post-development hydrograph and by allowing for the storage of that volume difference.

7.14 This approximate approach was agreed with PNCC (including Mr Arseneau and Ms Baugham) prior to lodgement of the NoR.

7.15 For the NoR I considered a range of options for the siting of detention storage facilities including upstream, downstream, within the Site and both on-line on the streams and off-line away from the main streams. Based on my analysis of the options I concluded that location of detention storage downstream of the Site and out of the existing flood plains (off-line) was the most appropriate options as it:

(a) did not require further land to be taken on upstream properties;

(b) would not increase flood levels on upstream properties, as on-line storage option would;

(c) allowed the unimpeded passage of flows (and fish) from upstream properties, by not siting dams on the main streams from them;

(d) enabled incorporation of the detention storage with the terminal stormwater treatment device for the Site; and

(e) enabled discharges from the Site to closely approximate existing discharges and discharge points, thus not creating effects where they would not previously have been experienced.

7.16 The detention pond arrangement I settled on included three ponds one within the operational area of the Site (southern site) and two (northern and central ponds) outside the operational areas west of the realigned Railway Road. Each of these will discharge to systems at the locations that the natural discharges from the Site would discharge to. In the on-site pipework section below I describe how I have confirmed the elevations for these devices is achievable.

7.17 The detention ponds will be the subject of detailed design and modelling at the design and consenting stages, as allowed for in the Stormwater Management Report in the Proposed Conditions.

Stormwater treatment Wetlands

7.18 The terminal treatment facilities allowed for within the designation are three wetlands, one within and two outside of the operational areas of the Freight Hub. These are shown in Figure 1 below which has been adopted from the Landscape Plan included in Ms Rimmer's evidence. These wetlands will receive general site discharges and discharges from the at source treatment devices.

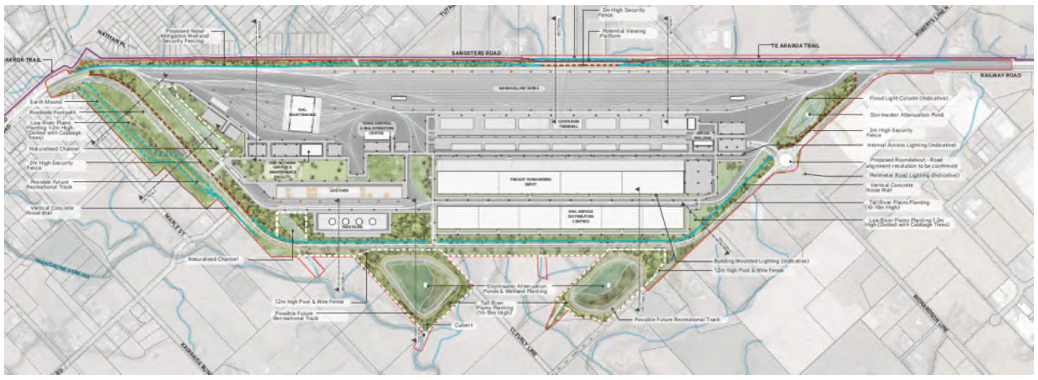

Figure 1: Snip from Landscape Plan showing location of stormwater detention ponds and treatment wetlands.

7.19 These devices have been sized using Auckland Council's GD01 sizing methodology, using conservative assumptions. I have also made an allowance in their footprint for the required maintenance access.

7.20 The stormwater treatment wetlands have been sized using Auckland Council's GD01 sizing methodology.[4] The Freight Hub will require a total stormwater treatment footprint of approximately 41,000m^2, including allowance for treating the Perimeter Road and the realigned NIMT. This footprint is based on the conservative assumption that the contributing catchment is 100% impermeable, with a ponding depth coefficient of 0.5 and no allowance for reduction of the Permanent Water Volume from the provision of live storage. The footprint area available to locate the wetlands in the base of the detention pond systems is approximately 97,000m^2.

7.21 Each wetland fits within the base areas of an associated detention pond within the Site. In this location each wetland will take both the low flow (piped discharges) and the high flows (overland flows) from the Site. The detailing of these devices will be the subject of detailed design and regional consenting processes.

7.22 As outlined in the Proposed Conditions a Stormwater Management and Maintenance Plan is proposed, which is intended to demonstrate how the quality of stormwater discharges will be managed for the Site. I expect it will also form the basis for subsequent regional consenting.

Culverts

7.23 Mitigation of upstream flooding will require the sizing of culverts to take anticipated flows, including an allowance for climate change and the risk of blockage from debris in order to manage upstream flooding effects. I have not carried out analysis for the sizing of culverts at this time, as they will be contained within the Site and will need to convey flows from each of the existing culverts that currently discharge across the NIMT and Railway Road and through the Site.

7.24 Design of culverts through the Site will be subject to analysis in both the Stormwater Management Report and the Stormwater Management and Monitoring Plan detailed in the Proposed Conditions. In the case of the culverts, I expect the design and reporting will incorporate integration with ecological issues and expert inputs, especially around fish passage.

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4 Auckland Council Guideline Document 2017/001, Stormwater Management Devices in the Auckland Region.

On-site Pipework

7.25 The ability to drain such a large flat site was a particular concern of mine. In conjunction with considering the location levels and sizing of the wetlands and detention areas, I had to also consider the ability for the Site to drain to these devices and also for the devices to drain to the receiving systems.

7.26 To satisfy myself of this I considered the level of the Site (RL50), the longest drainage paths on the site, pipe cover, minimum pipe gradients and ponding levels in the detention ponds. I also considered the 0.5%AEP flood level to ensure that the proposed system could drain out. I am satisfied having done this analysis that a solution is possible for this Site with the arrangement proposed.

7.27 The detailed design will be the subject of both the Stormwater Management Report and the Stormwater Management and Monitoring Plans included in the Proposed Conditions.

Naturalised Stream Channel

7.28 It is not possible from a stormwater engineering perspective, considering the operational imperatives of the Site, to avoid piping or culverting some of the streams within the Site. However, the opportunity exists to enhance the stream that drains the northern catchment through the Site. It is proposed to enhance this stream by keeping it open, creating a meandering baseflow channel and wetlands thus creating a more natural stream. The detailed design will be developed through the design and consenting process.

7.29 Design of the naturalised northern stream will be subject to analyses in both the Stormwater Management Report and the Stormwater Management and Monitoring Plan detailed in the Proposed Conditions. I am comfortable that enhancement, integrated with ecological and landscape inputs will result in a good stormwater outcome.

8. RESPONSE TO SUBMISSIONS

8.1 I have reviewed relevant submissions relating to the stormwater and flooding effects of the Freight Hub.[5]

[5] Sonia and Neal Watson (1), Bruce and Alison Hill (4), Central Economic Development Agency (12), Nga Kaitiaki O Ngati Kauwhata Incorporated (14), Kevin and Yvonne Stafford (18), Horizons Regional Council (20), Ian Alexander Shaw (21), Fiona Hurley (22), Mike Tate (23), Peter Hurly (26), Helen S Thompson (36), Ian Harvey (37), Logan Harvey (38), PMB Landco Ltd, Brian Green Properties Ltd and Commbuild Property Ltd (45), Aaron Fox (47), Ngati Turanga (49), Joanne Kathrine Whittle (59), Peter Gore and

8.2 I respond to these submissions by way of themes rather than individual submissions and I have summarised my understanding of the themes from my review of the submissions listed above.

Downstream and upstream flooding concerns

8.3 A number of submissions have expressed concern either in detail or in high level terms about an increase in local flooding or upstream or downstream flooding as a consequence of the Freight Hub.

8.4 This was a matter which I considered carefully through my technical analysis for the designation to ensure that adequate land was set aside. As discussed above, increased flooding is a potential effect. However, appropriate measures have been allowed for to manage this potential effect. These are discussed in section 7 of my evidence above and include:

(a) the provision of culverts through the site to convey flows;

(b) the provision for detention ponding to reduce flows from the Site;

(c) the siting of the detention ponds off-line of the stream systems; and

(d) the requirement for flooding effects to be addressed in detail by way of the Stormwater Management Report.

8.5 A number of the submissions discussed flooding, pipe capacities and sewer overflows in locations around the Site. While this level of detail will be addressed more fully at the design and regional consenting stage, I have considered the issues identified at a high level and conclude that:

(a) The Freight Hub is not expected to contribute to sewer overflows at the Kairanga Bunnythorpe Road. The stormwater runoff from the Site will not be discharging to the sanitary sewer system. It will discharge to the existing stream systems via the Site stormwater management system.

(b) The Freight Hub is not expected to contribute to local flooding at the Kairanga Bunnythorpe Road. At this stage I do not consider that local flooding experienced at this location will be affected by the

Dale O'Reilly (61), Mary Anne Chapman (62), Central New Zealand Distribution Hub Stakeholder Group (63), Te Ao Turoa Environmental Centre / Bestcare Whakapai Hauora Charitable Trust (69), Renee Louise Thomas-Crowther (70), Danelle O'Keeffe and Duane Butts (72), William John Bent (77), Dianne M C Tipene (81), June Irene Hurley (86), Max Houghton (89), Te Runanga O Raukawa (96).

Freight Hub, as this area has a higher elevation than the Site and is not on the routes for stormwater discharge from it.

(c) The Freight Hub is not expected to contribute to local flooding such as in the area around the Roberts Line / Railway Road intersection, and may assist to alleviate existing ponding in this area through standard drainage design and operation practices such as culverting. I am aware that there is already shallow ponding (flooding) occurring at this location and consider that the proposed works provide an opportunity to alleviate that ponding.

8.6 Local flooding of the Site will be managed by providing positive drainage (that is a piped drainage system) on the Site and by the elevation of the Site. I have considered the potential drainage line lengths and discharge points and am satisfied that drainage of the Site (including the need to treat and detain runoff) prior to discharge can be addressed and finalised through detailed design, as provided for in the Stormwater Management and Monitoring Plan required to be prepared under the Proposed Conditions. The Site elevation is well above the calculated 200-year flood level supplied in the current modelling of the Mangaone catchment, I am satisfied that the Site will not be subject to flooding from the Mangaone Stream flood levels.

8.7 Downstream flooding from the loss of flood plain storage or the increased impervious surfaces was considered in my assessment as discussed above. This has led to the three detention ponding areas that are proposed within the Site. Prior to allowing discharges from the Site to the existing stream systems (including the Mangaone Stream), flowrates from the Site will be reduced by the on-site detention so that there is no negative effect on downstream flood levels. The final design details of outlet configuration, detention volumes and depth and confirmation that flooding effects are managed will need to be confirmed at the design and consenting stage. I envisage that this will include considerable further analysis, not just of the Site but of the effects of runoff following mitigation on the existing downstream floodplains.

8.8 The detention areas set aside are outside of the existing flood plains and are sited so they will receive water from the Freight Hub. They are sited at an elevation above the identified 200-year flood plain. Located in this manner they allow for the mitigation of runoff without contributing to flooding effects themselves, because they do not sit within the floodplain areas.

8.9 The Proposed Conditions will require the preparation of a Stormwater Management Report to confirm that the stormwater detention ponds are

sufficient to mitigate the potential flooding effects of the Freight Hub. I consider that these conditions will ensure this issue is addressed.

8.10 Flooding risk upstream of the Site was also addressed in the Stormwater and Flooding Assessment. A submitter located upstream of the Site (submission 62) has concerns about extra flows into the streams through their properties. Extra flows to these upstream properties will not be able to occur from the Freight Hub as all discharges will be downstream of their property.

8.11 The key area of mitigation required, for upstream properties, will be to ensure that flood levels are not increased as a consequence of development of the Freight Hub. As in my evidence above there are two possible causes for an increase in flood levels:

(a) either backwater from increased downstream flood levels; or

(b) restrictions imposed by the culverts through the Freight Hub.

8.12 I have discussed the mitigation of downstream flood levels above and consider this effect can be managed by detention to be detailed in the design and consenting phases on the land set aside within the designation. Detaining flood flows to reduce peak discharges from a development site is an accepted and standard method of flood control.

8.13 Avoidance of upstream flooding caused by culvert restrictions is also an engineering design issue that will be addressed at the design and regional consenting stages of the Freight Hub. As described in my evidence above, I am satisfied that there are mechanisms available to address this effect such as culvert sizing and management of the entry conditions to minimise any adverse effects. Some culverts will be replacing old existing culverts with culverts that meet the latest design standards, and so upstream flooding risks are expected to be reduced because of this.

8.14 Any upstream flooding risks are also matters that will be addressed through detailed stormwater management design which will be provided for as part of the Stormwater Management and Monitoring Plan as outlined in the Proposed Conditions.

Quality of stormwater discharged downstream

8.15 Some submitters have raised concerns about the effect of the Freight Hub on the quality of the water discharged from the Site and its effect on the downstream watercourses. I acknowledge that adverse effects on the water

quality of stormwater discharges is a potential effect of the operation of the Freight Hub as detailed in section 5.2.3 of the Stormwater and Flooding Assessment.

8.16 This issue will be addressed through the detailed design and consenting stages of development and the Stormwater Management and Monitoring Plan required in the Proposed Conditions. However, for the purposes of the NoR, an assessment has been carried out of opportunities for the management of the quality of the stormwater discharges and the opportunities to address those effects.

8.17 A range of measures are expected to be included within the consenting phases and site development to construct the Freight Hub that will address water quality issues. The types of measures to be considered could include:

(a) the selection of neutral building materials;

(b) the provision of on-site low impact design type measures such as swales and raingardens to address hydrological changes and to provide at source treatment;

(c) the collection and reuse of water;

(d) the identification and isolation of particular contaminant generating sites and either diversion of runoff out of the stormwater stream or specific treatment of that runoff prior to discharge; and

(e) the provision of the treatment wetlands as the final treatment prior to discharge of stormwater runoff to the receiving systems.

8.18 While the detail of the final treatment solutions will not be finalised until detailed design and regional consenting, I have considered the options and consider that adequate provision exists within the Site to provide a range of treatment and mitigation options. The Proposed Conditions detail a proposed Stormwater Management and Monitoring Plan which has been offered to facilitate the addressing of hydraulic neutrality and water quality issues.

Extent of work to Satisfy Consent Assessment requirements

8.19 HRC's submission advises that with respect to the management of Natural Hazards that One Plan Objective 9-1, Policies 9-3 and 9-4 apply to the development of the Freight Hub.

8.20 Objective 9-1 states:

> The adverse effects of natural hazard events on people, property, infrastructure and the wellbeing of communities are avoided or mitigated.

8.21 Objective 9-1 has been considered in the Site by allowing for land outside of the operational areas to be included within the designation to enable the reduction in flood flows from the site by detention and attenuation of those flows.

8.22 Policy 9-3 states:

> The placement of new critical infrastructure in an area likely to be inundated by a 0.5% AEP (1 in 200 year) flood event (including floodways mapped in Schedule J), or in an area likely to be adversely affected by another type of natural hazard, must be avoided, unless there is satisfactory evidence to show that the critical infrastructure:
>
> a. will not be adversely affected by floodwaters or another type of natural hazard,
>
> b. will not cause any adverse effects on the environment in the event of a flood or another type of natural hazard,
>
> c. is unlikely to cause a significant increase in the scale or intensity of natural hazard events, and
>
> d. cannot reasonably be located in an alternative location.

8.23 Based on the flood plain information provided the 0.5%AEP flood level in the Mangaone Stream at the upstream end of the Freight Hub site is RL 46.2m. The Site operational level has been set as RL50m, that is 3.8m above the calculated flood level. I am comfortable that based on the flood plain information provided to date that the Site will be well above the calculated flood plain (sub clause a.) and understand that alternative locations (sub clause b. and d.) have been addressed in the evidence of others.

8.24 With respect to sub clause c, this is the purpose of the provision of the detention areas both within the southern end of the Site and outside of the operational site west of the perimeter road.

8.25 My analysis in the Stormwater and Flooding Assessment has given me confidence that enough land has been set aside to achieve the flooding related outcomes and conforms with the agreed methodology to achieve this as set out in Appendix A to the Stormwater and Flooding Assessment. In my view and as stated in the assessment report, I expect further work will need to be

carried out at the detailed design stage to numerically demonstrate that there are no adverse effects on the environment from a flood and that the proposal does not cause a significant increase in flood levels. To show compliance with Policy 9-3, sub clauses b) and c).

8.26 The Proposed Conditions relating to stormwater have been offered as a mechanism to demonstrate compliance and I would expect will be carried out in close consultation with both the HRC and PNCC. These conditions require the preparation of a Stormwater Management Report to confirm that the stormwater detention ponds are sufficient to mitigate the potential flooding effects of the Freight Hub.

Master Planning and Compliance with NEIZ Requirements

8.27 A number of submitters in support have commented on the positive benefit of the Freight Hub in facilitating comprehensive master planning of the site. I concur with this opportunity from a stormwater perspective.

8.28 One submission (PMB LandCo Ltd, Brian Green Properties Ltd and Commbuild Property Ltd) expressed concern that the designation includes 50Ha of the NEIZ and one Watercourse Reserve identified in Map 7.2 of the District Plan. The submitter has expressed concern that this Watercourse Reserve Area in the Structure Plan is proposed to be for detention and supplementary retention of stormwater from the wider area within the Zone including land owned and being developed by the submitters.

8.29 I have considered Map 7.2 and identified that the Watercourse Reserve identified by the submitter, is at the upstream end of the central watercourse adjacent to Railway Road. I agree that this Water Course reserve will be lost as part of the Freight Hub development.

8.30 The natural catchment to the identified Watercourse Reserve is wholly contained within the designation boundary. I do not consider that any other land within the NEIZ, outside of the proposed designation, would naturally drain to this site and there are other Watercourse Reserves identified on Map 7.2 that would better serve the remaining NEIZ sites. As such I do not agree that an alternative Watercourse Reserve site to service other NEIZ land (outside of the KiwiRail designation) is required as a consequence of the Freight Hub designation.

8.31 Notwithstanding my comment above, the plans supporting the designation show two stormwater management sites within the proposed designation to mitigate the effects of the Freight Hub development, particularly in the area

currently included within the northern extent of the NEIZ. The first is a small stormwater management site (detention and treatment wetland) within the KiwiRail operation area near the Roberts Line / Richardson Line intersection. The other is a large stormwater management area further down Roberts Line and west of the proposed Railway road realignment near the Roberts line intersection. These stormwater management areas are proposed for the mitigation of the Freight Hub development only.

9. RESPONSE TO SECTION 42A REPORT

9.1 I have reviewed the sections of the Section 42A Report relevant to my evidence, particularly:

(a) Section 9.8 - Stormwater management and flooding;

(b) Technical Evidence Stormwater and Flooding; and

(c) Section 9.8 of the planning report companion document table of effects and recommendations.

9.2 Overall, the Council Officers have agreed that adequate land has been set aside within the designation for stormwater management and flooding purposes. We do though appear to have some differences in specific areas of implementation which I have commented on below.

9.3 The Technical Report on Stormwater states that decommissioning the Freight Hub is not addressed within the operational effects and that it should be.[6] I am surprised by this suggestion (given the anticipated life of this project) and do not consider that it is necessary to assess the effects of the potential decommissioning the Freight Hub site as part of this process.

9.4 In any case, given the dispersed nature of the Site, and with its intended uses, I consider there would be adequate opportunity to incorporate decommissioning if and when the Site is closed.

9.5 Both the technical and planning reporting officers recommend that the Stormwater Management Framework ("**SMF**") be included in the Proposed Conditions. I agree that the items included in the SMF (with the exception of a decommissioning plan) are all items that will be required to be included within

6 Section 42A Technical Evidence Stormwater and Flooding, dated 18 June 2021 at pages [63], [66], [111] and [112].

resource consent evaluations. This was why I included them in my high level evaluation of stormwater requirements for the NoR.

9.6 However, I do not consider that it is appropriate to try to specify all of the detail of what should be included within the consenting process within the Proposed Conditions of this designation as this may restrict inclusion of items that become apparent during these more detailed considerations at the design and consenting stages. Ms Bell has addressed this matter, particularly relating to the appropriateness of the matters to be included in the Proposed Conditions in more detail in her evidence.[7]

9.7 The Stormwater and Flooding Technical Evidence seeks that a "*robust erosion assessment to demonstrate the effectiveness of the proposed stormwater system in mitigating*" downstream erosion.[8] I do not agree that is appropriate. This would be a condition requiring an assessment for which there is as yet no agreed methodology in New Zealand. The assessment would be significantly complicated by the existing on-going channel erosion in the artificially formed and unstable channels that currently exist downstream of the Site. That is, there is no stable channel form, from which to base the assessment. The normally accepted practices to manage the risk of new erosion from a land use change is through either the use of extended detention or volume reduction methods (such as low impact design, infiltration or reuse) to mimic the pre-development hydrological conditions. However, this is a detailed matter that I would certainly expect to be addressed at consenting stage rather than within designation conditions.

9.8 Overall, I support the Proposed Conditions attached as Appendix 1 to Ms Bell's evidence.

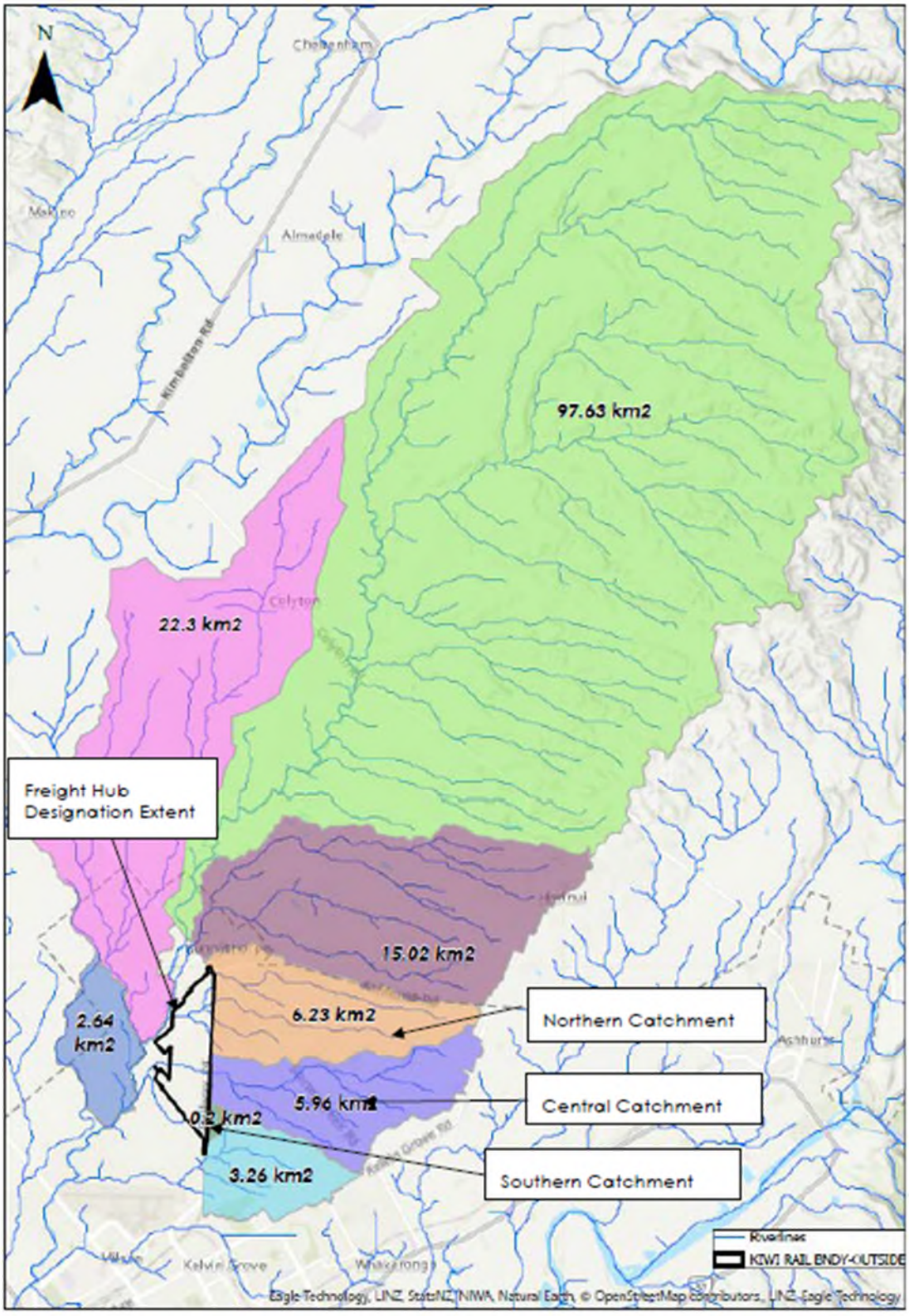
Allan Leahy

9 July 2021

7 Evidence of Karen Bell, dated 9 July 2021.

8 Section 42A Technical Evidence Stormwater and Flooding, dated 18 June 2021 at page [112].

APPENDIX 1



Freight Hub site in the catchment context and showing the northern, central and southern catchments draining through the site.
(Adopted from Figure 2, Stormwater and Flooding Assessment).