Memorandum

To: Tom Anderson, Incite Limited and Lynley Fletcher, Meridian Energy Limited.

From: Graeme Ridley, Ridley Dunphy Environmental Limited.

Date: 7th September 2023.

Re: Meridian Energy Limited / Horizons and GWRC. Mt Munroe Section 92 Response Erosion and Sediment Control.

1.0 S92 ESC REQUEST

This memorandum addresses the specific items of further information requested by Horizons and Greater Wellington Regional Council through a formal s92 request dated 6th July 2023. This relates to Horizons Regional Council – APP-2022203902.00 and Greater Wellington Regional Council – WAR230312 [39005, 39006, 39007, 39008, 39009]. This memorandum provides the technical response to questions 48 to 63 as set out below.

2.0 S92 ESC RESPONSE

48. Consent conditions offered specify provision of Construction Environmental Management Plans (CEMPs) and Specific Environmental Management Plans (SEMPs), however there appears to be no ability to audit and certify or otherwise the CEMP by the Regional Council. There appears to be the ability to certify the SEMPs, however there does not appear to be an allowance for certification of amendments. The ESCP Report is silent on the use of a CEMP, however discusses SEMPs. The AEE only contains mention of CEMP in the offered conditions. Please provide further information on the intent and interaction of the CEMPs and SEMPs, including proposed certification processes and their implementation on site.

Within the CWMR in Section 1.1 it is noted that "*It is also envisaged that through the detailed design phase the contents of this Report will also be refined and amended to include specific Project construction and earthworks analysis. This will occur prior to earthworks (or any stream works) commencing at a given location and will be produced in the form of a Specific Environmental Management Plan (SEMP). These SEMP's will be submitted to Manawatū-Whanganui Regional Council (Horizons) and Greater Wellington Regional Council (GWRC) for certification against the consent conditions, this Report and best practice ESC. The SEMPs will be informed by the principles of this Report and will enable specific construction constraints and opportunities to be incorporated into the final design for the works at that location. The SEMPs*

further will allow for flexibility, for enhanced outcomes and the opportunity for implementing improved practices based on any new knowledge and Project outcomes."

In addition, Table 3 of the CWMR provides the details and content of the SEMPs to be provided.

Condition amendments have been provided within the updated condition framework.

49. In Table 1 of the Erosion Sediment Control Plan Report (ESCP), the road corridor for earthworks is listed as approximately 2ha, yet there is a proposed (excluding topsoil) cut volume of 935,100 cubic metres for the road corridor. Are those values correct, and what are the maximum cut and fill depths? We note a slightly larger volume (1,090,000 cubic metres) is to be placed in fill sites over 25ha. How does the 2ha of roading correlate to 11km roading and access track?

Please refer to the response to Question 97 within the primary s92 response for a breakdown of cut and fill volumes.

50. Section 4.2 of the ESCP Report indicates an open earthworks period of 14 days, however, it also indicates in Section 7.1 "…a 14-day maximum period of leaving exposed areas with no works occurring." Does this mean an area will be exposed for a maximum of 14 days, or only stabilised after 14 days of no earthworks? On a project of this size, and with the cut and fill depths alluded to in the query above, how are the 14 day open earthworks areas going to be managed? Please provide further information around how the 14 day open earthworks period is going to be managed for both general earthworks and fill sites.

Section 4.2 of the CWMR notes "*The extent of exposed soil and length of time that area is exposed has a direct influence on the sediment yield leaving a particular area of the site. Earthworks and construction activities will be staged and sequenced in order to limit the area of exposed soil required to complete an element of the work. Open earthworks areas will be progressively stabilised to reduce the potential for erosion to occur with a 14-day period recommended*"

Section 7.1 of the CWMR notes "*To assist in this process, it is recommended that a 14-day maximum period of leaving exposed areas with no works occurring is assessed as a critical risk reduction element, and will in itself, encourage progressive stabilisation*"

The intent of this 14-day period is that the earthworks areas will not be left in an un-stabilised state for a period of time with no works occurring. If earthworks in a particular location are completed, they will be progressively stabilised and at no time will areas remain open for more than a 14-day period. This provision ensures that areas of earthworks are not unnecessarily undertaken and then left in an unstable state for a period of time.

The management of this will require progressive stabilisation of cut and fill batters as they are established for all earthwork locations. This is a similar provision that applies on many earthworks sites with similar conditions and can be implemented successfully. The nature of the stabilisation is further defined within Section 4.2 and 5.1.5 of the CWMR.

51. Section 5.1.5 of the ESCP Report states that hydroseeding may be applied as an alternative to mulch, and other alternatives such as polymer/soil binder products may be used to aid in stabilisation if trialled on site. While hydroseeding and polymer/soil binder products are a useful tool to aid in stabilisation, these products are generally not considered to be a form of stabilisation on their own. Please provide further information on how these methodologies will be used to achieve stabilisation and how sediment controls will be maintained until stabilisation is achieved.

Stabilisation is clearly defined within the CWMR and this is recognised as the industry best practice definition of stabilised. If applications such as hydroseeding and traditional grass sowing methodologies are utilised, these will not achieve a stabilised surface and in that case the downstream sediment control measure will need to remain in place until stabilisation is achieved. The alternative option in this scenario is application of a surface cover that achieves stabilisation.

In recent years there has been a significant use of soil binders and polymers on earthworks site and these are recognised to have benefits but will not always achieve a stabilised surface. In the circumstance that these are utilised they will need to be verified as stabilised, demonstrated to have no residual impacts and will need to be trialled on site to demonstrate appropriateness prior to use. This is detailed within Section 5.1.5 of the CWMR.

52. The ESCP Report details Sediment Retention Ponds (SRPs), Hybrid Decanting Earth Bunds (HDEBs), and Decanting Earth Bunds (DEBs) as the primary methods of sediment control. Section 5.2.1 of the ESCP Report states that "SRPs provide the most robust and effective measure in achieving sediment removal from construction runoff however are only appropriate for larger areas of earthworks." It is therefore assumed that HDEBs and DEBs provide a lesser robust and effective measure. Please provide further information around the hierarchy of sediment control and criteria that will be used to determine the use of the 'lesser' controls. Is a tool such as USLE or similar proposed in this assessment?

It is well recognised that SRPs, HDEBs and DEBs all provide a robust and proven sediment control function with SRPs the most effective of these options. This is not to diminish the value and effectiveness of the alternatives (HDEBs, DEBs, Super silt fences etc) but simply confirms the highly efficient nature of SRPs for larger areas of earthworks. The Project will implement SRPs wherever room availability and best practice assessment applies. This will be documented in a SEMP and reviewed and certified by Council.

In some circumstances where smaller catchment areas exist the use of HDEBs and DEBs (and other options) will apply with these installed as per the design criteria specified within the CWMR and the GWRC Guidelines. There is no need or requirement to undertake USLE calculations or similar to determine the sediment control measure to be implemented however it is recognised that the SEMP process does require assessment of risk management and detail and this process will further expand on any site-specific requirements that may apply. Again, this SEMP is subject to Council certification.

53. Section 5.2.2 of the ESCP Report states that DEBs will typically not be subject to chemical treatment unless the SEMP confirms this requirement for higher risk locations. Section F1.2.1 of the GWRC Guidelines (which is considered best practice and proposed as the ESC standard for the proposed works) states "Flocculation treatment should be used for all DEBs to increase their efficiency, unless other justification is provided." This is also consistent with current best practice and should be the minimum standard. If chemical treatment is not the proposed standard for DEBs, further justification is required to explain why it is not required in this case. This may include further information on how higher risk locations are to be determined and when flocculation will be utilised or not.

As specified in Section F2.1.5 of the GWRC Guidelines it states that DEBs can benefit from chemical treatment. This is recognised and accepted within the CWMR with the process being confirmed through the SEMP process. It is not possible to determine if some DEB catchments will benefit or otherwise from chemical treatment until such a time as the SEMP is established and the activity and nature of the works is understood. The key driver to chemical treatment implementation or otherwise is based on bench testing of the soils that apply to the area of interest with the bench testing undertaken to date demonstrating that very low dose rates are required in some soil types.

The soil type and bench test analysis, the duration of works, the nature of the works themselves, the vicinity of water bodies and the slope length and angle of the catchments all assist with risk determination and through the SEMP process will be documented to allow a risk profile to be understood and as part of this the need or otherwise for chemical treatment of DEBs.

It is assessed that the SEMP process remains as the best practice and most appropriate place for this determination.

54. Section 5.2.1 of the ESCP Report states that geotechnical assessment may be required in the construction of SRPs, however there is no 'trigger' for when this might be required. There is also no mention of whether this is required for the HDEBs and DEBs. Please provide further information on how a geotechnical assessment will be used in the design and construction of all sediment retention devices, including any geotechnical sign off required.

It is proposed to undertake a geotechnical assessment of the location of the SRPs to ensure that the location is suitable from a structural perspective for the purpose of a functional SRP device. On reflection it is assessed that all SRPs will be subject to this requirement due to the longer duration and the larger volumes of these devices. It does not apply to other control measures. If geotechnical constraints occur with the location of the SRPs then alternative locations will be determined and / or geotechnical solutions established for the SRP in question. This detail will all be provided for within the SEMP documentation.

The process will be based on undertaking such geotechnical assessments prior to construction occurring. While no ongoing geotechnical advice during the SRP construction itself is assessed as necessary this step may also occur as part of the wider geotechnical project advice.

55. Section 6.2 of the ESCP Report states "…earthworks themselves will progress no more than 24 hours in advance of the stabilised surface." This cut and cover approach is sensible in that it reduces the time of exposure, however given the size of some of the cut and fills on site, how is this proposed to work in a practical sense?

The cut and cover will be based on ongoing stabilisation utilising the recognised methods as specified within he CWMR. The 24hr period is designed to ensure that stabilisation occurs in a progressive manner.

Importantly as per Section 6.2 of the CWMR this provision applies to roading corridors and the CWMR specifies as follows: "*The road formation will be staged such that as the road is formed, a cover of aggregate can be placed over the track surface to achieve a stabilised area. This is referred to as a "cut and cover" methodology and earthworks themselves will progress no more than 24 hours in advance of the stabilised surface. This has the effect of reducing sediment generation and also associated risk*."

56. The level of sediment control for topsoil stockpiles is lower than that proposed for the main earthworks (silt fence or filter sock) given the temporary nature and lower risk. These are less effective than the SRP/HDEB/DEB controls proposed for the balance of the works. Please provide further information on the temporary nature of topsoil stockpiles, stabilisation proposed, and further justification for the controls proposed.

As with all erosion and sediment control measures the final determination of the specific measures to be implemented for each area of works will be made at the time of the SEMP development. For topsoil stockpiles these will likely fall within the catchment areas of the main sediment control measures used however silt fences and filter socks can assist with managing these stockpile locations in an effective manner.

As per the CWMR, all super silt fences, silt fences and filter socks will be based upon the design criteria within the GWRC Guideline. SSF fabric will be installed with 200mm of fabric upslope at the base of the trench. Further to this the stockpiles themselves will be subject to the progressive stabilisation provisions and in particular the 14-day stabilisation criteria as detailed above.

57. It is assumed that subsoil drainage will be required for turbine excavations, effectively providing drainage for the turbine excavation and completed foundations. If this assumption is correct, how is subsoil drainage from turbine excavations going to be managed from an ESC perspective?

The detailed design of the turbine excavations and platforms is not yet available. As noted, it is likely the subsoil drainage will form part of this design. The specific erosion and sediment control, methodology will be documented within a SEMP at the time however it is expected that this will likely include ensuring that subsoils discharge to appropriate sediment control measures and also that the subsoils themselves will be wrapped in cloth and have an aggregate drainage layer surrounding the subsoil drain. This specific detail cannot be determined at this time and will be turbine specific.

58. Section 6.4 of the ESCP Report states "ESC measures for this site compound will include a super silt fence and as soon as possible stabilising the area with aggregate as part of the site compound formation." As discussed at the site visit, the site compound remains for the duration of the proposed works and can be at risk of generating sediment runoff through the breakdown of stabilised surfaces. Has an SRP been considered for this area as a more robust and longer-term ESC measure?

It is confirmed that a SRP was originally considered for the site compound location however based on the site visits and associated analysis and the proposed site compound surface, it was assessed that the use of a super silt fence was more appropriate. This is due to allowing laminar flows from the compound area to discharge through the super silt fence rather than concentrating flows to one specific discharge location.

It is also important to recognise that the ESCP that supports the CWMR for this location has a primary purpose of demonstrating that there is a viable and effective erosion and sediment control approach to the area. A detailed SEMP will be established for the compound and as part of that, specific measures confirmed.

With respect to the breakdown of the stabilised surface this is recognised and if an ongoing stabilised surface forms an integral part of the methodology adopted then this will need to be achieved through the ongoing placement of new aggregate as required over time.

59. Section 6.4 of the ESCP Report states that "…one concrete batching plant to be located within the Turbine Envelope Zone or the Turbine Exclusion Zone." Section 2.12 of the Ecological Assessment states "The site will include two concrete batching plants to be located within the Turbine Envelope or Turbine Exclusion Zone." Please provide further information around the number and location of batching plants and proposed erosion controls.

Please refer to the response to Question 59 within the primary s92 response which clarifies this matter.

60. Section 6.5 of the ESCP Report details a cut and cover methodology for cable installation, however provides no details on the timing of this other than if a forecast rain event occurs. Please provide further details around the timing of the stabilisation for the cabling methodology.

As per Section 6.5 of the CWMR the primary erosion and sediment control is based on a progressive stabilisation with the trench area open able to be stabilised quickly if a forecast rain event occurs. In addition, filter socks will be utilised around all drainage systems and stream channels to ensure there is no direct discharge to these environments. It is assessed that the implementation of stabilisation can easily occur and with respect to timing of this stabilisation it is expected that this will occur on a daily basis however this can only be determined and specifically outlined within a SEMP process once detailed design and location is confirmed.

61. Section 6.7 of the ESCP Report states "…it is assessed that the key methodology to be employed will be based on a dam and pump process." Two of the proposed culverts are of significant length and require significant works to construct. The methodology that proposes pumping upstream flows around the works area can create an element of risk over longer construction periods as the pump is unlikely to cater for anything above minimum flows. How is this risk going to be mitigated?

a. A specific ESC methodology for two of the longer culverts along with associated bulk earthworks may assist in understanding the proposed construction methodology and thereby addressing this query.

The location of the culverts and streamworks are identified within the overarching s92 response. These locations have all been viewed on the ground and have been assessed based on the ability to install structures and methodologies in accordance with the CWMR. It remains our assessment that the methodologies outlined are appropriate and that only when detailed design and specific location is confirmed can we then determine the specific ESC approach and supporting plan. This will be provided to Council for full review (and further feedback if required) through the SEMP process.

62. The ESCP Report details "Proactive water quality monitoring, both qualitative and quantitative, will occur as part of the Project implementation as a way of assessing the effectiveness of the treatment and allowing for improvements/modifications as the Project works continue." What are the water quality monitoring processes, standards, and triggers used for this project? There is discussion around the use of turbidity, however no discussion on levels.

63. Consent conditions offered contain no discharge monitoring requirements or standards. These should be considered in relation to the sensitivity of receiving catchments. Are you proposing a discharge standard to protect the values of the receiving environments?

Questions 62 and 63 are responded to as below.

We have reviewed the construction related monitoring further and confirm that qualitative monitoring will be undertaken as per Section 8.1.1, 8.1.2 and 8.1.3 of the CWMR. With respect to quantitative monitoring, please refer Section 8.2 of the CWMR.

With respect to triggers for monitoring please refer to the ecological s92 response. In addition, as per the CWMR (with slight amendments to reflect ecological considerations further), triggered monitoring will result from activities or events that may trigger:

- Activities observed to be happening on-site that are likely to compromise the effectiveness or integrity of that site's erosion and sediment controls;
- Taking into account antecedent climatic conditions, a conspicuous change of water colour at the downstream receiving environment that is very different to the colour that

is normally associated with conditions at the same site, and with such change in colour not evident at upstream locations above the construction zone;

- Obvious accumulation of sediment in the vicinity of the discharge points, or anywhere else within or in proximity to the active construction zones;
- Streambank collapse or obvious signs of channel erosion / instability in the immediate receiving environments;
- Visual reports / evidence of uncharacteristic changes to downstream substrate composition, increased macrophyte bed cover in stream or discolouration of instream plant communities; and
- Spillage / accident reports by site personnel.

In the event of a trigger as above the erosion and sediment control management will be investigated to determine whether there has been a discharge from the devices. If there has been a discharge, manual water quality monitoring from the discharges and receiving environment will occur and a detailed response undertaken including full review of the ESC measures and processes associated with that specific trigger.

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