

**IN THE MATTER** of the Resource Management Act 1991 (**RMA**)

**AND**

**IN THE MATTER** of an application for regional resource consents and a land use consent under the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES Soil) in fulfilment of section 88 of the RMA.

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**SUPPLEMENTARY EVIDENCE OF IAN KENNETH GRANT BOOTHROYD  
ON BEHALF OF WATERCARE SERVICES LIMITED  
Freshwater Ecology  
13 April 2021**

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**1. INTRODUCTION**

**1.1** My full name is Ian Kenneth Grant Boothroyd.

**1.2** I prepared a statement of evidence dated 4 February 2020 in relation to Watercare Services Limited (**Watercare**)'s application for regional resource consents and a land use consent for the replacement of the existing Huia Water Treatment Plant (**WTP**) (the **Project/Application**). I refer to my qualifications and experience in my original statement of evidence and do not repeat those matters here.

**1.3** I also prepared a statement of summary evidence dated 24 February 2020 which provided a brief summary of my original evidence. I presented this statement of summary evidence at the Council hearing on 26 February 2020.

**1.4** The purpose of this supplementary evidence is to address the National Policy Statement for Freshwater Management 2020 (**NPSFM**) and the Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (**NESF**), both of which have come into effect since the hearing was adjourned.

**1.5** In this statement of supplementary evidence, I refer to Ms Karen Baverstock's supplementary evidence dated 13 April 2021, which also responds to these documents.

**1.6** I advise that I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014 and have complied with it in preparing this evidence. I confirm that the issues addressed in this evidence are within my area of expertise and I have not omitted material facts known to me that might alter or detract from my evidence.

## **2. SUMMARY OF EVIDENCE**

**2.1** My supplementary evidence considers the proposed Huia replacement WTP against the provisions of the NPSFM and the regulations of the NESF.

**2.2** Only one wetland occurs on the overall Project site. The 'swamp maire-puketea-kahikatea swamp forest' (swamp forest wetland) wetland feature (of some 0.37 ha) occurs at the western margin of the overall site, in the upper Armstrong Stream catchment. This feature meets the definition of a natural inland wetland (NPSFM s3.21(1)). I estimate that this swamp forest wetland occurs more 100 m from the nearest proposed earthworks, and thus the regulations of the NESF do not apply.

**2.3** In any case, groundwater surveys at the site have confirmed that drawdown will be limited to the west of the footprint, and I conclude that in my opinion this indicates that any proposed earthworks that may occur within a 100 m set back from the swamp forest will not result, nor is likely to result, in the complete or partial drainage of all or part of the swamp forest wetland (NESF regulation 45).

**2.4** The Project has avoided the reclamation of any permanent streams at the site. The Project will result in the reclamation of 53 m of intermittent stream (and creation of a 70m diversion channel) in the Yorke gully catchment. This catchment is highly modified and does not reflect the natural watercourse that would have existed previously.

**2.5** The periodic flowing nature of the intermittent stream and the lack of suitable fish habitat upstream means that fish passage is not a consideration for the intermittent stream. It is my understanding that there are no requirements for a culvert, weir, flap gate, dam or ford within the footprint of the intermittent stream or diversion.

**2.6** I have applied the effects management hierarchy to the actual effects of the Project, as referred to in the NPSFM. The ecological assessments carried out for the Project enabled the Project design team to give priority to avoiding areas of highest freshwater ecological value. Accordingly, the proposed footprint for the Project:

- (a) Avoids the reclamation or diversion of permanent watercourses (i.e., Armstrong\_Manuka Tributary is retained);
- (b) Minimises impacts on riparian vegetation as much as practicable (i.e., loss of riparian vegetation is limited to 0.21 ha);
- (c) Minimises sediment entering watercourses and downstream environments; and
- (d) Minimises, as much as practicable, changes to the hydrological regime of the lower catchments of Armstrong and Yorke Streams.

**2.7** I am confident that the effects management hierarchy has been applied to the greatest extent possible at the site. The measures that have been proposed to manage the effects on freshwater ecological values are:

- (a) The creation of 70 m of diversion channel.
- (b) Riparian planting as feasible along the length of the diversion channel.
- (c) Daylighting of approximately 45 m of currently underground piped sections of watercourses within the Armstrong\_Manuka Tributary Stream.
- (d) Provision of fish passage to the Armstrong\_Manuka Tributary Stream.
- (e) Enhancement of riparian planting throughout the remainder of the Project site.

**2.8** I have considered the National Objectives Framework (**NOF**) of the NPSFM in my assessment. Although NOF-required compulsory values have yet to be applied to the Armstrong and Yorke Stream catchments, I consider that these compulsory values are not compromised or diminished because of the proposed Huia replacement WTP.

2.9 In conclusion, it is my opinion that the Project does not contravene any of the provisions laid out in the NPSFM, and meets the regulations as detailed in the NESF.

### 3. NPSFM OBJECTIVE

3.1 The NPSFM came into force on 3 September 2020. The objective of the NPSFM is to ensure that natural and physical resources are managed in a way that prioritises:

- (a) first, the health and well-being of water bodies and freshwater ecosystems.
- (b) second, the health needs of people (such as drinking water).
- (c) third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.

3.2 Ms Baverstock's supplementary evidence provides an assessment of the Project against this objective.

3.3 The NPSFM directs regional councils to update their regional plans to include a variety of policies (or modifications to existing policies), as well as to undertake specific tasks.

3.4 In the next sections of my evidence I detail some of the fundamental components of the NPSFM and the NESF and how they relate to the Project.

### 4. NATURAL INLAND WETLANDS

#### Relevant provisions

4.1 The RMA definition of a wetland states:

- **Wetland** includes permanently or intermittently wet areas, shallow water, and land margins that support a natural ecosystem of plants and animals that are adapted to wet condition.

4.2 The NPSFM definition<sup>1</sup> states:

- **natural wetland** means a wetland (as defined in the Act) that is not:
  - (a) a wetland constructed by artificial means (unless it was constructed to offset

<sup>1</sup> NPSFM, s3.21(1)

impacts on, or restore, an existing or former natural wetland); or

- (b) a geothermal wetland; or
- (c) any area of improved pasture that, at the commencement date, is dominated by (that is more than 50% of) exotic pasture species and is subject to temporary rain-derived water pooling.

- **Improved pasture** means an area of land where exotic pasture species have been deliberately sown or maintained for the purpose of pasture production, and species composition and growth has been modified and is being managed for livestock grazing

**4.3** I note that the RMA wetland definition is relevant, that natural wetlands are not restricted to indigenous ecosystems or biota, and no reference is made to the significance, quality or condition of the wetland feature in the definition.

**4.4** I consider that the Project meets the requirements of “specified infrastructure” under the NPSFM and NESF as set out in the supplementary statement of Ms Karen Baverstock.

#### **Wetlands at the Project site**

**4.5** My colleague, Dr Sarah Flynn, has undertaken vegetation and wetland surveys of the broader Huia site. Dr Flynn has visited the site on numerous occasions but undertook a specific visit on 31 March 2021 to determine the status of any wetlands under the NPSFM and NESF.

**4.6** In her evidence in chief, Dr Flynn identified a ‘swamp maire-puketea-kahikatea swamp forest’ (swamp forest wetland) wetland feature (of some 0.37 ha) at the western margin of the overall site. I agree with Dr Flynn’s opinion that this feature meets the definition of a natural wetland under the NPSFM. This is the only wetland feature that occurs across the broader designation, and I confirm that no areas of constructed wetland, geothermal wetland or improved pasture occur at the Project site.

**4.7** Accordingly, I confirm that there are no natural wetlands within the proposed footprint of the Project, and no earthworks or vegetation removal are proposed within 10 m of a natural wetland.

**4.8** The NESF regulations for construction of specified infrastructure are as follows:

45 Discretionary activities

- (1) Vegetation clearance within, or within a 10 m setback from, a natural wetland is a

- discretionary activity if it is for the purpose of constructing specified infrastructure.
- (2) Earthworks or land disturbance within, or within a 10 m setback from, a natural wetland is a discretionary activity if it is for the purpose of constructing specified infrastructure.
  - (3) Earthworks or land disturbance outside a 10 m, but within a 100 m, setback from a natural wetland is a discretionary activity if it—
    - (a) is for the purpose of constructing specified infrastructure; and
    - (b) results, or is likely to result, in the complete or partial drainage of all or part of the natural wetland.
  - (4) The taking, use, damming, diversion, or discharge of water within, or within a 100 m setback from, a natural wetland is a discretionary activity if it is for the purpose of constructing specified infrastructure.

**4.9** My understanding is that there will be no earthworks within (or within a 10 m setback), nor the taking, use, damming, diversion, or discharge of water within the swamp forest wetland on the site. Therefore the consent requirements in regulations 45(2) and (4) will not be triggered.

**4.10** The swamp forest wetland has not been mapped exactly, but I estimate that it is more than 100 m from the nearest proposed earthworks (earthworks associated with the NH2 shaft). Nevertheless, for completeness I have given consideration as to whether there could be any potential drainage or partial drainage of the swamp forest wetland resulting from earthworks.

**4.11** I have relied on the groundwater report of Tonkin & Taylor<sup>2</sup> who conclude that:

‘The construction of the water storage reservoirs and tunnel shaft will however result in groundwater drawdowns of up to 12 m and drawdown-induced settlements of up to 75 mm immediately adjacent to the excavations’;

**4.12** The report goes on to conclude that:

‘The extent of the drawdown effects at the reservoir site are limited to approximately 30 m due to the sloping nature of the ground. The only potential for extensive drawdown effects is east of the tunnel shaft where, depending on the assumed permeability of the soil, drawdown may extend some 80 m. The Armstrong Gully Stream lies outside of the zone of impact of the dewatering and will not be affected.

**4.13** Accordingly, in my opinion this indicates that any proposed earthworks that may occur within a 100 m set back from the swamp forest will not result, nor is likely to result, in the complete

<sup>2</sup> Tonkin & Taylor (2018) Huia Replacement Water Treatment Plant. Groundwater and Settlement Effects Report. October 2018.

or partial drainage of all or part of the swamp forest wetland. Consent will therefore not be required under regulation 45(3) even if there were earthworks within 100m of this wetland.

## **5. RIVERS AND STREAMS**

**5.1** In this section I discuss the definitions and provisions of the NPSFM and NESF that relate to streams.

**5.2** The RMA definition of a river is:

**river** means a continually or intermittently flowing body of fresh water; and includes a stream and modified watercourse; but does not include any artificial watercourse (including an irrigation canal, water supply race, canal for the supply of water for electricity power generation, and farm drainage canal).

**5.3** The NPSFM directs that councils include the following policy in their regional plan (3.24(1)):

- (1) "The loss of river extent and values is avoided, unless the council is satisfied:
  - (a) that there is a functional need for the activity in that location; and
  - (b) the effects of the activity are managed by applying the effects management hierarchy."
- (2) Subclause (3) applies to an application for a consent for an activity:
  - (a) that falls within the exception to the policy described in subclause (1); and
  - (b) would result (directly or indirectly) in the loss of extent or values of a river.
- (3) Every regional council must make or change its regional plan(s) to ensure that an application referred to in subclause (2) is not granted unless:
  - (a) the council is satisfied that the applicant has demonstrated how each step in the effects management hierarchy will be applied to any loss of extent or values of the river (including cumulative effects and loss of potential value), particularly (without limitation) in relation to the values of: ecosystem health, indigenous biodiversity, hydrological functioning, Māori freshwater values, and amenity; and
  - (b) any consent granted is subject to conditions that apply the effects management hierarchy.

**5.4** I note that under the NESF (Subpart 2.57), the reclamation of the bed of any river is a discretionary activity but is a non-complying activity under the AUP(OP), E3.4.1(A49). The AUP(OP) is therefore more stringent. Ms Baverstock's supplementary evidence addresses this further.

**5.5** I identified intermittent and permanent streams at the proposed Huia replacement WTP. The Armstrong Stream reach is a permanent watercourse of moderate-high ecological value. Other freshwater habitats within the Project Site are intermittent or ephemeral in nature, and

intermittent watercourses are of moderate-low ecological value. The downstream receiving environments of Armstrong Gully and Yorke Gully are incised gully streams of high ecological value.

### **Avoidance of streams in Armstrong Gully**

- 5.6** All permanent and intermittent stream reaches within the Armstrong Gully catchment have been avoided and there is no loss or diversion of any watercourse proposed. We have recommended the retention and enhancement of a 10 m riparian buffer alongside the waterways. We have noted that the construction of the NH2 shaft will require removal of a small section of the vegetation surrounding the permanent stream section of Armstrong Gully. Some 0.03 ha of riparian vegetation comprising rank grassland and weedy exotic scrub will be lost.

### **Reclamation of intermittent stream in Yorke Gully**

- 5.7** The proposed Huia replacement WTP footprint requires the diversion of approximately 53 m of intermittent stream. As I have stated in my evidence-in-chief, the intermittent stream in the Yorke gully catchment is a highly modified catchment and does not reflect the natural watercourse that would have existed previously.
- 5.8** As set out above, the policy direction in 3.24(1) of the NPSFM is that the loss of river extent is to be avoided unless the council is satisfied that there is a functional need for the activity in that location and the effects are managed by applying the effects management policy. It is my understanding that the loss of the intermittent stream is unavoidable.
- 5.9** I emphasise that considerable effort over a significant period of time was entered into to look at alternatives, both to the location at Huia, and also regarding the final footprint. The outline of the proposed footprint was modified to particularly avoid high value vegetation and permanent watercourses as far as practicable. There is a functional requirement for the replacement WTP at this location. That is addressed in Ms Baverstock's supplementary evidence. Accordingly, we have applied the 'effects management hierarchy' to the diversion of the intermittent stream as I explain below.

- 5.10** As I have detailed in my evidence-in-chief, offsetting for the loss of the intermittent stream is proposed through the creation of a stream diversion channel, along with a further compensatory measure of stream daylighting.
- 5.11** The stream diversion will receive collected and treated stormwater from the replacement WTP site. Delivery of treated stormwater to the diversion channel will replicate the intermittent nature of the existing stream, and support flows in the Yorke Gully stream downstream.
- 5.12** I have relied on the groundwater study to confirm that there will be no effect on the groundwater regime or drawdown (baseflows) downstream on Yorke Gully stream. I also note that the contributing catchment area to the Yorke Gully stream will be reduced once the construction of the WTP has been completed. I understand that the intermittent flow characteristics of the re-aligned stream will be retained, and treated stormwater entering the diversion will ensure that flows are maintained downstream in the Yorke Gully stream.
- 5.13** In my opinion the proposed stream diversion is consistent with the policy framework of the NPSFM.

## **6. FISH PASSAGE**

- 6.1** The NPSFM directs regional councils as follows (3.26(1):
- (1) Every regional council must include the following fish passage objective (or words to the same effect) in its regional plan(s):
- “The passage of fish is maintained, or is improved, by instream structures, except where it is desirable to prevent the passage of some fish species in order to protect desired fish species, their life stages, or their habitats.”
- 6.2** The NPSFM goes on to require regional councils to include a series of policies aimed to provide for the requirement above, as well as the requirements for the collection of information.
- 6.3** Subpart 3 of the NESF deals with the effects on the passage of fish of the placement, use, alteration, extension, or reconstruction of any of the following structures in, on, over, or under the bed of any river or connected area: culvert, weir, flap gate, dam and ford.

### **Fish passage in the intermittent stream (Yorke gully catchment)**

- 6.4 The periodic flowing nature of the intermittent stream and the limited fish habitat upstream means that fish passage is not a consideration for the intermittent stream.
- 6.5 It is my understanding that there are no requirements for a culvert, weir, flap gate, dam or ford within the footprint of the intermittent stream or diversion.
- 6.6 Therefore, I consider that the provisions for fish passage of the NPSFM and NESF are not applicable to the proposed Project.

### **Fish passage in the Armstrong Stream catchment**

- 6.7 There are no proposed streamworks in the Armstrong Stream catchment as part of the proposed Huia replacement WTP project. Accordingly, there are no requirements to provide for fish passage under the NPSFM or NESF.
- 6.8 However, as I describe in my evidence below, I have recommended that provision is made to improve fish passage in the Armstrong Stream catchment as part of the effects management for the Project.

## **7. APPLICATION OF EFFECTS MANAGEMENT**

- 7.1 As outlined above, the policy direction in the NPSFM is that reclamation is to be avoided unless the council is satisfied that the 'effects of the activity are managed by applying the effects management hierarchy ((3.24(1). 3.21(1) sets out the definition of the effects management hierarchy as follows:

**effects management hierarchy**, in relation to natural inland wetlands and rivers, means an approach to managing the adverse effects of an activity on the extent or values of a wetland or river (including cumulative effects and loss of potential value) that requires that:

- (a) adverse effects are avoided where practicable; and
- (b) where adverse effects cannot be avoided, they are minimised where practicable; and
- (c) where adverse effects cannot be minimised, they are remedied where practicable; and
- (d) where more than minor residual adverse effects cannot be avoided, minimised, or remedied, aquatic offsetting is provided where possible; and
- (e) if aquatic offsetting of more than minor residual adverse effects is not possible, aquatic

compensation is provided; and

(f) if aquatic compensation is not appropriate, the activity itself is avoided.

**7.2** The ecological assessments carried out for the Project enabled the Project design team to give priority to avoiding areas of highest freshwater ecological value. Accordingly, the proposed footprint for the Project:

- (a) Avoids the reclamation or diversion of permanent watercourses (i.e., Armstrong\_Manuka Tributary is retained);
- (b) Minimises impacts on riparian vegetation as much as practicable (i.e., loss of riparian vegetation is limited to 0.21 ha);
- (c) Minimises sediment entering watercourses and downstream environments; and
- (d) Minimises, as much as practicable, changes to the hydrological regime of the lower catchments of Armstrong and Yorke Streams.

**7.3** I am confident that the effects management hierarchy has been applied to the greatest extent possible at the site.

**7.4** The measures that have been proposed to manage the effects on freshwater ecological values are:

- (a) The creation of 70 m of diversion channel.
- (b) Riparian planting as feasible along the length of the diversion channel.
- (c) Daylighting of approximately 45 m of currently underground piped sections of watercourses within the Armstrong\_Manuka Tributary Stream.
- (d) Provision of fish passage to the Armstrong\_Manuka Tributary Stream.
- (e) Enhancement of riparian planting throughout the remainder of the Project site.

**7.5** These measures are described in detail in my evidence in chief.

**7.6** The Auckland Council SEV and Environmental Compensation Ratio (**ECR**)<sup>3</sup> were utilised to ensure there was 'no net loss' on freshwater ecological habitat and function across the site. These calculations and detailed information on the proposed management are outlined in our formal response to an S92 request for further information, entitled 'Addendum to Stream Ecological Value Plan' and provided in **Appendix E** of my evidence-in-chief and are reflected in the comprehensive conditions of consent that Watercare has proposed.

### **Potential values**

**7.7** I note that the SEV requires that 'potential values' are taken into account during the calculation of the ECR and satisfies the requirement of the effects management application of the NPSFM.

### **Cumulative effects**

**7.8** In this section I consider the cumulative effects on the freshwater values resulting from the proposed Huia replacement WTP. As set out above the definition of the effects management hierarchy includes a reference to cumulative effects.

**7.9** The stream reclamation and diversion channel will have some minor temporary effects during the construction phase that will be mitigated by the proposed environmental management measures. These effects will be short-term, with any residual effects appropriately mitigated for through the stream diversion channel design and Yorke Gully erosion protection works. As a result, there will not be any permanent adverse effects on freshwater ecological function as a result of the replacement WTP project. The Project will provide an overall ecological enhancement in this respect.

**7.10** Improvements to water quality will occur through enhancement of the riparian margins and the proposed stormwater management. Planting will strengthen the integrity of the riparian margins and stream banks, to improve bank stability and prevent bank erosion. The proposed stormwater management will result in discharges of water quality that is better than the present quality of stormwater discharged from the site and enhanced to pre-development

<sup>3</sup> ECR = Environmental Compensation Ratio. The ECR determines the amount of stream restored relative to the amount of stream degraded; or when restoration is not feasible, the quantum of financial contribution taken in lieu of this.

levels. This will benefit the downstream water quality, and ultimately the water reaching the downstream estuarine environment.

**7.11** The loss of the intermittent stream and its replacement with a greater extent of length of the diversion stream means that there is no net loss of overall extent of stream length. In fact, with the proposed daylighting of the lower Armstrong\_Manuka stream there will be an overall gain in stream length.

**7.12** In conclusion, there will not be any permanent or cumulative adverse effects on freshwater ecological condition or function, or water quality, as a result of the construction and operation of the replacement WTP project. Overall, the replacement WTP project will provide an overall ecological enhancement for waterways on the site, and to the downstream receiving environment.

**7.13** I consider that this satisfies the NPSFM requirement for consideration of 'cumulative effects' in the effects management hierarchy.

## **8. NATIONAL OBJECTIVES FRAMEWORK**

**8.1** Subpart 2 of the NPSFM requires certain attributes to be managed within a compulsory NOF. The NOF requires that water quality is maintained or improved to established water quality attribute bands for a variety of parameters. It is not my intention to comment on each and every parameter; to the best of my knowledge no water quality data is available to provide a meaningful assessment.

**8.2** However, although the Auckland Council have yet to designate objectives and unit management to Armstrong and Yorke Streams, and no specific water quality data is available, it is my opinion that the water quality parameters would sit in the upper bands of water quality (i.e., A or B band) for most water quality attributes.

**8.3** My reason for suggesting this water quality status is that these streams sit at the top of the catchment and although these streams are subject to stormwater runoff from the local roads and residences, the vegetated nature of the catchment and their position as headwaters in the catchment would suggest a better water quality than would be expected in downstream sites.

**8.4** I note that improvements to the stormwater from the site as a result of the proposed Huia replacement WTP will result in a slightly better water quality than occurs now.

**8.5** The NPSFM requires that Councils apply compulsory values to stream management units in their respective regions as part of the NOF (Subpart 2, 3.9(1)). Those compulsory values relevant to freshwater ecology are:

**Ecosystem health** refers to the extent to which an FMU or part of an FMU supports an ecosystem appropriate to the type of water body (for example, river, lake, wetland, or aquifer).

There are 5 biophysical components that contribute to freshwater ecosystem health, and it is necessary that all of them are managed. They are:

*Water quality* – the physical and chemical measures of the water, such as temperature, dissolved oxygen, pH, suspended sediment, nutrients and toxicants

*Water quantity* – the extent and variability in the level or flow of water

*Habitat* – the physical form, structure, and extent of the water body, its bed, banks and margins; its riparian vegetation; and its connections to the floodplain and to groundwater

*Aquatic life* – the abundance and diversity of biota including microbes, invertebrates, plants, fish and birds

*Ecological processes* – the interactions among biota and their physical and chemical environment such as primary production, decomposition, nutrient cycling and trophic connectivity.

In a healthy freshwater ecosystem, all 5 biophysical components are suitable to sustain the indigenous aquatic life expected in the absence of human disturbance or alteration (before providing for other values).

**Threatened species** refers to the extent to which an FMU or part of an FMU that supports a population of threatened species has the critical habitats and conditions necessary to support the presence, abundance, survival, and recovery of the threatened species. All the components of ecosystem health must be managed, as well as (if appropriate) specialised habitat or conditions needed for only part of the life cycle of the threatened species.

**8.6** I have addressed freshwater ecological values of the streams at the site, in part in my evidence above, and more fully in my evidence-in-chief.

**8.7** In my opinion, after the ‘effects management hierarchy’ has been applied (in its fullness including avoidance), these compulsory biophysical values are upheld and maintained.

**8.8** In fact, I consider that these compulsory values are for the most part enhanced, or create a potential for enhancement (i.e., potential for threatened fish access). I draw attention to the provision of the stream daylighting and improved fish passage at the

Armstrong\_Manuka\_tributary stream as enhancements for habitat, aquatic life, ecological processes and potential threatened species (via fish passage access). Equally, as I have commented above, water quality is likely to be slightly improved and water quantity (as a provision of the intermittent stream diversion) is not diminished.

**8.9** Accordingly, although NOF-required compulsory values have yet to be applied to the Armstrong and Yorke Stream catchments, I consider that these compulsory values are not compromised or diminished as a result of the proposed Huia replacement WTP.

## **9. CONCLUSION**

**9.1** In conclusion, it is my opinion that the Project does not contravene any of the provisions laid out in the NPSFM, and meets the regulations as detailed in the NESF.



Ian Kenneth Grant Boothroyd

13 April 2021