Absolutely Positively
Wellington City Council
Me Heke Ki Pōneke

2 August 2022

Wellington City Council
PO Box 2199
Wellington 6140

Attention: Monique Zorn

Dear Monique,

Re: Wellington Sludge Minimisation Facility – Notice of requirement to alter Designation 58

Please find enclosed a notice of requirement (NOR) and supporting assessment of environmental effects (AEE) report for the construction, operation and maintenance of a new Sludge Minimisation Facility (SMF) at Moa Point ("the proposal"). Form 20 is contained as Appendix A to the AEE.

The proposal will provide for:

- a new Sludge Minimisation Facility with all associated structures and pipework;
- associated connections to the existing Moa Point Wastewater Treatment Plant for transferring water and wastewater;
- associated enabling works, including earthworks and slope stabilisation;
- formation of new vehicular site accesses/egresses to/from Stewart Duff Drive;
- construction activities including site offices and material laydown areas; and
- associated connections to the local water supply and local stormwater and sewer networks.

Further details of the proposal are described in Section 4 of the AEE.

Notification

Pursuant to section 149ZCB(2)(b) of the Resource Management Act 1991 (RMA), WCC requests notification of this NOR.

Wellington City Proposed District Plan (WCPDP)

WCC notified the WCPDP on 18 July 2022. The WCPDP includes the rollover of Designation 58 which has the unique identifier 'Designation WCC6' in the proposed plan. In accordance with section 175 of the RMA, any decision made on this NOR will alter both Designation 58 in the operative district plan and Designation WCC6 in the WCPDP.

Lodgement fee

The required lodgement fee of $20,800.00 has already been made to WCC.

Wellington City Council
PO Box 2199
Wellington 6140
New Zealand
Phone +64 4 499 4444
Fax +64 4 801 3138
Wellington.govt.nz

Additional information

If you require any additional information, or wish to discuss any aspect of this NOR, please contact Paul McGimpsey at Beca as Wellington City Council's planning agent for this proposal.

Yours sincerely

Barbara McKerrow
Chief Executive Officer

ADDRESS FOR SERVICE:

Beca
Attention: Paul McGimpsey
PO Box 3942
Wellington 6140
paul.mcgimpsey@beca.com

Wellington Sludge Minimisation Facility

Notice of requirement and assessment of environmental effects

Prepared for Wellington City Council
Prepared by Beca Limited

3 August 2022

make
everyday
better.

Creative people together transforming our world

Revision History

Revision Nº	Prepared By	Description	Date
1	Jennifer Beardsall Paul McGimpsey	Draft for internal verification (Tranche 1 only)	14/04/2022
2	Jennifer Beardsall Paul McGimpsey	Draft for client and legal review (Tranche 1 only)	19/04/2022
3	Jennifer Beardsall Paul McGimpsey	Draft for Council review (Tranche 1)	10/05/2022
4	Jennifer Beardsall Paul McGimpsey	Draft for client and legal review (Tranche 2)	19/05/2022
5	Jennifer Beardsall Paul McGimpsey	Draft for Council review (Tranche 2)	15/06/2022
6	Jennifer Beardsall Paul McGimpsey	Final for lodgement	03/08/2022

Document Acceptance

Action	Name	Signed	Date
Prepared by	Jennifer Beardsall Paul McGimpsey		3 August 2022
Reviewed by	Graeme Roberts		3 August 2022
Approved by	Wayne Estment		3 August 2022
on behalf of	Beca Limited		

Cover photo: SMF site looking east, February 2022 (Credit WSP).

Contents

Appendices

Executive summary

Introduction and background to the proposal

This assessment of environmental effects (AEE) report has been prepared in support of a notice of requirement (NOR) issued by Wellington City Council (WCC) to provide for the construction, operation and maintenance of the proposed Sludge Minimisation Facility (SMF) at Moa Point, Wellington.

Sludge is the term for the solids produced from the wastewater treatment process. Due to its high moisture content, it is not an easy material to dispose of and can create odour if not treated appropriately. More than a million litres of sludge per day is currently piped 9km from the wastewater treatment plant (WWTP) at Moa Point to Carey's Gully sludge dewatering plant at the Southern Landfill. Sludge from the from Western WWTP (Karori) is dewatered separately and disposed of at the Southern Landfill. Once some of the water is removed, about 13 tonnes of dewatered sludge per day is buried in the landfill and the water returned to Moa Point via the wastewater network.

The current approach to disposing of sludge at the landfill has a number of issues:

- WCC has committed to reducing the volume of waste going to landfill by one third, yet volumes of sludge are increasing with population growth.
- The resource consent for the Southern Landfill requires every tonne of sludge to be mixed with four tonnes of refuse which constrains WCC's ability to reduce the amount of solid waste going to the landfill over time.
- Sludge disposal uses valuable and limited landfill capacity.
- The disposal of sludge to landfill creates methane emissions which contribute to climate change.
- The sludge pipelines that currently carry sludge from Moa Point to Carey's Gully are in poor condition and are vulnerable. The pipes failed in January 2020 resulting in a sludge trucking operation over several months until the pipes were repaired.

A priority for WCC is waste minimisation initiatives through the council's commitment to reducing carbon emissions and reducing waste by a third by 2026. This is set out through Te Atakura (WCC's Zero Carbon Plan) and the Regional Waste Minimisation and Management Plan and most recently articulated in the 2021/31 Long Term Plan. The minimisation of sludge, which is the core aim of the SMF, has been identified as an essential enabling step in achieving these objectives.

The SMF will also significantly reduce the environmental impact of disposing of Wellington City's sludge by treating the sludge at the new SMF to convert it to stabilised biosolids. Stabilised biosolids are inert and low-odour. Compared to sludge currently disposed of to landfill (approximately 13 tonnes per day), the volume of material will be reduced by 82% once converted into stabilised biosolids at the SMF. Treatment of sludge at the SMF has a number of other benefits:

- It will reduce carbon emissions from the treatment and processing of the city's sludge by 63%.
- It will remove reliance on the existing 9km pipelines between the Moa Point WWTP and Carey's Gully currently used to transfer sludge. Odour associated with current sludge disposal at Southern Landfill will be eliminated.
- A significant reduction in a volume of material needing to be disposed of at the Southern Landfill will reduce pressure on the landfill, the capacity of which is already constrained. The long-term intention is to make beneficial re-use of the stabilised biosolids product to avoid the need altogether to dispose of it to landfill.

For the purposes of this NOR, WCC's specific RMA project objectives for the SMF are to:

1. Significantly reduce the operational impact of sludge management at Southern Landfill.

2. Provide a sustainable and resilient long-term solution for sludge management from Wellington's WWTPs, that:
    a Has appropriate capacity to provide for projected population growth, and aligns to associated infrastructure planning; and
    b Can be integrated into the wastewater network in a cost-effective manner.
3. Reduce the environmental impact of sludge disposal, particularly in terms of:
    a. Carbon emissions; and
    b. Odour at the disposal site.

Description of the environment

The SMF will be located on a highly constrained site south-east of Wellington city centre, situated between Wellington International Airport, Miramar Golf Course and the existing Moa Point WWTP. The site is accessed off Stewart Duff Drive, a private road owned and controlled by the airport. The majority of the site is already designated for wastewater treatment purposes.

The site is highly modified, having been quarried in the 1930s and used for airport support uses and wastewater treatment more recently. Presently, the site contains an existing inlet pump station (IPS) associated with the Moa Point WWTP and the Aviation Ground Services (AGS) building used for repair/maintenance of airport service vehicles. Immediately adjoining the site to the south is a building housing a pharmaceuticals manufacturer and laboratory (trading as Cyclotek).

For construction, an area of land on the other side of Stewart Duff Drive will be temporarily used for a construction yard and laydown area. This area is currently occupied by a landform known as the 'hillock' which will be removed to enable this, as well as the future use of the land for airport purposes. A separate resource consent application will be made jointly by the airport and WCC to remove the hillock.

In the future, much of the area around the site will be developed by the airport in line with its 2040 masterplan. This will include the land currently containing the southern half of the Miramar Links golf course. More immediately, on the opposite side of Stewart Duff Drive from the site, construction of the large freight hub is scheduled to commence later this year.

The proximity of the SMF site to the airport also means that there are other limitations on the use of the site to ensure the safety of airport operations. The site is subject to height limit controls imposed by the Civil Aviation Authority. All SMF structures will be within these limits. Wellington Airport also strongly opposes planting of trees that might attract birds and the creation of areas of standing water, again due to the potential to attract birds and cause safety risks. Because of this, only limited low-level landscape planting is possible and the erosion and sediment control plan has been developed to avoid the use of open sediment retention ponds which would normally be used for earthworks of the scale proposed.

Description of the proposal

The technology for the treatment of sludge comprises of a Lysis-Digestion and Thermal Drying process.

The works are expected to commence in February 2023 and take approximately three years to complete.

Early works will include site establishment, service relocations and earthworks involving stabilisation of the slope on the east of the site and removal of the northern section of the former quarry headwall. The earthworks will be carried out in accordance with an erosion and sediment control plan, which sets out measures for managing and minimising the effects of erosion, sediment generation and dust on the surrounding environment.

The following elements will make up the SMF:

- A three-storey Main Process building (approximately 22.5m in height).
- A three-storey Energy Centre building (approximately 21.3m in height) This building will encompass and enclose the existing influent pump station (IPS).
- An odour control stack (approximately 28.7m in height) and associated comprehensive odour treatment system.
- Two large cylindrical tanks, known as digesters between 14 and 16m in diameter and between 20 and 24m in height (depending on the gas storage option selected).
- An Export Silo Building for the load out of the final minimised/stabilised sludge product. This may be incorporated into the envelope of the proposed Energy Centre building.
- Other ancillary buildings, tanks and silos
- New pipework between the proposed SMF and the existing WWTP for the purposes of sludge, odour and disinfected water conveyance.

Statutory matters

The works will be authorised under the Wellington City District Plan through an alteration to the existing Designation 58. This will add some land area to the existing designation (8,079m^2), as well as add a comprehensive suite of conditions to apply to the SMF. Post-construction, part of the designation will be removed (the land on the north side of Stewart Duff Drive which is only needed for construction of the SMF and not required for ongoing operations).

An outline plan will be submitted to WCC to confirm the final details of the work.

Resource consents are needed from Greater Wellington Regional Council under regional plans and a wildlife permit is required from the Department of Conservation for the relocation of lizards from the site. These approvals are being sought concurrently to this NOR.

Consideration of alternatives

A structured process was undertaken to select a preferred sludge treatment process and location of the new facility which meets the key investment objectives for the project. The process for selecting the preferred process and location included four key stages as follows:

1. Options identification: initial lists of 25 process and site options were developed individually, largely based on desktop studies of a broad range of potential process and site options.

2. Options analysis: the initial list of process and site options was subjected to a fatal flaw analysis. The output of this stage of work was a long list of nine feasible consolidated process and site options.

3. Longlist analysis: A multi-criteria analysis was undertaken involving a range of criteria which were set by key project stakeholders. The analysis identified four shortlisted options (in addition to the base case).

4. Shortlist evaluation: The shortlisted options were evaluated against a set of critical success factors which define successful delivery of the project and its outcomes. A cost benefit analysis was developed to support this. This evaluation identified a preferred option, which is the subject of this NOR.

Consultation and engagement

Iwi engagement

Taranaki Whānui and Ngāti Toa were engaged during the initial optioneering process to determine a preferred process and site option. This included consultation with iwi to assist in the short listing of process options to understand cultural concerns with sludge management that might influence process selection.

The principal issue for mana whenua relates to how the stabilised biosolids, arising from the SMF process, are to be disposed of or re-used for other purposes. Whilst the SMF process enables beneficial re-use of

stabilised biosolids, it is not within the scope of the project to confirm how this is to occur in the long term. WCC is therefore seeking to engage with both Taranaki Whānui and Ngāti Toa to work collaboratively on developing a 'Biosolids Reuse and Management Plan'. This will form part of a broader Takai Here Partnership Agreement with each iwi, which will detail how all parties will engage on key issues moving forward, on both the SMF project and wider long term waste management and minimisation initiatives for the city.

Engagement with councils

Engagement has been undertaken with WCC officers in developing the proposal and this AEE. This has involved regular meetings with planning staff to discuss the consenting approach as well as providing draft documentation for comment, including proposed designation conditions.

Draft technical reports and proposed conditions were also provided to council's experts covering transport, landscape and visual assessment, noise and vibration, air quality, ecology, earthworks, stormwater and flood risk (Wellington Water officer), contaminated land and natural hazards.

Engagement with Wellington International Airport Limited (WIAL)

WCC has worked closely with WIAL in developing the proposal to ensure that the safety of airport operations is not compromised and that the SMF does not impinge on the airport's expansion plans. WCC and WIAL will continue to work together so that SMF and airport works are planned and undertaken in a coordinated manner.

Other engagement

Over the last 12 months, WCC has engaged with a number of community groups, namely the Moa Point Road Residents' Association, Strathmore Park Residents' Association, Owhiro Bay Residents' Association and Guardians of the Bay. These groups are generally supportive of the proposal but did raise some concerns about localised effects, notably odour. Guardians of the Bay did express concern over the proposed removal of the hillock.

Many of these community groups are part of an existing Community Liaison Committee (CLC) which was established by conditions on the existing Moa Point WWTP designation. The intention is to use the existing CLC to engage with the local community through the construction and operation of the SMF. Accordingly, proposed SMF designation conditions will continue to provide opportunities for the CLC to work with WCC to provide input and establish ways to avoid, remedy or mitigate any adverse effects of the construction and operation of the SMF on adjacent communities.

Regional Public Health (RPH, now Te Whatu Ora – Health New Zealand) has been briefed and regularly updated about the project. The main area of interest for RPH is the management of odour.

Engagement has been early and ongoing with Cyclotek Industries working with this business of national significance located next to the facility site to minimise adverse odour, dust, noise and vibration and traffic impacts.

Assessment of environmental effects

An assessment of environmental effects has been undertaken. Detailed technical assessments are contained in the appendices to this AEE. A summary of expected effects is as follows.

Positive effects

The proposal will have a number of positive effects:

- substantially reducing carbon emissions from the disposal of the city's sludge;

- substantially reducing odour emissions at the landfill associated with the disposal of sludge;
- substantially reducing leachate to land and groundwater at the landfill from the disposal of sludge;
- removing the risk of environmental degradation (particularly to streams) posed by failure of the existing sludge transfer pipelines between the Moa Point WWTP and Carey's Gully.
- substantially reducing the volume of material needing to be disposed of to landfill from the treatment of the city's sludge; and
- treating odour currently periodically emitted from the existing Inlet Pump Station adjacent to Stewart Duff Drive.

Temporary effects during construction (including commissioning)

The main potential adverse effects during construction are the emission of dust and odour (during the commissioning phase), noise and vibration, traffic, erosion and sedimentation effects, ecological effects, land contamination. Potential effects from dust, noise and vibration, traffic, erosion and sedimentation and land contamination will be managed using standard construction environmental management practices. A suite of management plans will be submitted to WCC (as part of the outline plan process) confirming specific measures to be used.

The potential for the emission of offensive odour during the commissioning phase (at the end of construction) has been identified as a specific risk. This will be managed through a specific commissioning odour management plan which will require the use of temporary odour treatment during commissioning. With these controls in place, there will be no adverse odour effects on the nearest residential properties in the area (Moa Point and Strathmore Park).

The slopes at the north and east of the site have been found to contain two different lizard species. Both species are widespread around the lower North Island and upper South Island and are classified as 'Not Threatened'. A specific lizard management plan (LMP) has been developed to manage impacts on lizards.

Permanent effects during operation

The main potential effects during operation are dust and odour, noise and vibration, traffic, and landscape and visual.

Given the facility will be fully enclosed, dust (mostly from the loading of stabilised biosolids into trucks) and odour will be able to be managed. Odour from all odorous activities will be treated via a comprehensive odour treatment system. During operation, there will be no objectionable or offensive odours from the SMF at residential properties.

Operational noise levels will be within district plan limits and vibration levels will be within limits set out in international standards.

During general operation, there will be approximately 14 truck movements (seven trucks) per day and approximately 12 light vehicle movements (six cars) per day. Given the low volume of operational traffic, no issues are anticipated. Traffic volumes will be higher during scheduled maintenance (an annual event) and a specific traffic management plan for this activity will be developed. Among other things, this plan will address the potential for conflict with Moa Point WWTP/SMF traffic and airport traffic.

The landscape of the site has been almost completely modified, formerly through quarrying and latterly, through the construction of industrial and airport buildings. For these reasons, natural character values have been largely extinguished. The SMF is not considered to be in the coastal environment for the purposes of the NZ Coastal Policy Statement.

Landscape effects have been assessed to be moderate-low adverse.

Visual effects have been considered from a range of locations that will have views of the development. Visual effects have been assessed with and without the hillock. With the hillock removed, adverse visual effects from Stewart Duff Drive, the airport terminal and the golf course have been assessed at 'moderate-high'. Visual effects from other locations such as Strathmore Park and Moa Point Road are lower.

The site offers very limited opportunity for landscape planting mitigation due lack of space on site and due to its proximity to the airport. The landscape and visual impact of the proposal will be reduced through using recessive colours and low reflectivity materials externally.

Statutory assessment

An assessment of the proposal against the relevant national, regional and local planning documents and Part 2 of the RMA has been undertaken. The assessment concludes that the proposal is consistent with the objectives and policies within the NZ Coastal Policy Statement, the National Policy Statement on Urban Development, the Wellington Regional Policy Statement, the Wellington City District Plan, the Wellington City Proposed District Plan and Part 2 of the RMA.

Overall, it is concluded that the NOR can be confirmed as being reasonably necessary to give effect to the defined project objectives.

1 Introduction

1.1 Overview

This assessment of environmental effects (AEE) report has been prepared in support of a notice of requirement (NOR)[1] given by Wellington City Council (WCC) under section 181 of the Resource Management Act 1991 (RMA) to alter Designation 58 (Moa Point Drainage and Sewage Treatment) in the Wellington City District Plan (WCDP) to provide for the construction, operation and maintenance of the proposed Sludge Minimisation Facility (SMF) at Moa Point, Wellington.

The altered designation will provide for:

- a new Sludge Minimisation Facility with all associated structures and pipework;
- associated connections to the existing Moa Point Wastewater Treatment Plant (WWTP) for purposes of water and wastewater transfer;
- associated enabling works, including earthworks and slope stabilisation;
- formation of new vehicular accesses/egresses to/from Stewart Duff Drive;
- construction activities including site offices and material laydown areas; and
- associated connections to the local water supply, local stormwater and sewer networks.

1.2 Requiring authority

WCC is a territorial authority, and also a requiring authority pursuant to section 166 of the RMA. WCC has financial responsibility for all water related infrastructure assets and asset development programmes within Wellington City.

'Our 10-Year Plan' is WCC's Long-term Plan for 2021-2031. This plan seeks to meet the challenges of today whilst preparing for challenges of the future, including minimising waste, building a more resilient three-waters network and mitigating climate change.

WCC's long-term strategic vision is *"Wellington 2040 – an inclusive, sustainable and creative capital for people to live, work and play".* This vision is supported by four community outcomes that are at the centre of the long-term plan:

- Environmental – A sustainable, climate friendly eco capital
- Social – A people friendly, compact, safe and accessible capital city
- Cultural – An innovative, inclusive and creative city
- Economic - A dynamic and sustainable economy.

Whilst the above outcomes present the long-term outlook for the city, the Long-term Plan seeks to focus on the following six priority objectives over the next three years:

1. a functioning and reliable three waters infrastructure;
2. Wellington has affordable, resilient and safe housing;
3. the city's core transport infrastructure is a safe, resilient, reliable network;
4. the city has resilient and fit-for-purpose community, creative and cultural spaces;
5. an accelerating zero-carbon and waste-free transition; and
6. strong partnerships with mana whenua.

[1] See attached Form 20 contained in **Appendix A**.

A current area of focus for WCC is on waste minimisation initiatives through the Council's commitment to reducing carbon emissions and reducing waste by a third by 2026, set out through *Te Atakura* (WCC's Zero Carbon Plan) and the *Regional Waste Minimisation and Management Plan.* The minimisation of wastewater sludge, which is the core aim of the SMF, has been identified as one of the main enabling steps in achieving these objectives.

1.3 Purpose and structure of this report

This AEE report has been prepared in accordance with sections 168A and 181 and Schedule 4 of the RMA. It sets out a description of the proposed activities, an assessment of the effects on the environment, and the proposed measures to avoid, remedy or mitigate any potential effects. It also sets out the consultation undertaken and assesses the proposal against the relevant statutory documents.

This report and its supporting documentation are structured as set out in Table 1.1 and Table 1.2.

Table 1.1: Structure of this report

Chapters	Name	Contents
1 - 2	Introduction and background to the proposal	An introduction to the proposal, including the strategic context, need for the proposal, design considerations and objectives for the proposal.
3	Description of the environment	A description of the existing environment and future baseline environment.
4	Description of the proposal	A description of the operational and functional requirement of the Project process and operational design, indicative building design and layout and indicative construction methodology.
5	Statutory matters	Details of the statutory matters relevant to the development and consideration of the Project.
6	Consideration of alternatives	An assessment of the alternatives considered in the development of the Project.
7	Consultation and engagement	Identification of the persons affected by the Project and details of the methods and outcomes of consultation undertaken for the Project.
8	Assessment of environmental effects	An assessment of the effects on the environment of the Project.
9	Statutory assessment	An assessment of the Project against all relevant statutory considerations, including Part 2 of the RMA.

Table 1.2: List of appendices to this report

Appendices	Name
A	RMA forms
B	Records of Title
C	Drawings and Plans
D	Proposed Conditions
E	SMF Business Case
F	Air Quality Assessment
G	Landscape and Visual Assessment
H	Ecological Impact Assessment
I	Lizard and Threatened Plant Survey
J	Construction Noise & Vibration Assessment
K	Noise Effects Assessment

Appendices	Name
L	Transport Assessment
M	Draft Erosion & Sediment Control Plan
N	Hydraulic Modelling Report
O	Natural Hazards Risk Assessment
P	Coastal Hazards Risk Assessment
Q	Seismic Hazard Assessment
R	Detailed Site Investigation
S	Contaminated Soils Management Plan
T	Archaeology Assessment

1.4 Other matters

1.4.1 Early enabling works

Some early enabling works will be undertaken to prepare the site and existing wastewater assets in the vicinity for the main SMF works. These works are anticipated to occur between Q4 2022 and Q2 2023. The works will be:

- demolition of existing structures on the site being the (Aviation Ground Services (AGS) building and Inlet Pump Station (IPS) building);
- slope stabilisation works (south-eastern area of the site only); and
- realignment of existing underground pipework running through the site.

These works can be undertaken under the existing Designation 58 or as permitted activities in accordance with the 'General utilities' standards within the district plan. WCC has indicated it will waive the requirement for an outline plan to be submitted for these early enabling works.

1.4.2 Outline plan for SMF works

Whilst the design of the proposed SMF is well developed in terms of both building design and treatment technology/mechanical design, further refinement will occur as part of detailed design and early contractor involvement. This AEE has therefore assessed the proposal on the basis of an indicative site layout, floor plans and building elevations. To ensure that the environmental effects of the final built form and layout remain consistent with what has been assessed in this AEE and supporting technical assessments, a series of design limits/parameters and minimum performance standards will be imposed by way of conditions.

The final details and designs for the work will therefore be submitted as part of an outline plan, under section 176A(3) of the RMA. WCC, as the 'requiring authority', will submit an outline plan to the territorial authority prior to the main SMF works commencing.

1.4.3 Removal of the hillock

The area proposed for the main construction laydown site for the SMF currently contains a landform known as 'the hillock' on the north-western side of the site. This land is owned by Wellington International Airport Limited (WIAL) and part of the area currently occupied by the hillock would also be used by WIAL for airport purposes.

A resource consent application is to be lodged with WCC and GWRC to remove the hillock, and this AEE for the SMF has largely been prepared on the basis that the hillock will have been removed by the time that the SMF construction commences (2023). However, where relevant, the AEE and relevant underlying assessments have also considered the effects of the SMF in the event that the hillock has not been removed.

1.4.4 Resource consents required under regional plans

Resource consent applications have been concurrently lodged with Greater Wellington Regional Council (GWRC) for all necessary regional consents required for the proposed works under the Proposed Natural Resources Plan (PNRP). The consents sought relate to earthworks, discharge of stormwater to the stormwater network during enabling works and during operations and the discharge of odour/contaminants to air during the SMF commissioning period and during operations.

1.4.5 Permits under the Wildlife Act 1953

Part of the site has been found to contain lizards (locally abundant and classified as “not threatened”). As part of the ecological mitigation, lizards will need to be relocated. This will require a wildlife permit from the Department of Conservation under the Wildlife Act 1953. This permit will be sought concurrently to the NOR and resource consent application being determined.

2 Background to the proposal

2.1 Introduction

The proposal is for the construction, operation and maintenance of a new SMF on land adjacent to the existing Moa Point Wastewater Treatment Plant (WWTP).

The SMF is required to treat, stabilise and reduce the volume of sewage sludge arising from Wellington City's existing wastewater treatment processes which is currently discharged to landfill in a relatively untreated form. The long-term intention is to make beneficial re-use of the resultant biosolids (treated sludge) product to avoid the need to discharge sludge to landfill.

This chapter sets out:

- the existing situation with regard to the treatment and disposal of Wellington City's sludge;
- why the SMF is needed;
- a summary of the factors that have influenced the design and capacity of the SMF; and
- WCC's objectives, as a requiring authority, for the SMF.

2.2 Existing situation

The Wellington region's wastewater network conveys wastewater from homes and businesses to be treated at one of four wastewater treatment plants (WWTP). The vast majority of wastewater from Wellington City is currently treated at Moa Point WWTP and Western WWTP (Karori).

At each of these WWTPs, sewage waste is subject to a range of treatments with three outputs. Non-organic materials (such as toilet paper, grit and other larger items) are removed through screens, then washed and compressed and sent to Southern Landfill. The wastewater that passes through the screens is then held in primary sediment tanks to settle out organic and inert material that can readily settle. Bioreactors then treat the wastewater utilising microorganisms to break down contaminants in the wastewater which have not already been removed. The wastewater is then transferred to a clarifier which separates the microorganisms from the liquid. The resulting treated liquid wastewater (known as effluent) is disinfected using ultra-violet (UV) light and then discharged into the sea. The residual by-product of these treatment plants is sludge, which is made up of the settleable material from the primary sedimentation tanks and the microorganisms from the bioreactors / clarifiers.

The sludge from Moa Point WWTP is currently transferred via pipelines to Carey's Gully at Ōwhiro Bay for processing (dewatering) and then disposed of at the adjacent Southern Landfill. The Western WWTP already dewaters sludge as part of the treatment process at this facility, which is then directly disposed of at Southern Landfill via vehicle.

The existing dewatering process at Carey's Gully and Western WWTP is designed to remove some water from the sludge by way of centrifuge. The product from this process is a wet soil-like material that enables the sludge to be mixed with solid waste at the Southern Landfill. The mixing of sludge with solid waste is a requirement of the extant GWRC resource consent for the Southern Landfill (No. WGN070230 [26013]), requiring every tonne of sludge to be mixed with four tonnes of rubbish. This ratio is a necessary landfill operational requirement to manage landfill structural stability and odour (due to the relatively untreated nature of the sludge) but constrains WCC's ability to reduce the amount of solid waste going to the landfill over time.

Given the current processing methods of the sludge, and the significant volume of it, the only place it can currently be disposed is at the landfill.

2.3 Need for the SMF

The need for a transformative change in sludge management for Wellington City is driven by the following key challenges:

- At present, there is only one method for sludge management and disposal in Wellington City which exposes the entire wastewater network in the event of a prolonged failure.
- Existing sludge management infrastructure has a low level of resilience which has been exposed through a 2020 critical infrastructure failure.
- Due to the operational constraints that the current nature and volume of sludge places on the Southern Landfill, WCC's solid waste and carbon emission reduction commitments at the Southern Landfill cannot meaningfully occur until the volume of sludge is reduced and alternative sludge disposal pathways identified.

Each of these key drivers are considered in further detail below.

2.3.1 A singular sludge disposal pathway

The existing Carey's Gully Sludge Dewatering Plant is designed to remove freely available water from the raw sludge that is transferred from Moa Point WWTP. As previously highlighted at Section 2.2, the Western WWTP already dewaters sludge as part of the treatment process at this facility. This dewatering process produces a sludge product which is "soil like" in nature. Because the sludge does not undergo any further treatment, the sludge contains high levels of biodegradable solids (particles) which break down in the landfill. By national and global standards for larger wastewater treatment systems, this is a relatively low level of treatment.

The disposal of sludge in New Zealand is currently guided by the *NZWWA/MfE Guidelines for the Safe Application of Biosolids to Land in New Zealand*, 2003. These guidelines grade biosolids against two factors, the level of stabilisation (biological degradation potential) achieved (Grade A or B) and the level of chemical contaminants (Grade a or b). The stabilisation and contaminant grades are combined to give four possible grades of biosolids, Aa, Ab, Ba and Bb. Grade Aa products can be discharged to land as a permitted activity with no requirement for a resource consent. All other biosolids grades require a resource consent to be discharged to land. The SMF will produce a product that achieves Grade A in terms of stability. Achieving Grade a is dictated by the contaminants that are discharged into the wastewater system (as opposed to something that can be treated within the SMF itself) and is therefore outside of the scope of this project.

In terms of stability, the current sludge produced from the Carey's Gully Sludge Dewatering Plant is Grade B because it is un-stabilised. Generally, this grade of sludge is limited to being disposed of at landfills. Its un-stabilised nature means that it is difficult to transport long distances and it would not be feasible to transport this sludge to other landfills within the region as a long-term measure, because of the likely environmental effects (odour) and risk from spillage during transportation.

On this basis, ultimate sludge disposal is currently limited to a single option – disposal at Southern Landfill. In addition to those impacts discussed above, the current disposal pathway:

- exposes WCC to cost increases for sludge disposal that are beyond Council's control (such as increases in levies on waste disposal); and
- removes flexibility for WCC to respond to regulatory changes associated with sludge and solid waste disposal, because there is no alternative.

2.3.2 Operational and seismic resilience

The current way in which sewage sludge is managed presents several risks in terms of both operational and seismic resilience. These include:

- A pair of 9km sludge transfer pipelines currently transfer sludge between Moa Point WWTP and the Carey's Gully Sludge Dewatering Plant. These pipelines commenced operation in 1998 and there have been two significant failures in the last ten years (2013 and 2020). The most recent failure affected both pipes and meant that over one million litres of sludge a day was transported using trucks on a 24-hour rotation to collect the liquid sludge from Moa Point WWTP and take it to the sludge dewatering facility at Carey's Gully. The pipelines also traverse multiple known seismic fault lines and includes almost 2km of pipework within a sewer tunnel beneath Mount Albert.
- The existing Carey's Gully dewatering facility was constructed in the late 1990s and the mechanical equipment used at this facility is expected to reach its nominal end of life within the next five years. While routine maintenance and careful use may extend this life expectancy, it would be prudent not to rely heavily on this facility to service Wellington City in the medium to long term.
- The Carey's Gully dewatering facility is located in an old gully on the top of a former, uncontrolled landfill site, which presents a significant geotechnical risk in the event of a major seismic event. If a significant and prolonged failure were to occur at the Sludge Dewatering Facility, this would cause a ripple effect through the wider sludge management system until alternative arrangements could be made for treatment and/or disposal.

2.3.3 Waste minimisation and carbon reduction

Wellington City Council is committed to reducing carbon emissions and to greatly reducing the amount of waste sent to landfill, with a specific commitment to delivering a viable sewage sludge minimisation solution by 2026. These commitments are detailed in the following WCC documents:

- **Wellington Region Waste Management and Minimisation Plan (WMMP) 2017 – 2023 (2017) commits to greatly reducing waste to landfill.** The key target in this plan is to reduce solid waste sent to Class 1 landfills from 600kg per person per annum to 400kg per person by 2026. The current sludge management practice currently inhibits solid waste minimisation efforts due to the need for four times as much solid waste as sludge to meet the mixing ratio consent condition. As sludge volumes continue to grow as the City's population grows, so too must the volume of solid waste. Therefore, any aspiration to actively reduce solid waste inflows to the landfill, or to manage waste inflows differently, must first remove sludge in its current form from the equation. The WMMP therefore expressly identifies a reduction of sludge being sent to landfill as a necessary measure in achieving the overarching target. A specific secondary target aims to reduce sludge to landfills by 64kg, per person, per annum to 4kg. The SMF will contribute to achieving this reduction.
- **Te Atakura - First to Zero, Wellington's Blueprint for a Zero Carbon Capital (June 2019) – This Strategy commits Wellington City to be a net zero carbon capital by 2050.** Approximately 80% of Wellington City Council's carbon emissions are attributed to the Southern Landfill. Therefore, reaching zero carbon requires a fundamental change in solid waste management including sludge management. This strategy references sewage sludge as an existing project within this plan, by committing to exploring solutions and funding options for a sewage sludge processing solution at the Southern Landfill in the long term plan. In exploring solutions, the plan commits to looking at the potential for digesters or co-processing of other waste streams other than sludge to see if further maximised benefit can be achieved.
- **Te Atakura – First to Zero Implementation Plan (August 2020) – This Strategy commits WCC to reducing landfill waste by 33% by 2026.** The Plan acknowledges that the ability to meet this commitment is heavily reliant on a viable sewage sludge solution being adopted given the necessary landfill ratio of sludge to general waste. In accordance with the First to Zero Blueprint, the Implementation Plan identifies a specific action to fund a sewage sludge processing solution for the city.
- **Wellington City Council's Long-term Plan 2021-2031 (June 2021) – One of the key projects within the 10-year plan is to deliver a new sewage sludge plant in years 2 to 5 (by 2026).** The delivery of a new sludge minimisation facility is specifically identified in order for the Council to meet waste minimisation and carbon reduction commitments. It is anticipated that the project will require investment

of between $147 million to $208 million, funded through the Infrastructure Funding and Financing legislation.

As highlighted in the WMMP, the above commitments are inhibited by current requirements for the disposal of sludge to landfill. In this regard, the existing regional consent for the discharge of sludge at the landfill (ref. WGN070230) places limits on the amount of sludge that can be disposed of in the landfill, as a weight for weight ratio of four-parts general/municipal waste to one-part sludge. Ongoing waste minimisation efforts are reducing general/municipal waste volumes to landfill, so the amount of sludge that requires disposal is likely to be greater than is permitted by this ratio within the near future. Furthermore, ongoing sludge disposal at the current volumes experienced will prevent WCC from undertaking any further (general) waste minimisation initiatives (as that would make compliance with the mixing ratio more difficult). The requirement to adhere to a fixed ratio will be further exacerbated by population growth which will result in greater volumes of sludge, further inhibiting solid waste minimisation commitments.

2.3.4 Increasing the operational life of a class 4 landfill

Given sludge's hazardous properties it may only be disposed of in class 4 landfills. There are only three class 4 landfills in the Wellington region (Southern, Spicer (Porirua) and Silverstream (Hutt / Upper Hutt). Reducing the demand placed by sludge disposal on class 4 landfills will increase the capacity and ability of these landfills to receive other waste and extend their operational life.

2.3.5 Southern Landfill consents

The Southern Landfill operates under existing resource consents which are due to expire in 2026. The LTP notes that "*given the Southern Landfill consenting conditions are substantially about the management of water, there is a likelihood that conditions will be substantially more rigorous*".[2] The continued disposal of sludge to the Southern Landfill is therefore dependent on WCC obtaining consent for the ongoing operation of the landfill.

Notwithstanding the above, the existing resource consent (ref. WGN070230) imposes a specific commitment on WCC to investigate long term options for sludge re-use within 10.5 years of the permit being commenced (by May 2022). This commitment is imposed at Condition 10 and requires WCC to consider technological advances in relation to wastewater and sludge management, treatment and disposal, with the aim of minimising the volume of waste being disposed to landfill. WCC is in the process of preparing a standalone report to directly respond to this commitment.

2.3.6 Consistency with good practice

The disposal of untreated sludge to landfill from large municipalities is becoming less common and is now inconsistent with good practice. In New Zealand, larger municipalities have or are identifying ways to beneficially reuse sludge. For example:

- Sludge from Christchurch's main wastewater treatment plant is dried and used for mine rehabilitation.
- Sludge at Hamilton's wastewater treatment plant is pre-treated (digested) and used for the production of vermicast in worm farms.
- Sludge from Auckland's largest wastewater treatment plant, Mangere, is digested and used as fill to rehabilitate a former volcanic island.
- Wastewater sludge from the New Plymouth wastewater treatment plant is dried and sold as a commercial fertiliser product.

[2] Page 8 (Volume 2), Wellington City Council Long Term Plan 2021 – 2031

2.3.7 Summary

In order to address the above challenges and take opportunities to improve environmental outcomes, Wellington City requires a fundamental change in the management of the sludge across the city's wastewater treatment network. Given the practicalities of the current approach to sludge disposal, and the community's expectations and councils' policy settings, it is considered that the current approach is not sustainable in the long-term. The change needs to enable the management of the sludge to be 'de-coupled' from the existing disposal to the Southern Landfill and enable WCC to pursue other options for disposing of, or otherwise using the sludge, and substantially improve the resilience of its sludge management.

In order to achieve a more resilient system for the management of sludge, WCC wishes to establish a new SMF to reduce the total volume of sludge and stabilise it, enabling handling/transportation to alternative disposal sites and/or for beneficial re-use of the sludge and/or other by-products (such as biogas) in the future. This project presents an opportunity to significantly improve the operational resilience of sludge management by considering the processes, location and materials used for the infrastructure.

2.4 Environmental considerations

In the development of the SMF design and construction, the following considerations have been taken into account to reduce potentially adverse environmental effects as far as practicable:

- Reducing the visual impact of SMF infrastructure
- Minimising odour effects on surrounding land uses
- Minimising dust impacts on surrounding land uses
- Minimising noise effects on surrounding land uses
- Ensuring the proposal does not increase flood risk to surrounding land uses
- Ensuring the development does not significantly increase the natural hazard risks posed to the site or Wellington's wastewater network
- Seeking to minimise traffic impacts on the wider road network.

2.5 Determining SMF capacity

This section provides an overview of the factors considered in determining the capacity of the SMF. These factors include the expected life of the plant (the design horizon). Chapter 6 of this AEE provides a discussion of the option evaluation process undertaken to develop the preferred solution.

The design horizon of the plant and equipment to be used in the SMF was determined to be 50 years. In order to determine a sizing for plant and equipment (which determines capacity) within the new SMF, assessments of the sludge production capacity of the Moa Point and Karori WWTP's was undertaken.

Moa Point WWTP currently serves a population of approximately 175,000 (as at 2020). Moa Point WWTP has been designed, following a capacity upgrade at some stage, to ultimately serve a future population of approximately 240,000. This would indicate that Moa Point WWTP can accommodate an additional 65,000 people. Based on available population projections from WCC, this capacity would be reached in the Moa Point WWTP catchment in the next 30 to 50 years.

Karori WWTP will contribute a relatively minor amount (approximately 5%) of total sludge to the new SMF. Karori WWTP does not generally have the same ultimate capacity constraints as Moa Point WWTP but the catchment which it serves will be constrained by capacity to accommodate more people. To project the increase in sludge contribution from Karori to SMF, WCC population projections for the 50-year design horizon were used. For conservativism, a 75th percentile population projection was used which indicates that the catchment population will increase by 10,000 to 15,000 people over the next 30 to 50 years.

Therefore, in total, the SMF is designed to accommodate an additional population of 75,000 to 80,000 people over the next 30 to 50 years.

A 50-year design life would equate to approximately two to three lifecycles of main process/mechanical plant and provides the flexibility to reassess capacity at the end of the first plant lifecycle. It will also allow for incorporation of technological changes that are likely to enable the capacity of the SMF to be increased within the same footprint. This would allow an even greater population to be served by the SMF.

Sizing of the plant takes into account the operating regime, including factors such as downtime for maintenance, whether the plant runs continuously or intermittently, and plant attendance requirements.

2.6 Requiring authority's objectives

For the purposes of section 168A(3)(c) of the RMA, WCC's specific RMA project objectives for the SMF are to:

1. Significantly reduce the operational impact of sludge management at Southern Landfill.
2. Provide a sustainable and resilient long-term solution for sludge management from Wellington's WWTPs, that:
    - a Has appropriate capacity to provide for projected population growth, and aligns to associated infrastructure planning; and
    - b Can be integrated into the wastewater network in a cost-effective manner.
3. Reduce the environmental impact of sludge disposal, particularly in terms of:
    - a. Carbon emissions; and
    - b. Odour at the disposal site.

These project objectives have been formulated in response to the problem which has led to the development of the proposal for a new SMF.

3 Description of the environment

3.1 Introduction

This chapter provides an overview of the SMF site and surrounding area (as currently exists and as likely to change in the future).

More detailed descriptions of the environment for specific topics (eg ecology, air quality etc.) are provided in Chapter 6 and the relevant technical reports.

3.2 SMF site

3.2.1 Overview

Figure 3.1 shows the location of the proposed SMF. The highly constrained site is located south-east of Wellington city centre and is situated between Wellington International Airport, Miramar Links Golf Course and the existing Moa Point WWTP.

Figure 3.1 : Location of the SMF site (shown in red)

The SMF site has been highly modified and comprises an area of mostly flat land adjoining Stewart Duff Drive, enclosed by a former quarry headwall on the northern, eastern and southern boundaries. The flat area of land is largely previously developed, comprising an existing inlet pump station (IPS) and associated infrastructure, together with an Aviation Ground Services (AGS) building used for repair/maintenance of airport service vehicles. The wider flat area of land is predominantly surfaced in hard standing and provides for staff parking and machinery / equipment storage associated with the range of on-site uses. A small, grassed area is located behind the pump station and the embankments are partially vegetated. The site is outlined in red at Figure 3.2.

Immediately adjoining the site to the south is a building housing a pharmaceuticals manufacturer and laboratory (trading as Cyclotek).

The northern boundary of the site abuts an access road to the Moa Point WWTP. The access road is sealed, with a narrow footway on the northern side. It is understood that the access road was carved into a former ridgeline and hence has rock underlain vegetated embankments on either side. Established tree planting is also present either side of the access road on the eastern stretch of the road.

To the west, the site is abutted by Stewart Duff Drive, a private road owned and controlled by WIAL. Stewart Duff Drive is accessible to public traffic and provides access to the airport (including long-stay parking), a DHL logistics facility, Miramar Golf Course and the aforementioned Cyclotek laboratory.

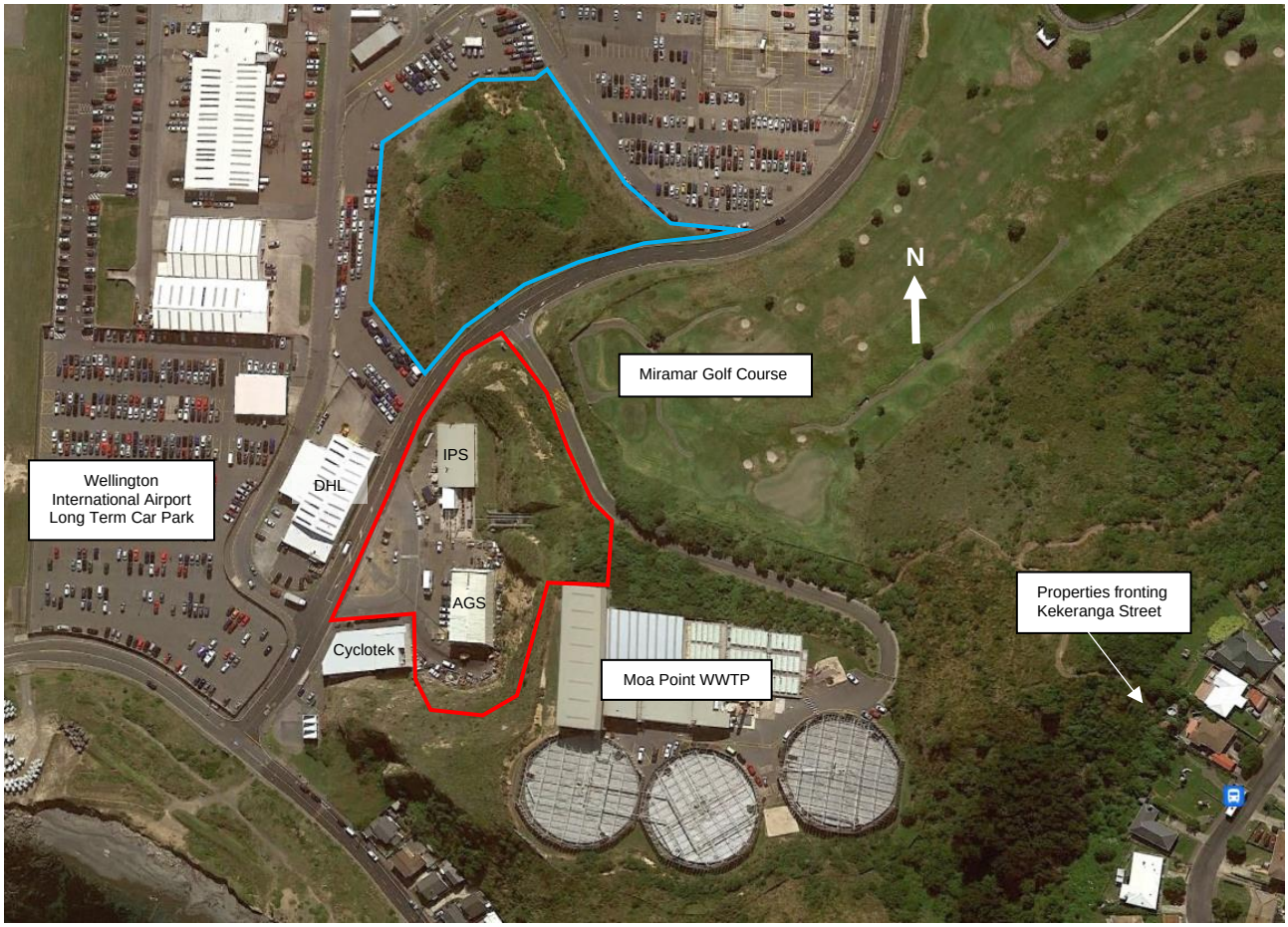

Figure 3.2: SMF site (shown in red) and construction yard (shown in blue)

The site ground level is underlain by rock of the Rakaia Terrane (Wellington Greywacke) at very shallow depth. Ground water measurements have been inconsistent with depths of 1-2.5m below ground level recorded during borehole drilling and no groundwater detected in piezometer screen depths of 3.5m below ground level.

Figure 3.2 also identifies a proposed off-site construction yard to facilitate the construction of the SMF.

3.2.2 History of the site and surrounding area

Historical aerial photography and WCC records indicate that the site was within the perimeter of a landfill in the 1940s and was subsequently quarried between the 1950s and 1970s as part of the reclaimed land required for the WIAL runway extension. The west facing slope of the project area is the former quarry headwall. The existing on-site commercial/industrial buildings which are to be demolished as part of the proposal include the aforementioned inlet pump station (IPS) and aviation ground services (AGS). The AGS workshop was originally constructed as a milliscreen facility in the 1980s and comprised an early form of wastewater treatment on the site. The construction of the AGS building resulted in the steepening of the lower 10m of this slope.

3.2.3 Legal description of the site

The legal description of the majority of the land within the existing designation is Lot 2 Deposited Plan 381401 and owned by WCC. A small proportion of the existing designation forms part of a wider WIAL owned land parcel with a legal description of Part Lot 1 DP 78304 and part Section 1 Survey Office Plan 37422 and Section 2-3 Survey Office Plan 37422 and Section 3 Survey Office Plan 38205 and Section 1, 5 Survey Office Plan 342914. The associated records of title are contained in **Appendix B.**

The extent of land currently owned by each party within the boundary of the designation is identified in Figure 3.3.

Figure 3.3 identifies a small area on the north-eastern boundary in green which forms part of a separate land parcel, also owned by WIAL. However, as described in more detail in Chapter 5 of this AEE, this area of land is to be removed from the existing designation post-construction.

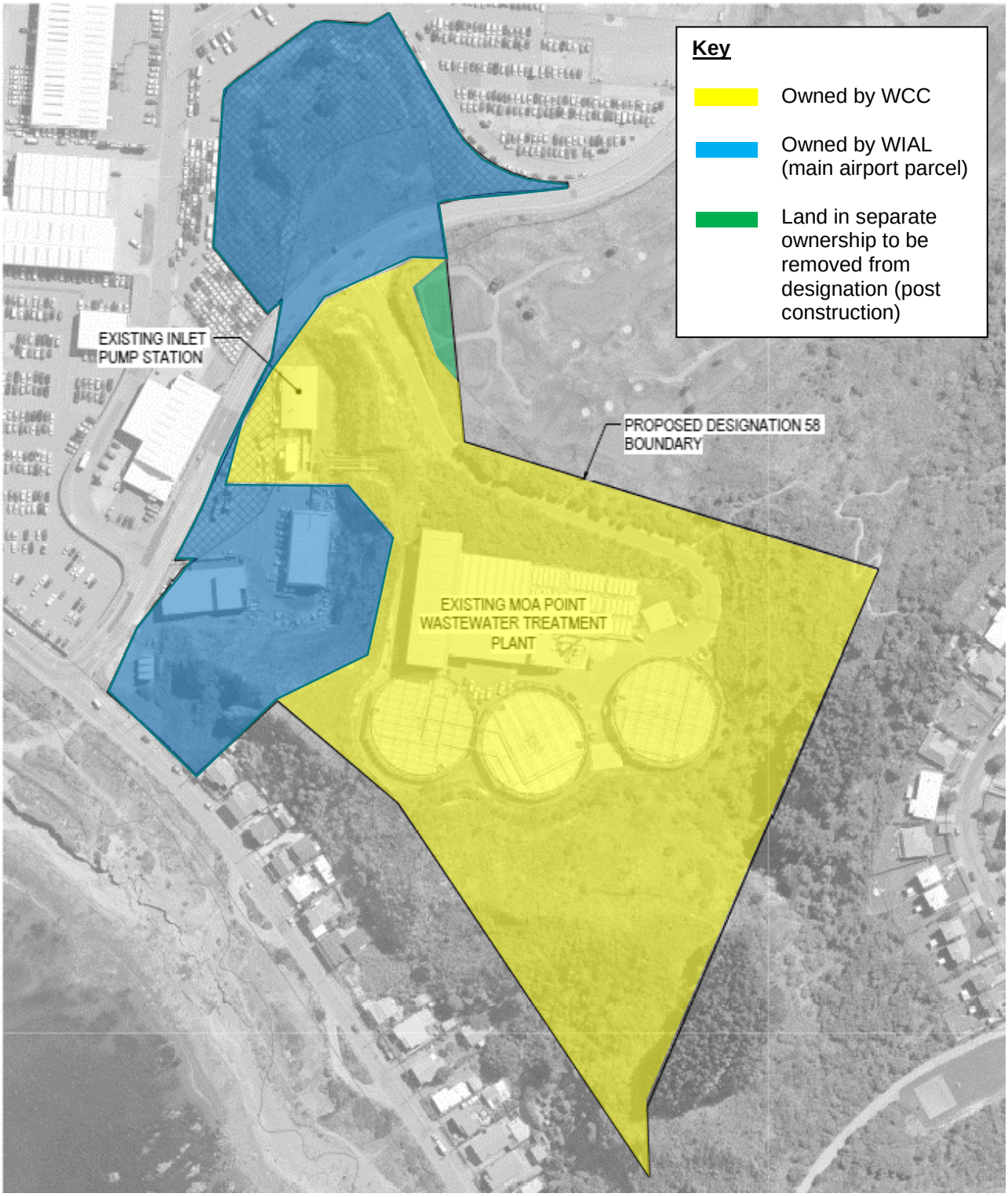

Figure 3.3: Land ownership within proposed designation boundaries

3.3 Future environment (2023 and beyond)

When the main construction stage of the proposed SMF begins (currently anticipated to be early to mid-2023), the surrounding environment is expected to be different to how it currently appears (as of August 2022). Further changes to the surrounding environment are also anticipated by the time that the SMF construction is completed (currently anticipated to be end of 2026). These include the following activities in the Airport Precinct:

- the levelling of the hillock to the north-west of the application site; and
- the erection of a new logistics hub to the west of the application site.

As such, the future baseline scenarios below consider these planned works by WIAL in the short-medium term.

3.3.1 Changes to future environment upon anticipated commencement of SMF construction (2023)

A resource consent application for the levelling of the hillock is to be lodged in due course. It is anticipated that by the commencement of the main SMF construction stage, the hillock will comprise flat bare ground. In some circumstances, the AEE and relevant technical assessments have also considered the effects of the SMF in the event that the hillock has not been removed, in the event that this does not occur (ie the Landscape and Visual Assessment).

3.3.2 Changes to future environment upon anticipated completion of SMF construction (2026)

It is understood through consultation with WIAL that the proposed logistics hub, which is to be located on the opposite side of Stewart Duff Drive to the application site, can be erected as a permitted activity, save for the requirement to obtain consent under the NESCS. This AEE and supporting technical assessments therefore assumes that the logistics hub will be completed and in operation prior to the completion of the SMF construction. The construction of the logistics hub is therefore anticipated to overlap, at least in part, with the construction of the SMF.

3.4 Constraints imposed by airport operations

The SMF site is subject to constraints imposed to ensure the safety of airport operations. These are:

- The airport's Obstacle Limitation Surface (OLS) which is imposed by the Civil Aviation Authority (CAA) and is a defined airspace around the airport which is protected to maintain safety of airport operations. The OLS places limitations on the height of structures within various proximities to the WIAL runway, as well as the height of construction equipment.
- In order to ensure that appropriate visibility is maintained for pilots within the airspace, the OLS also places constraints on the velocity of any discharges to air. This constraint is relevant for the purposes of considering methods by which to discharge combustion exhaust gases and odour to air.
- It has not been possible to incorporate any new tree planting within the site, as a method of softening the visual effects of the proposal, due to the potential to attract wildlife and therefore increasing the potential for bird strike within the vicinity of the airport.
- As per tree planting above, in order to avoid attraction of wildlife and potential bird strike, sediment laden discharges from the site during construction cannot be treated through a sediment control mechanism which involves an open pond or area of standing water. An alternative solution is therefore proposed for the purposes of sediment control, as discussed in detail at Section 8.11 of this AEE.

3.5 Natural hazard risks

A number of studies have been undertaken to assess the vulnerability of the site to natural hazards. A summary of each potential natural hazard risk is detailed below.

3.5.1 Coastal hazards

The coastline of Lyall Bay is presently 135m south of the site and accordingly and has the potential to be exposed to coastal erosion, inundation and tsunami over time. The nearest area of coastline comprises a steep gravel beach below an actively eroding scarp comprising gravel material associated with the original airport reclamation in the 1950s and subsequently extended in 1974.

A Coastal Hazards Risk Assessment (**Appendix P**) considers the susceptibility of the site to each coastal hazard, with a summary of each provided below.

Coastal erosion

While coastal erosion hazard will result in significant retreat from the existing shoreline position, the Assessment confirms that the extent of this coastal retreat, assessed on the basis of existing retreat rates and the incremental effects of sea level rise, is not predicted to affect the proposed SMF site within the next 100 years. There is however significant existing related infrastructure that lies within the predicted extent of coastal erosion, and it is expected that intervention to prevent or limit shoreline retreat, or to provide protection to these exposed infrastructure assets will be required.

Coastal inundation

Recent work undertaken by NIWA provides a detailed assessment of the extent of coastal inundation around the Moa Point foreshore and the southern end of the Wellington Airport facilities within a 100-year timeframe. This work incorporates recent vertical land movement projections, together with sea level rise predictions and wave and storm tide information, and predicts inundation extents based on detailed shoreline topography and high resolution runup modelling.

The Coastal Assessment results show the proposed SMF plant site remains inland of the encroachment of projected coastal inundation for the 100-year case presented and is thus unlikely to be exposed within its 50-year design life provided the actual sea level rise (SLR) and Vertical Land Movement (VLM) do not exceed present projections.

Tsunami risk

The Coastal Assessment states GNS Science (Ref GNS, 2021) has recently prepared probabilistic tsunami inundation hazards maps for Wellington City Council (WCC) to inform WCC's Urban Growth Plan review. GNS calculated the tsunami risk based on coastal zones offshore of the Wellington region, giving an unconservative assessment of tsunami risk for the Wellington Airport area (which includes the SMF site). The relevant hazard maps define three zones for tsunami inundation:

- The low coastal hazard zone was defined using probabilistic wave heights with a 1 in 1000-year return period (0.1% Annual Exceedance Probability).
- The medium coastal hazard zone was defined using probabilistic wave heights with a 1 in 500-year return period (0.2% Annual Exceedance Probability).
- The high coastal hazard zone can encompass areas subject to inundation from wave heights with a 1 in 100-year return period (1% Annual Exceedance Probability).

Areas outside of these zones are not considered to be susceptible to tsunami inundation.

The GNS hazard maps presently identify approximately 280m^2 of the SMF site (within the west-southwest corner) as being located within a low coastal hazard zone, ie at risk of a 1 in 1000 year (0.1% AEP) tsunami impact. The remainder of the site is not located within an identified tsunami inundation zone.

The probability of tsunami exposure at the site within the 50-year design horizon of the facility is considered to be very low (2-5% probability of tsunami inundation occurring over the next 50 years).

3.5.2 Geotechnical hazards

A Natural Hazards and Geotechnical Assessment (**Appendix O**) has been prepared to consider the geotechnical hazards affecting the site.

Seismic hazards

As no active faults are mapped through the site, the risk of direct fault rupture on site is assessed to be low.

A separate Site-Specific Seismic Hazard Analysis (**Appendix Q**) has been conducted in accordance with relevant standards to provide a more accurate understanding of the geotechnical engineering and structural design required for the SMF. All major plant and equipment will be seismically designed to withstand seismic loading without excessive displacement.

As a major infrastructure asset, the SMF will be designed and constructed in accordance with the seismic resilience requirements for such assets as set out in Wellington Water Standard for Water Services (V3)[3].

The Greater Wellington Regional Council (GWRC) hazards data indicates that there is no risk of liquefaction at the site. This is consistent with the soil profile that indicates in-situ rock being near to the surface.

Slope stability

The assessment shows that the rock cut slopes (slope stability) pose a moderate to high probability of affecting the proposed development without mitigation. Previous instabilities and potential for future instabilities have been identified on existing slopes. The stabilisation of existing rock cut slopes near the proposed SMF development is required. Rock slope stabilisation, primarily through the use of rock anchors and mesh, will reduce the risk affecting the proposed development to low. The detailed design of the proposed slope stabilisation will be determined during later design stages.

[3] Wellington Water, Regional Standard for Water Services, December 2021, Version 3.0

4 Description of the proposal

4.1 Introduction

This chapter sets out:

- the functional and operational requirements of the SMF;
- an overview of the sludge treatment process and operation of the SMF;
- indicative built form and layout of the SMF; and
- indicative construction methodology.

4.2 Functional and operational requirements

In order for the proposed SMF to meet the project objectives, the following key requirements must be met:

- Design life of 50 years.
- Appropriate capacity to provide for projected population growth.
- Reduce the volume of sludge disposed of at Southern Landfill from the Moa Point and Karori WWTPs by at least 80%.
- Produce a biosolids product from the SMF which achieves Grade A requirements for stabilisation and pathogen reduction to enable beneficial re-use of the product (subject to meeting contaminant levels which are outside of the scope of project)
- Minimise odour effects through an appropriate on-site control system by managing odours from the treatment process and discharging them through an appropriately located stack, as well as creating a low-odourous end product which can be disposed of at landfill (and ultimately be beneficially re-used).
- Ability to receive sludge from the Western (Karori) WWTP via truck.
- Seismic design criteria: The main buildings and primary treatment tanks are considered as Importance Level 3 structures (structures that are of high value to the community).

4.3 Treatment process and SMF operation

Following an extensive exercise considering a range of process options and site options, followed by a multi-criteria assessment with key stakeholders, and subsequent investigation on three final short-listed options, the preferred process option identified was Lysis-Digestion and Thermal Drying, to be located at a site at Moa Point.

This process uses mesophilic anaerobic digestion, which is a commonly used process globally for the stabilisation of sludge. The sludge is retained within tanks (digesters), typically for up to 20 days, where it is mixed and maintained at a temperature of 37°C, in which microbes break down the organic matter within the sludge in the absence of oxygen. The microbial process produces methane rich biogas which rises to the top of the digester where it is captured under the lid. The biogas is then extracted and can be used beneficially to produce heat and/or electricity, depending on quantity and quality.

The sludge from an anaerobic digester is said to be stabilised because organic material is largely broken down, meaning that it has less potential to breakdown and cause odour and the emission of greenhouse gases in the environment at its disposal site.

To further enhance the anaerobic digestion process, and reduce the footprint of the plant, the sludge can be subjected to thermal hydrolysis before the anaerobic digestion stage[4]. In this process, the sludge is placed in a pressure vessel and heated, causing the destruction of the cellular material in the sludge (cell lysis),

[4] Steps/sequencing of the sludge treatment process are summarised below.

providing much greater access to organic matter for the microbes in the digestion process. This leads to greater breakdown of organic matter during the digestion process (stabilising the sludge further) and significantly increases the amount of biogas (which enables more heat and/or electricity to be generated as a result).

The final stage of the sludge minimisation process, after anaerobic digestion, is to thermally dry the sludge. In this process, hot air is passed through the sludge on a conveyor belt which evaporates off water. This reduces the mass of the sludge further and provides further pathogen destruction in the sludge. The thermally dried sludge is then exported via truck for disposal.

The treatment process will produce 'stabilised biosolids', a low-odorous, stabilised product which will have the look and characteristics of dried granules. The overall volume of imported sludge will have been reduced by 82% after processing at the SMF. Carbon emissions from the disposal of the product at landfill, as a result of the treatment process, are expected to be reduced by 63%.

Figure 4.1 outlines the proposed treatment process.

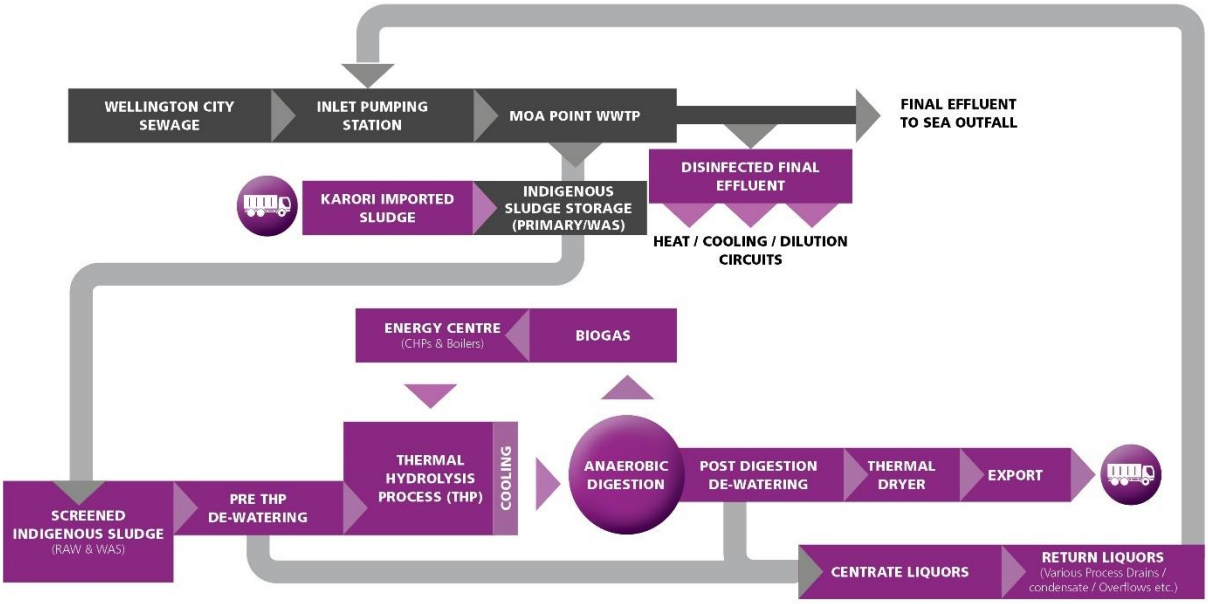

Figure 4.1: SMF sludge treatment process[5]

The operation of the new SMF will largely comprise of the following steps:

1. Sludge from Karori will be delivered to Moa Point WWTP by vehicle (approximately five trucks per day) and combined with the raw Moa Point sludge.
2. The sludge waste from the existing Moa Point WWTP and Karori WWTP will be subject to finer screening (strain press) at the WWTP[6], before being transferred by pipe to the adjacent SMF. The material collected from the strain press will be discharged into the existing screenings skips already located at Moa Point WWTP, which are disposed of at Southern Landfill. This will typically add less than one skip of waste material per week, of a similar nature to the existing screenings.
3. The screened sludge waste will then be subject to dewatering (by centrifuge) within the SMF.

[5] WAS – Waste Activated Sludge. CHP – Combined Heat and Power

[6] New treatment stage forming part of the SMF treatment process but to be located within existing WWTP buildings

4. As described earlier, the sludge treatment process then involves thermal hydrolysis, mesophilic anaerobic digestion, further dewatering (centrifuge) and then thermal drying, all of which is contained within the SMF site.
5. The processed solid sludge, which will be substantially reduced in volume, is then transported to Southern Landfill by vehicle (approximately two rigid bulk truck vehicles per day).
6. Any liquid effluent from the SMF will be discharged to the Inlet Pump Station, so that it is treated with other wastewater through the existing Moa Point WWTP.

The SMF is intended to run full-time (24 hours per day, seven days a week) and will be supported by a small number of staff for operations and maintenance.

4.4 SMF design and layout

The description of the proposed SMF in this chapter should be read in conjunction with the drawings contained in **Appendix C**, specifically:

- General arrangement plan **3258521-DA-000-K1201**
- Elevation plan **3258521-DA-000-K1202**
- Earthworks concept plans **3258521-DA-000-K1101 to 3258521-DA-000-K1107.**

While the design of the proposal has been significantly developed, refinements to the design will continue between now and construction. While only minor changes are envisaged, the final layout and built form will be confirmed through the outline plan process. This AEE and supporting technical assessments have considered the effects of the proposal based on a general arrangement plan, elevation plan and set of earthworks plans which identify the maximum anticipated bulk and height of all key structures and the maximum extent of earthworks. Accordingly, refinements to the building design and site layout would not change the conclusions set out in this AEE which have been based on an “envelope of effects”.

To ensure that the environmental effects of the final built form and layout remain consistent with what has been assessed in this AEE, a series of design limits will be imposed by way of conditions. The key limits with respect to built form and layout are maximum height limits for main structures as set in the SMF designation conditions.

4.4.1 Structures

The SMF will comprise the following structures:

- A three-storey Energy Centre building (Building 1, approximately 22.5m in height) which comprises the SMF’s main energy sources including Combined Heat and Power (CHP) engines, boilers, energy convertors and a back-up diesel generator and also incorporates the final, thermal drying element of the sludge minimisation process. This building will encompass and enclose the existing influent pump station (IPS) associated with the Moa Point WWTP.
- A three-storey Main Process building (Building 2, approximately 21.3m in height) which will comprise the key stages within the sludge minimisation process including dewatering (by way of centrifuge) and thermal hydrolysis equipment which will comprise a combination of silos, coolers, pumps and conveyors.
- An odour control stack (approximately 28.7m in height) and associated comprehensive odour treatment system.
- Two large cylindrical tanks, known as digesters, which will either feature hemispherical roofs to store biogas generated from the digestion process or will feature flat roofs, with a separate gas balloon

structure proposed to store biogas[7]. The digesters are anticipated to be 20.4m in height (above finished ground level) depending on the gas storage option selected.

- An Export Silo Building for the load out of the final minimised/stabilised sludge product. This may be incorporated into the envelope of the proposed Energy Centre building.
- Other ancillary buildings, tanks and silos.
- New pipework between the proposed SMF and the existing WWTP for the purposes of sludge, odour and disinfected water conveyance.

The Energy Centre building will involve the demolition of the current structure which houses the existing inlet pump station associated with the Moa Point WWTP. The proposal will incorporate the existing plant/equipment currently operating within this location both below and above ground.

4.4.2 Odour treatment system

The SMF will include a high-performance and comprehensive odour treatment system. All odour-emitting elements of the SMF will be enclosed within buildings allowing odours to be treated through an odour control unit. Buildings will be maintained at slightly negative pressure to assist. The SMF OCU will use a bio-trickling filter (BTF) followed by activated carbon (AC) scrubbing control technology. BTF/AC is a mature technology and widely used to control WWTP odours in New Zealand and internationally.

4.4.3 Works to existing WWTP

Works to be undertaken at the existing WWTP to integrate with the SMF are the introduction of a 'strain press'[8] and building alterations necessary for the import of sludge from Karori Western WWTP. The footprint of the existing WWTP building will not change. Further works to the existing WWTP involve the formation of piped connections between the existing Moa Point WWTP and SMF. These works are authorised by existing Designation 58.

4.4.4 Other onsite infrastructure / services relocations

In order to construct the SMF, it is envisaged that a number of existing below ground three waters, power and telecommunications services will need to be realigned to ensure that such services can be accessed and maintained at all times. New services will also be required to provide connections between the SMF and the existing WWTP, as well as between the proposed on-site buildings.

These utilities works are authorised by existing Designation 58.

The installation of all new proposed pipework to provide necessary connections between the SMF and existing WWTP will seek to utilise the existing exposed pipework corridor on the cut face of the existing slope.

The project will also require the realignment and upgrade of existing services along Stewart Duff Drive. Such works can be undertaken as a permitted activity, in compliance with relevant standards, under district-wide utilities rule 23.1.1 of the WCDP.

4.4.5 Landscaping

Parts of the slope where rock scaling has occurred will be actively stabilised where required, including vegetated wire 'mattresses' being pinned to the slope (approximately 2,300m^2). These mattresses will be seeded to allow vegetation to re-establish naturally.

[7] A separate gas balloon is currently shown on indicative site layout.

[8] As referenced at section 4.3 of this AEE.

Less steep, unscaled areas of the headwall will be left in their current, partially vegetated, state.

4.5 Scheme co-benefits

Alongside the primary purpose of the SMF, the scheme provides an opportunity to deliver a range of other benefits. These are:

- Mitigating existing odour effects which are understood to be associated with the maintenance of the wet wells within the existing influent pump station, which are not wholly contained within a building. In order to address this, the proposed scheme will incorporate and enclose the existing wet wells within a new building. This will enable any odour arising from the maintenance of the wet wells to be contained and then extracted and treated through the odour control system for the wider SMF.
- Creating a grade A biosolids product which has greater potential for beneficial reuse than the existing untreated sludge product.
- The operation of the plant seeks to make beneficial re-use of methane gas (produced through the digestion process), by providing a fuel source to generate heat for the sludge treatment process, and for fuel to the CHP engines to produce more heat and electricity (co-generation).
- The plant will also seek to re-use liquid effluent from the existing WWTP (which will be subject to additional filtering/UV treatment within the SMF) for cooling of the sludge during the treatment process.

4.6 Indicative construction methodology

An indicative construction methodology has been prepared to enable the subject AEE and accompanying technical assessments to consider the potential environmental effects of the construction phase of the SMF. This methodology is indicative only and would be refined at a later date as part of early contractor involvement (ECI) on the project and confirmed as part of the outline plan process.

4.6.1 Construction staging

The construction is likely to take place in nine stages, as set out at Table 4.1. The estimated duration of each key construction stage, together with key construction plant and an estimated number of on-site workers and vehicle movements is outlined at Table 4.2.

Table 4.1: Construction staging

Stage	Key activities
Site establishment	• Site accommodation set-up (site offices, off-site parking, laydown and fabrication areas etc) • Site fencing / security • Construction of erosion and sediment control measures • Traffic management establishment (which changes as construction progresses)
Enabling works	• Clearance of vegetation (on slope face) and slope stabilisation works • Clearance of vegetation on north-north-eastern section of quarry headwall and removal of required area of the headwall • Excavation / removal of existing pavements and subgrade • Services relocation and protection • General site grading (to enable effective stormwater management) • Erection of a tower crane in between the digesters and the dewatering building area
Inlet Pumping Station (IPS) works	• Construct a new electrical switch room building above IPS wet well area • Install temporary wet well odour treatment equipment • Install new 11kV transformers and electrical connections • Install temporary gensets to be able to provide back-up power to IPS pumps • Install new Inlet Pumping Station (IPS) switch room equipment and commission

Stage	Key activities
	• Removal of existing IPS switch room building and transformers from the building • Remove existing odour scrubber equipment and chemical tanks • Remove and store existing electricity generator (genset) for reuse in the new energy centre room • Remove existing in ground diesel storage tank • Demolish existing IPS control building
Digester construction	• Excavation for foundations and ground treatment (if required) • Construct foundations, including importation of materials • Construct digester walls and roof in in situ and pre-cast concrete and/or steel panels • Connection of services
Energy Centre and Main Process Building Foundation construction	• Excavation for foundations and ground treatment (if required) • Construction of existing services protection facilities • Construct foundations, including importation of materials • Construct lower plant room walls in in situ and pre-cast concrete and/or other cladding systems
Plant installation	• Fabricate process equipment in support modules offsite • Transport plant modules to site and crane into place and fix to building / structure foundations • Connection of services between and to plant items
Building completion	• Complete cladding and install roofing systems on building after plant installation
Site finishing and restoration	• Erection of permanent fencing and security systems • General site grading (to enable effective stormwater management) • Final pavements
Commissioning	• Undertake testing programmes on a system-by-system basis and as a whole system • Introduce process fluids (sludge, water etc) and stabilise the process • Undertake further testing to prove performance

An overview of each of these stages is provided below.

4.6.2 Site establishment

Site offices, laydown, fabrication and parking

Construction site offices, laydown area and fabrication facilities, along with tradesperson parking will need to be established at the commencement of the construction period to facilitate the administration of the contract works and provide for contract staff welfare.

The proposed option for this facility, as also shown in Figure 4.2 below, is at the location of the current hillock, which is proposed to be removed prior to the commencement of these construction works.

Site access

The site is currently accessed from Stewart Duff Drive. It is proposed that both temporary and permanent access will continue from Stewart Duff Drive.

During construction it is anticipated that both lanes of Stewart Duff Drive will need to be closed for prolonged periods to facilitate construction traffic movement, heavy lifts, pre-cast panel erection and the like. Wellington City Council is working with WIAL to establish a traffic management strategy for this period. It is recognised that WIAL's construction of a new logistics freight hub on the opposite side of Stewart Duff Drive will overlap in part with the construction of the SMF.

Stewart Duff Drive provides access to critical airport and wastewater treatment operations. As such, the project team are in consultation with WIAL and the wastewater treatment plant operator to develop contingency plans for continued site access. This will involve the use of temporary diversions and single lane traffic flows on Stewart Duff Drive using appropriate traffic management provisions. Both WIAL and the existing WWTP operator, Veolia, are supportive of the current proposal with regard to traffic management during construction.

A key consideration here is access for pedestrians along Stewart Duff Drive – a detailed traffic assessment is required to determine appropriate alternatives and mitigation measures and this may entail closure of Stewart Duff Drive to pedestrians between the Moa Point WWTP access road and Moa Point Road.

Site security

The contractor shall be required to erect and maintain suitable fencing / hoardings for the duration of the contract works in such a way as to:

- prevent the entry of public for health and safety purposes; and
- not be a nuisance to the general public.

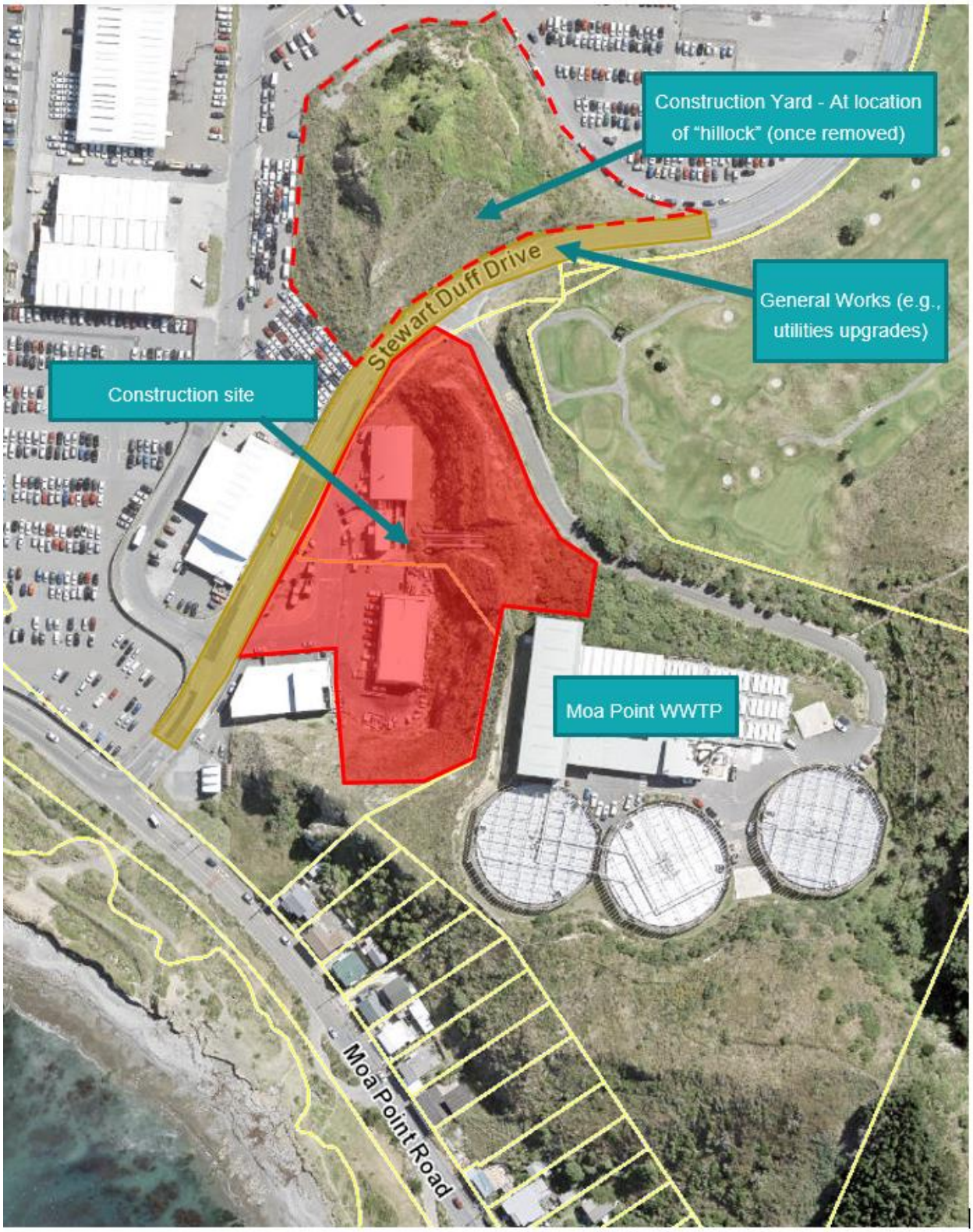

Figure 4.2: Proposed location of contractor's facilities/laydown area

Environmental controls

Prior to construction activities commencing, environmental controls will be established around the site. A draft erosion and sediment control plan (ESCP) is to be developed for the proposed works.

The ESCP will be finalised once the contractor has been appointed and the final construction methodology established. The ESCP will require certification from Greater Wellington Regional Council prior to commencement of earthworks, which will be secured through a condition attached to the GWRC earthworks consent. A designation condition is also proposed requiring a copy of the certified ESCP to be provided to WCC in advance of such works occurring. The specific erosion and sediment controls implemented are likely to vary depending on the stage of construction works and will be targeted appropriately towards the relevant earth worked areas, and particularly:

- Slope stabilisation, to prevent unintended erosion of the embankment, and/or the ingress of silt / sediment into stormwater drains or as run-off.
- Bulk earthworks excavation to the north and north-east of the existing IPS to allow the creation of a larger platform area.
- Site excavation for foundations and ground treatment, particular to prevent the ingress of silt into stormwater drains.

All final erosion and sediment control measures will be designed, constructed, and maintained in accordance with the Erosion and Sediment Control Guide for Land Disturbing Activities in the Wellington Region (February 2021) ('the Guidelines').

A further consideration is to prevent the tracking of debris, mud and the like from the site onto surrounding roads which could then have the potential to enter stormwater drains and the environment. As the site is at an old quarry, it is expected that the site is predominantly underlain by rocks / gravels for which this does not pose a risk. Specific controls for tracking of mud will be confirmed with the contractor for any specific activities that pose this risk.

4.6.3 Enabling works

Enabling works are the initial works undertaken to prepare the site to a stable and accessible condition to enable the construction of the structures on site. For this project, enabling works is made up of the following key components, as described below.

Slope stabilisation works

The proposed site was formed from an old quarry and is therefore surrounded by steep slopes to the north, east and south. Previous instabilities and potential for future instabilities have been identified on these existing slopes. As such, the stabilisation of these existing slopes near the proposed new Sludge Minimisation Facility is required. The preferred method is active slope stabilisation (over passive measures such as rockfall barriers), as follows:

1. Cleaning/scaling loose material and vegetation from the slope, and removal of the accumulated colluvial (rock / soil deposit) blanket on the lower part of the slope (though not trimming the slope itself, as this could trigger further instability). Vegetation and soil material that is removed will be taken off site and disposed of at an appropriate location.
2. Installing drilled and grouted rock anchors and mesh on the slope. This may include the installation of soil nails (in place of rock anchors) in the upper reaches of the slope. Weepholes will also be required.
3. To improve the visual impact of the slope treatment, where possible, vegetation will be reinstated on the upper (less steeply sloping) part of the cut slope through the use of vegetated wire 'mattresses' which will be pinned to the slope. These mattresses will be seeded to allow vegetation to re-establish naturally.
4. Where the rock mass is highly fractured, and there is a risk of smaller blocks of rock frittering from behind the mesh, matting will be placed between the slope and mesh, or the areas will be applied with a layer of shotcrete.

Quarry headwall shaping and removal

The proposed site layout requires partial removal and stabilisation of the northern section of the former quarry headwall, identified at Figure 4.3.

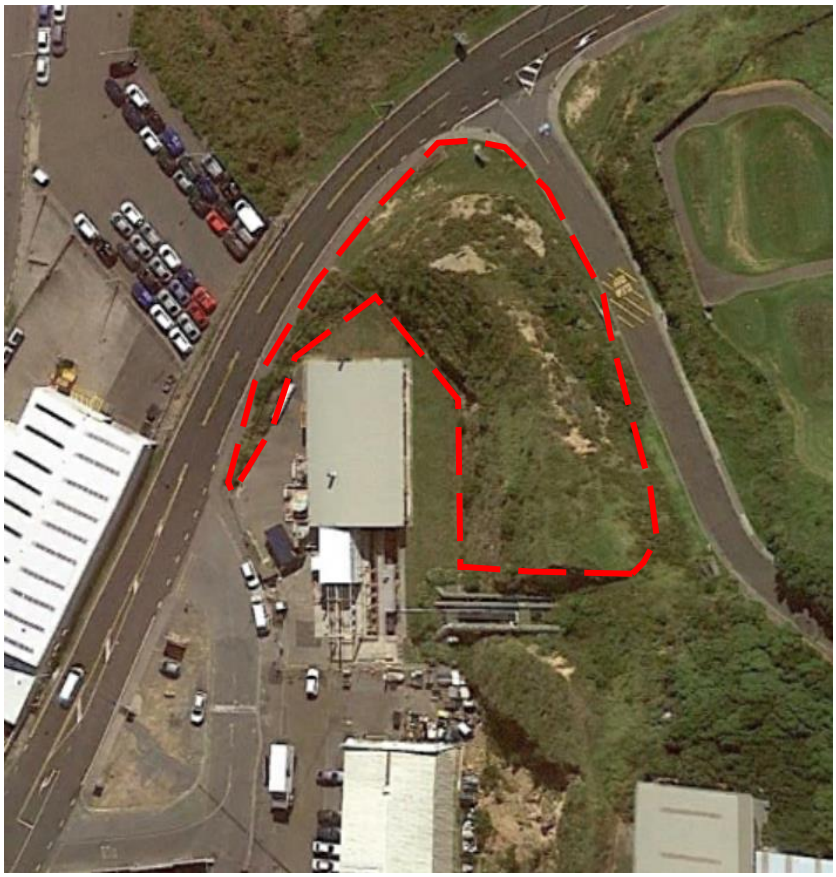

Figure 4.3: Approximate extent of quarry headwall to be removed / stabilised

Vegetation and soil material that is removed will be taken off site and disposed of or utilised at an appropriate location. Key stages will be:

- Exploratory drilling: This step is used to determine whether there are potential sinkholes or cavities in the sections that are cut.
- Pre-splitting: It can be helpful to use rock pre-splitting techniques. The goal is to manage the breakage within the neat lines that are chosen in the cross-section.
- Mechanical, hydraulic, chemical, or hydro excavation techniques will be determined.
- Finished grade: The final step is to break the rocks in a way that is close to the slope lines on the plans. The goal is to leave the slopes reasonably uniform and smooth, and to remove all overhanging and loose rock. In the situation where the rock is excavated lower than the required elevation, then backfill is needed to meet subgrade elevation specifications. This backfill typically includes reclaimed excavation stone, crushed stone, subbase material, or other material.

Excavation and removal of existing pavements and subgrade

Most of the existing site is paved with asphaltic concrete of variable (and in places significantly deteriorated) condition. Geotechnical investigations have been undertaken to confirm the ground type and condition beneath the pavement and includes engineered sub-grade on gravels and rock. A detailed site investigation has also been undertaken to confirm the presence (or not) of contaminated ground. For the purposes of this draft methodology, it is assumed that contaminated ground is non-existent or in very small patches.

The likely construction methodology is to remove the existing pavement, across the site, and then remove subgrade and gravels at selected locations to facilitate the construction of structures and the like, during various stages of construction. New engineered subgrade would be placed to create the civil platform with appropriate falls to accommodate stormwater run-off. Depending on the outcomes of the Detailed Site Investigation, this may require the removal of some specific areas of contaminated subgrade / gravels early in the construction work programme, for disposal at a dedicated special waste management facility. Such areas will be backfilled with engineered clean or reclaimed material.

Services relocation and protection

The site is known to be underlain by several services in the locations of the proposed new structures. Different strategies are required for the protection of these services, including:

- For existing large sewers, protection works will be required. This may include the placement of a concrete section over the top of the pipes in particularly vulnerable areas, provision of foundations that span over the pipes or the creation of a concrete tunnel for protection and future access purposes.
- Stormwater manholes, laterals and mains located on the site are to be removed and replaced with new stormwater reticulation required for appropriate stormwater management during construction and the final configured site.
- Watermains will be relocated to divert away from the site works.
- Electrical cables will be relocated to the transformer locations.
- Based on information available, we are not aware of the presence of gas pipelines beneath this site.

In order to facilitate the SMF, existing services within Stewart Duff Drive may also need to be realigned and/or upgraded. Such work would occur at the same time as any on-site services relocation.

General site grading

During various stages of construction, site grading will be required to enable construction works in particular areas and aid the appropriate management of stormwater. The principles of site grading are as follows:

- To prevent the accumulation of stormwater on site through appropriate drainage; and
- To prevent stormwater run-off from entering neighbouring properties / premises; and
- To prevent contaminated stormwater from entering stormwater drains or the environment through appropriate control measures (as previously noted).

Site cranage

It is anticipated that the construction of the digestors, main processing building and the building enclosing the existing IPS wet well area, including placement of process / mechanical equipment will predominantly be undertaken by a tower crane supported by mobile cranes. The energy centre building and plant and equipment to the north and north-east of it is expected to be erected with the assistance of mobile cranes as it is expected that these areas will extend beyond the reach of the tower crane.

4.6.4 Inlet Pumping Station (IPS) works

IPS modification

To establish the site for the proposed SMF, the existing Inlet Pumping station requires modification. A new control building will be constructed above IPS wet well area, thereby enclosing the existing IPS. New control panels will be installed in the new building above the IPS and the existing pumps will be systematically swung over onto the new switch room equipment and be commissioned.

Removal of existing IPS buildings

To establish the site for the proposed Sludge Minimisation Facility, the existing Inlet Pumping Station Control building is to be removed. This will entail new electrical and controls systems as described above, along with temporary standby generation and odour control.

The preferred method of removal is demolition. Given the size of this building, and the need for dust control, this will require controlled removal of building components, predominantly using excavators with cutting and grabber attachments. The concrete foundations will require concrete breaking with appropriate dust suppression.

Formed concrete trenches in the building foundations that are not removed will be backfilled with engineered material and become part of the new energy centre floor foundation.

The existing in ground diesel storage tank associated with the standby diesel generator that provides back-up power to the IPS pumps will be removed. Soil testing will be undertaken and the excavated material disposed of as appropriate with the excavation backfilled with engineered fill. A new in ground diesel storage tank of similar size to the existing tank will be provided on the new SMF site to supply the existing relocated standby diesel generator set

4.6.5 Digester construction

The SMF requires the construction of two large tanks, known as digesters, which form a critical part of the sludge treatment process. Sludge is held within these tanks for typically 10-16 days and is metabolised by microorganisms to break it down and stabilise it. This produces biogas which is collected, stored in a gas balloon at ground level and is utilised as a fuel source for heating the process.

The digesters required for this project are approximately 16m in diameter and 19m high. Additional height may also be required to allow for gas storage above the main structures. The likely construction method is as follow (subject to confirmation at ECI design):

- Excavation will be undertaken to facilitate the tank foundations and to enable the tanks to be partially buried. This could vary between 2m and 4m below ground level.
- The tank foundations and below-ground floor slab will be constructed from reinforced in-situ concrete.
- The lower side walls (above ground) of the digesters will be constructed from pre-cast concrete panels.
- The upper side walls and roof of the digester will either be constructed from prefabricated, bolted steel panels or fully reinforced concrete.
- Internal and external pipework and fittings will then be added. This will require the use of cranes to lift significant components.

The photograph at Figure 4.3 illustrates bolted steel digester tanks under construction at a WWTP in Canada where the construction methodology referenced at 4.6.5 was adopted.

Figure 4.4: Example of a bolted steel digester under construction (foreground) and completed digesters (background)

4.6.6 Building foundation construction

The SMF requires the construction of two main process buildings, the Energy Centre/Dryer Plant Room and the Main Sludge Process Building (THP and dewatering).

The likely construction method is as follows (subject to confirmation during the ECI design stage):

- Excavation will be undertaken to facilitate the building foundations.
- The building foundations will be constructed from reinforced concrete.
- The building construction will be steel portal frame structure. The lower cladding will be constructed from pre-cast concrete panels, with upper wall sections clad in a corrosion resistant steel cladding.
- Major plant and equipment will be installed (refer further below).
- The upper walls of the building and the roof will then be constructed with architectural finishes applied.
- Services will be connected, and finishes undertaken.

4.6.7 Plant installation

The Energy Centre/Dryer Plant Room and the Main Sludge Process Building will contain mechanical processing and ancillary equipment located over multiple levels. Photographs of the typical equipment utilised in this type of process are shown at Figure 4.5 and Figure 4.6.

Figure 4.5: Sludge processing equipment under installation in a plant building

Figure 4.6: Electrical and control panels under construction inside a plant building

Given the space restriction on site, the preferred method is to store plant and equipment off site and install it pre-fabricated on steel skids, together with all piping, cables and ancillary systems where possible. This will enable the skid mounted units to be transported to site by truck for immediate installation within the plant buildings. The equipment would then be wrapped for protection while the buildings are closed in, and before final fitment of inter-process services are connected.

This will necessitate the movement of oversize loads and significant crane lifts at site. To facilitate this, we are in consultation with Wellington International Airport limited, and propose the use of the airport runway during aircraft curfew hours (00:00 to 06:00) to transport oversized goods to the site as required. Cranes requiring high lifts outside the WIAL Obstacle Limitation Surface (OLS) parameters would also need to be undertaken during airport curfew hours with prior approval from WIAL.

4.6.8 Site finishing and restoration

The final stage of construction is the completion of site finishes. This includes:

- Final connections of services.
- The erection of fences and security systems
- Installation of pavements at final grade.
- General site tidying and finishing.

The construction activities described above and in Table 4.2 are not entirely sequential with some overlap between activities. In particular it is envisaged the Digestor Construction will overlap with the Building Foundation Construction and subsequent Plant Installation activities. The heaviest construction period (other than concrete pour activities) can be deemed to be:

- Number of on-site workers – 100
- Estimated number of vehicles per week -LGVs: 100, HGVs: 40
- Hours of Work – Both

- Key Construction Plant – as per the Plant Installation activity.

4.7 Commissioning

At completion of construction, commissioning will be undertaken. This will involve a staged approach whereby individual systems are tested and then integrated with other systems to undertake plant-wide commissioning. The general process of commissioning involves:

- Factory Acceptance tests (FATs) carried out off site, with key stakeholders witnessing tests
- Installation inspection checks, to check that plant and equipment is installed in the correct alignment.
- Pre-commissioning checks and Site Acceptance Tests (SATs), whereby the response of plant and equipment to control functions are checked, pressure tests are undertaken on pipelines and vessels, and the like.
- Commissioning with water, to confirm that the plant behaves generally as expected.
- Commissioning on sludge to confirm that the plant performs as intended, digester seeding and to make final adjustments.
- Proving period, to prove that the plant operates within the required performance parameters.

During commissioning, particularly the final two stages, some local impacts can be expected, most notably odour emissions. Every endeavour will be made to minimise these impacts as the process safety system tests and equipment is optimised to a steady state of operation. A specific odour management plan for commissioning, together with a communications strategy for affected nearby neighbours, will be required and this will be secured by a condition.

The commissioning phase will involve some noise emissions as part of start-up activities, which may fall outside the normal operating parameters of the facility. It is considered however that such emissions will fall within acceptable levels. Should unusual noise emitting activities be required, such events should be communicated ahead of time to the community. This requirement will be detailed in a Construction Noise & Vibration Management Plan, to be secured by a condition.

Table 4.2: Key construction stages and activities

Stage	Key activities	Estimated duration	Approx. number of on-site workers	Estimated number of vehicle movements (per week)	Hours of work (Standard or night-time or both)	Key construction plant
Site Establishment	• Site accommodation set-up (site offices, off-site parking, fabrication areas etc) • Site fencing / security • Construction of erosion and sediment control measures	2 months	10	LGVs: 50 HGVs: 10	Standard	• Crane - mobile: once for up to 3 days • Excavator: Daily for 3 weeks
Enabling Works	• Clearance of vegetation (on slope face) and slope stabilisation works • Clearance of vegetation on northern quarry headwall and removal of required area of the headwall • Excavation / removal of existing pavements and subgrade • Services relocation and protection • General site grading (to enable effective stormwater management) • Erection of a tower crane	5 – 8 months	25	LGVs: 50 HGVs: 20	Standard	• Excavator: Daily for 24 weeks • Demolition vehicle & equipment for up to 12 weeks within period • Piling rig once for 5-day period - Geotech survey to be completed for confirmation of piling requirements
Inlet Pumping Station (IPS)	• Build new switch room building above IPS wet well area • Install new Inlet Pumping Station (IPS) switch room and commission • Removal of existing IPS switch room and associated equipment from building • Removal of existing IPS control building	6 – 8 months	20	LGVs: 50 HGVs: 10	Both	• Crane both mobile and tower various days throughout period • Excavator: various days over 2 months (30 days max) • Demolition vehicle & equipment for up to 3 weeks within period • 2 Telehandlers: daily over period • 2 Cherry pickers daily over period

Stage	Key activities	Estimated duration	Approx. number of on-site workers	Estimated number of vehicle movements (per week)	Hours of work (Standard or night-time or both)	Key construction plant
Digester Construction	• Excavation for foundations and ground treatment (if required) • Construct foundations, including importation of materials • Construct digester walls and roof in in situ and pre-cast concrete and/or steel panels • Connection of services	8 - 10 months	40	LGVs: 50 HGVs: 20	Standard	• Crane both mobile and tower various days throughout period • Excavator: various days over a 4-month period • Telehandler: various days over 4-month period • Cherry picker various days over period
Building Foundation Construction	• Excavation for foundations and ground treatment (if required) • Construct foundations, including importation of materials • Construct lower plant room walls in in situ and pre-cast concrete and/or other cladding systems	2 – 4 months	30	LGVs: 50 HGVs: 20	Standard	• Crane both mobile and tower: various days throughout period • Excavator: various days over period • Telehandler: various days over period • Cherry picker various days over period
Plant Installation	• Fabricate process equipment in support modules offsite • Transport plant modules to site and crane into place and fix to building / structure foundations • Connection of services between and to plant items	12 – 16 months	60	LGVs: 50 HGVs: 10	Both	• Cranes both tower and mobile: various days throughout period • Excavator: various days over 16 months (100 days max) • 2 Telehandlers: daily over period • 2 Cherry pickers daily over period
Building Completion	• Complete cladding and install roofing systems on building after plant installation	4 – 6 months	20	LGVs: 20 HGVs: 5	Standard	• 2 Telehandlers: daily over period • 2 Cherry pickers daily over period
Site Finishing and Restoration	• Erection of permanent fencing and security systems • General site grading (to enable effective stormwater management) • Final pavements	2 – 4 months	25	LGVs: 40 HGVs: 5	Standard	• 2 Telehandlers: daily over period • Excavator: Daily for 3 weeks

Stage	Key activities	Estimated duration	Approx. number of on-site workers	Estimated number of vehicle movements (per week)	Hours of work (Standard or night-time or both)	Key construction plant
Commissioning	• Undertake testing programmes on a system-by-system basis and as a whole system • Introduce process fluids (water, sludge etc) and stabilise the process • Undertake further testing to prove performance	10 – 12 months	25	LGVs: 40 HGVs: 10	Both	• Telehandler: daily over period • Cherry picker daily over period

4.8 Earthworks

Earthworks to construct the SMF will cover an approximate area of 7,200m^2 and will consist of 15,000m^3 of material to be cut from the site and approximately 3,500m^3 of that material will be used as fill. Material will be predominantly cut from the former quarry headwall on the northern portion of the site, with material cut from the site being used to fill and shape the southern portion of the site as shown on the cut/fill plan within the ESCP.

These volumes have been taken from the current ground level and the proposed finished ground levels, with additional allowance below for inground structures:

- Raw cut = 12,000m^3
- Disinfected effluent tank cut = 400m^3
- Digesters cut = 2,048m^3.

The proposed earthworks will be managed in accordance with an ESCP prepared in accordance with GWRCs Guidelines. A draft ESCP has been developed for the earthworks and is contained in **Appendix M**. The ESCP describes and depicts the erosion and sediment control measures that will be implemented on site during the earthworks to minimise discharges of sediment laden run-off. It also includes a methodology for undertaking the earthworks and methods for stabilisation.

The controls to be implemented on site include the construction of Decanting Earth Bunds which will be chemically treated to allow for the effective removal of sediment entering this device. Silt fencing will be installed around the perimeter of excavated areas as well as stormwater catchpit protection, such as silt socks and geofabrics, around stormwater systems along Stewart Duff Drive to minimise sediment leaving the site and entering the stormwater network, and ultimately the coastal marine area.

4.9 Stormwater

The stormwater and flood risk assessment provided in **Appendix N** assess the actual and potential adverse effects of flooding within the site and on downstream infrastructure and property as a result of the proposed SMF during 20, 50 and 100 year annual recurrence interval events. It also outlines the stormwater treatment devices that will be implemented on site to minimise contaminants from entering the stormwater network during the operation of the SMF.

5 Statutory matters

5.1 Notice of requirement to alter an existing designation

This NOR, given under section 181 of the RMA, seeks to alter existing Designation 58 in the WCDP, for the purposes of the construction, operation and maintenance of a proposed new sludge minimisation facility (SMF).

Section 181(3) provides that the usual designation sections of the RMA apply "with all necessary modifications" to a notice of requirement to alter a designation, as if it were a new designation.

In addition, section 181(4) states that section 181 applies "with all necessary modifications" to a requirement by a territorial authority to alter its own designation within its own district.

In combination, this means that, in substance, the NOR to alter a designation needs to be considered in terms of the matters in section 168A of the RMA ('Notice of requirement by territorial authority'). Section 168A ordinarily applies if a territorial authority decides to issue a notice of requirement for a designation for a public work within its district and for which it has financial responsibility, or for work which relates to the construction of eligible infrastructure for which the territorial authority is a responsible infrastructure authority.

Subsection (3) of Section 168A sets out the matters needed to be covered by the NOR and supporting AEE:

> *When considering a requirement and any submissions received, a territorial authority must, subject to Part 2, consider the effects on the environment of allowing the requirement, having particular regard to -*
>
> *(a) any relevant provisions of—*
>
> *(i) a national policy statement:*
>
> *(ii) a New Zealand coastal policy statement:*
>
> *(iii) a regional policy statement or proposed regional policy statement:*
>
> *(iv) a plan or proposed plan; and*
>
> *(b) whether adequate consideration has been given to alternative sites, routes, or methods of undertaking the work if—*
>
> *(i) the requiring authority does not have an interest in the land sufficient for undertaking the work; or*
>
> *(ii) it is likely that the work will have a significant adverse effect on the environment; and*
>
> *(c) whether the work and designation are reasonably necessary for achieving the objectives of the requiring authority for which the designation is sought; and*
>
> *(d) any other matter the territorial authority considers reasonably necessary in order to make a decision on the requirement.*

5.2 Land to be added to Designation 58

The land subject to this NOR comprises land which encompasses and immediately abuts existing Designation 58 and it is proposed to add two areas to the existing designation for the following purposes:

1. To allow for the construction, operation and maintenance of the SMF itself, on a permanent basis.
2. To provide a temporary construction yard, outside of the permanent 'project footprint' for the purposes of all main off-site construction activities, on a temporary basis – such as workshop, material laydown, construction vehicle parking etc.

These numbered areas are identified at Figure 5.1.

The designation alteration would initially result in an increase to the designation of 8,079m². Refer to Proposed Alterations to Designation 58 Boundary **Plan 3258521-DA-000-K0101 Rev A and 3258521-DA-000-K0102** (**Appendix C**). An extract of the plan showing the altered designation is shown in Figure 5.1.

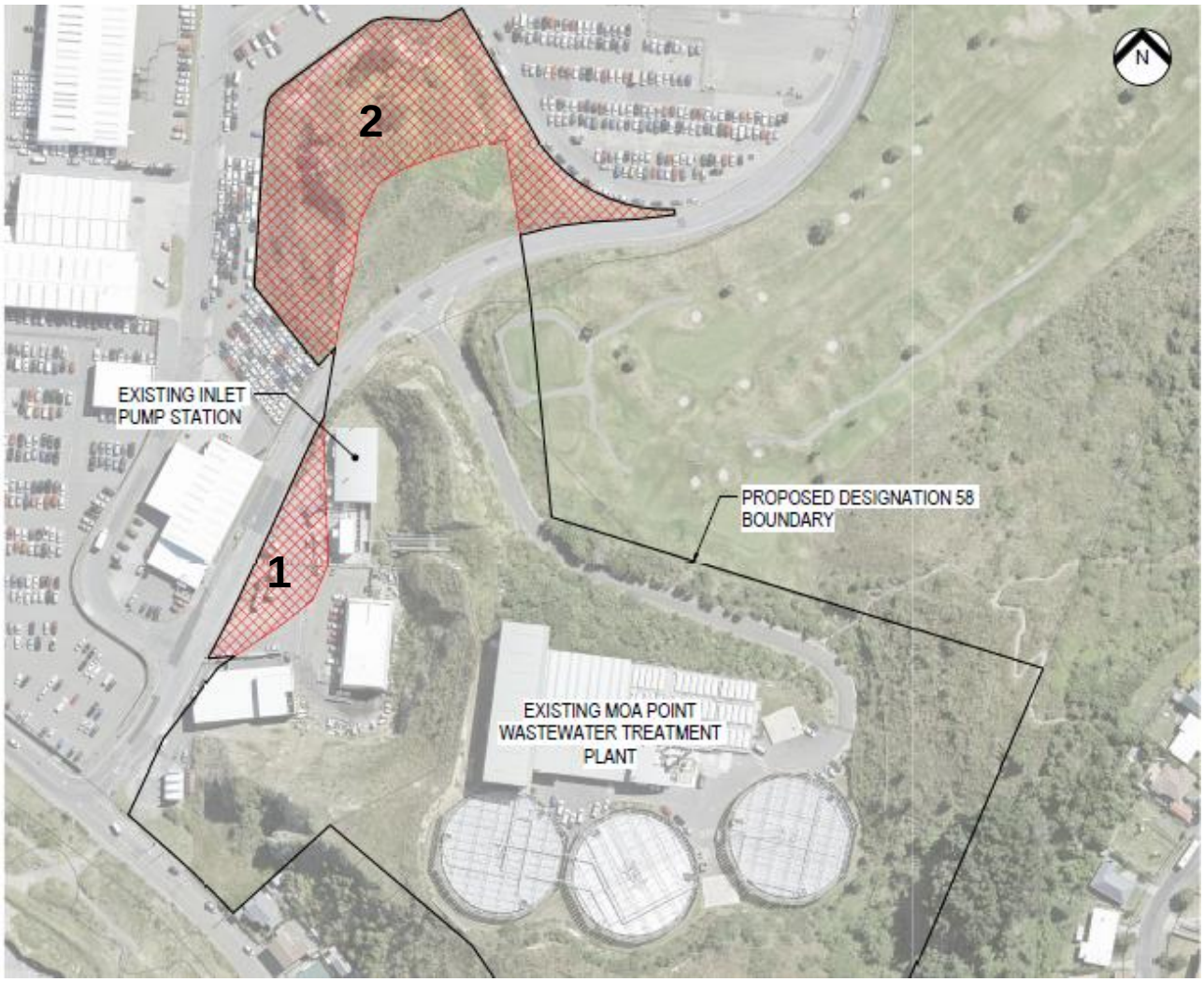

Figure 5.1: Proposed alterations to Designation 58 boundary (new areas to be added shown in red hatching)

However, once the SMF construction is complete, Area 2 will be removed from the designation. It should be noted that the area required for the operation and maintenance of the SMF (Area 1) will remain within the designation permanently. This designation 'uplift' process will also provide an opportunity to remove a small area of the existing designation (currently covering a small part of the golf course) which is outside of the property boundary. The alterations would ultimately result in a net decrease in land within the existing designation of 4,044m² (refer to Proposed Alterations to Designation 58 Boundary (Post Construction) ref. **3258521-DA-000-K0111 and 3258521-DA-000-K0112** – extract in Figure 5.2).

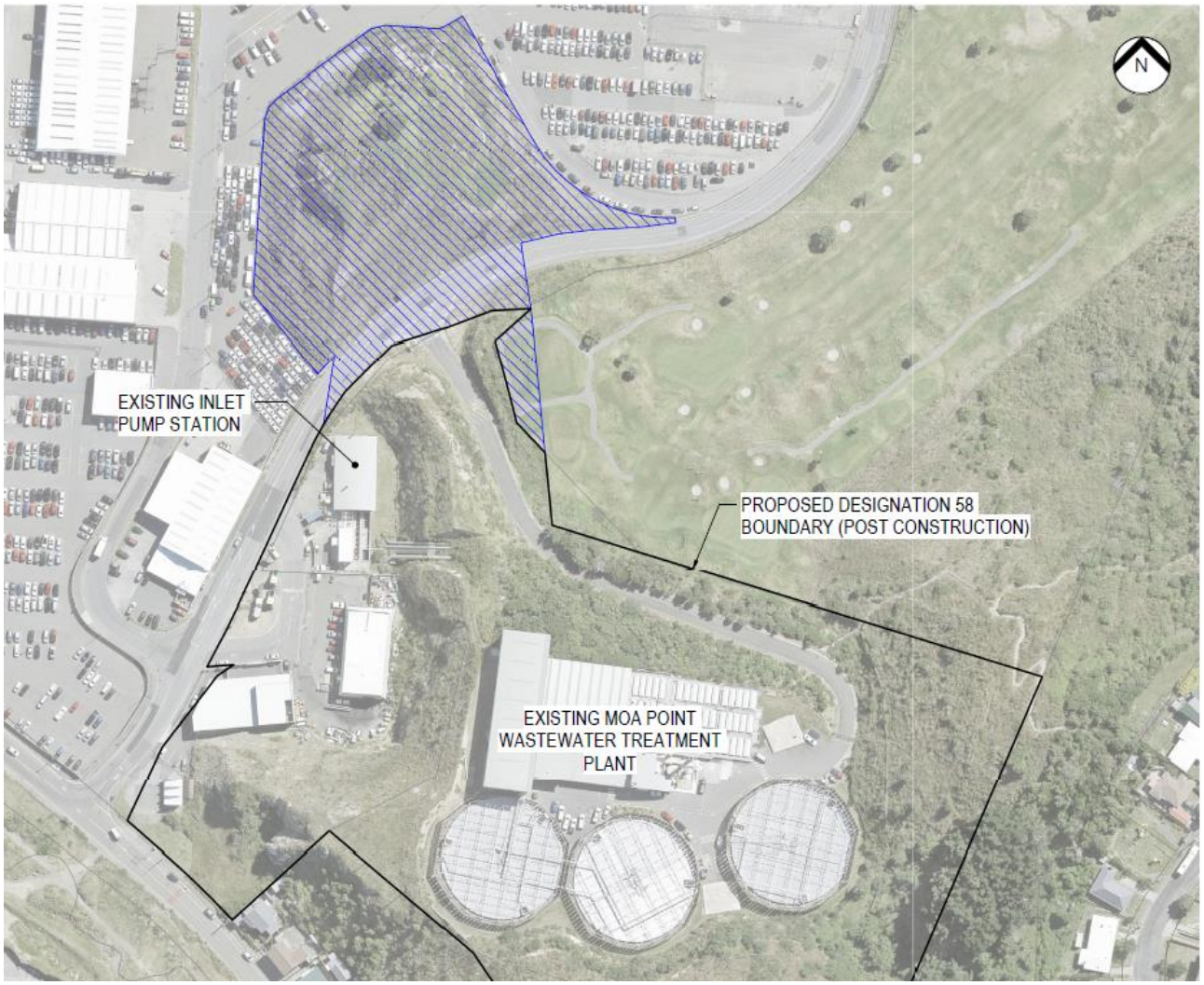

Figure 5.2: Proposed alterations to Designation 58 boundary post-construction (areas to be removed shown in blue hatching)

With reference to the proposed designation plans:

- The area to be permanently added to the existing designation will be the subject of a sale and purchase agreement between WCC and Wellington International Airport Limited (WIAL).
- With regard to the area to be temporarily added to the existing designation, its proposed use as a temporary construction yard will form part of the terms and conditions of the aforementioned sale and purchase agreement between WCC and WIAL.
- The areas to be removed from the existing designation, and subsequently removed from the temporary proposed designation, are currently owned (and will continue to be owned) by WIAL.

As referenced in Section 3.2.3, the majority of the land within the existing designation is owned by WCC. A small proportion of the existing designation forms part of a wider WIAL owned land parcel.

6 Consideration of alternatives

When considering an NOR under section 168A, the territorial authority (WCC) is required under section 168A(3)(b) of the RMA to have particular regard to whether adequate consideration has been given to alternative sites, routes or methods of undertaking the work if either:

(i) The requiring authority does not have an interest in the land sufficient for undertaking the work; or

(ii) It is likely that the work will have a significant adverse effect on the environment.

At the time of lodgement, WCC does not have sufficient interest in the land located at 28 Stewart Duff Drive (the proposed SMF site) to undertake the proposed works. However, agreement in principle has been reached between WCC and WIAL in terms of using the required land (both temporary and permanent) and purchasing the required land (for the permanent project footprint) to undertake the proposed works. It is expected that that WCC will have a 'sufficient interest in the land' at the time that the NOR is determined.

This chapter is a summary of a Business Case Report and a Concept Design Report which were prepared to show the process that was undertaken for selecting the preferred solution for the long-term processing and management of sewage sludge in Wellington. The Business Case Report is attached as **Appendix E** while the Concept Design Report is publicly available on WCC's website[9]. Given that the SMF is a significant investment for Wellington City, this alternatives assessment covers a wider scope and complexity beyond what might have been anticipated under the RMA consenting regime alone.

6.1 Approach to identifying a preferred option

A structured process was undertaken to select a preferred sludge treatment process and location of the new facility which meets the key investment objectives (as noted in Section 2.6 of this AEE) for the project. The process for selecting the preferred process and location included four key stages of work.

1. Options identification: initial lists of process and site options was developed individually, largely based on desktop studies of a broad range of potential process and site options.
2. Options analysis: the initial list of process and site options was subjected to a fatal flaw analysis. The output of this stage of work was a long list of consolidated process and site options.
3. Short list analysis: A multi-criteria analysis was undertaken involving a range of criteria which were set by key project stakeholders. The analysis identified four shortlisted options (in addition to the base case).
4. Shortlist evaluation: The shortlisted options were evaluated against a set of critical success factors which define successful delivery of the project and its outcomes. A cost benefit analysis model was developed to support this. This evaluation identified a preferred option, which is the proposed Thermal Hydrolysis, Digestion and Thermal Drying Plant located at the Moa Point WWTP.

A summary of the work undertaken in each stage in selecting the preferred process and site option is provided in the following sections.

[9] https://wellington.govt.nz/your-council/projects/moa-point-sludge-minimisation-facility

6.2 Stage 1: Identifying potential process and site options

6.2.1 Potential process options

Sewage sludge is an unavoidable by-product of centralised wastewater treatment processes, and the only way to reduce the volume of sewage sludge is to focus on sludge treatment methods. These treatment methods focus on two key constituents in the sludge, being the removal of water and stabilisation of organic matter. To achieve these two things, a sludge treatment facility is usually made up of a combination of process units (technologies) that form a process train to treat and minimise sludge. These technologies are classified into four categories:

- Concentration technologies – reducing sludge volume, generally by removing water from the sludge.
- Stabilisation technologies – stopping or stabilising biological activity, which can reduce odour emissions from further handling/disposal, in addition to reducing microbiological contaminants.
- Hydrolysis technologies – treatment to support the enhanced recovery of energy or nutrients, or aid sludge reduction and microbiological stabilisation.
- Conversion technologies – conversion of the sludge into other forms for beneficial re-use.

During the early feasibility stages, a list of 25 potential technology options was developed by combining the range of technologies available across the above categories into known process train options. This list of potential technology options is provided below in Table 6.1.

Table 6.1: List of potential technology options

Option No	Technology
1	Status Quo (Sludge Dewatering Only)
2	Electrostatic Belt Filter Press
3	Heated Filter Press
4	Solar Drying
5	Aerobic digestion + solar drying
6	Mesophilic anaerobic digestion + solar drying
7	Autothermal anaerobic digestion + thermal drying
8	Mesophilic anaerobic digestion + composting
9	Mesophilic anaerobic digestion + vermicomposting
10	Thermal hydrolysis + mesophilic anaerobic digestion + thermal drying
11	Mesophilic anaerobic digestion + thermal hydrolysis + thermal drying
12	Digestion-lysis-digestion + thermal drying
13	Mechanical Hydrolysis + MAD + thermal drying
14	Ultrasonic Hydrolysis + MAD + thermal drying
15	Biological Hydrolysis + MAD + thermal drying
16	Mesophilic anaerobic digestion + struvite recovery
17	Mesophilic anaerobic digestion + thermal drying
18	Thermal drying
19	Thermal drying + Gasification
20	Thermal drying + Pyrolysis
21	Mesophilic anaerobic digestion + thermal drying + Pyrolysis
22	Hydrothermal liquefaction + oil upgrading
23	Wet Air Oxidation
24	Thermal hydrolysis + mesophilic anaerobic digestion + wet air oxidation
25	Incineration (thermal drying optional)

6.2.2 Potential site options

A desktop study of Wellington's southern districts was undertaken to identify potential site options for a sludge treatment facility. Each option was assessed against the criteria outlined in Table 6.2 below. Locating the facility in another part of Wellington would add significant operational risk, cost, and complexity of having to transfer sludge from the WWTP's located in southern Wellington through dense urban environments to another location.

Table 6.2: Criteria for initial identification of potential sites

Criteria	Criteria description
Size	Providing sufficient space and an appropriate site configuration for sludge processing operations.
Vehicle access	Being able to accommodate heavy vehicle access for loading / unloading operations.
Noise and odour	Sufficient distance from sensitive residential areas.
Utilities access	Ability to access to power and utility connections.
Topography	Favourable sites have flat, open land for vehicle movements and large building and process plant areas.
Land use and designation	Ability to acquire land based on district plan rules and zoning, designations, existing land use, community amenity value, land ownership, Selected Land Use Register (SLUR) status.

The desktop assessment found that there are very limited appropriate site locations across southern Wellington. Using the criteria above, feasible site options were identified which generally fell into two groups:

- Group A - sites located close to Moa Point WWTP.
- Group B - sites located close to the Southern Landfill (Carey's Gully).

Other potential site options were discounted given that much of the area of southern Wellington is already constrained by residential suburbs (which are unsuitable for the placement of a sludge facility), is designated town belt, or has other uses not aligned to this activity such as sports fields and shopping centres.

6.3 Stage 2: Identifying a long list of combined process and site options

6.3.1 Developing a long list of process options

To identify a long list of feasible process options, a fatal flaw analysis was undertaken by applying three critical success factors to the original list of 25 potential process options, being:

1. The maturity of the technology. If a new or emerging technology was to be implemented in Wellington that was untested or unsupported, this could impact the resilience of the sludge management system. This would include technologies that are only available from a single global supplier that is not established in New Zealand.
2. Dry solid content of the end product. This is an important consideration, as a high dry solids content represents a significant reduction in the volume of sludge.
3. Total plant area and footprint. Only processes that can fit within available site footprints should only be considered. The estimated maximum land available is approximately 15,000m^2.

Table 6.3 below summarises the scoring that was applied to each option for each of these fatal flaw criteria.

Table 6.3: Scoring of fatal flaw criteria

Criteria	Scoring parameters		
	Meets criteria	Partially meets criteria	Does not meet criteria
Maturity of technology	Current application in NZ	Applied in more than 2 sites globally	Applied in 1 site / Novel
Dry solid content of end product	> 60% dry solids	~60% dry solids	< 60% dry solids
Total plant footprint	<15,000m^2	~15,000m^2	>15,000m^2

A summary of the results of the fatal flaw scoring applied to the initial list of 25 options is shown in Table 4 of **Appendix E**. Any options with at least one "does not meet" score across the three criteria was not taken forward for consideration. Overall, five options were considered to meet the criteria while four were considered to 'almost' meet the criteria.

Options considered to meet the fatal flaw criteria (Group A):

- Option 8: Mesophilic Anaerobic Digestion + Composting
- Option 10: Lysis-Digestion + Thermal Drying
- Option 17: Mesophilic Anaerobic Digestion + Thermal Drying
- Option 18: Thermal Drying
- Option 25: Incineration (Thermal Dryer optional).

Options considered to 'almost' meet the criteria (Group B):

- Option 7: (Autothermal) Aerobic digestion + Thermal Dryer
- Option 12: Digestion – Lysis – Digestion + Thermal Dryer
- Option 19: Thermal Drying + Gasification
- Option 23: Wet Air Oxidation.

All options within Groups A and B were taken forward into Stage 3 for identifying a shortlist of combined process and site options.

6.3.2 Developing a long list of site options

An analysis of the identified potential site options within Groups A and B was undertaken to identify the fatal flaws associated with these options. The approaches taken for each group included:

- Group A sites: investigations were undertaken to identify the technical constraints for these sites to inform discussions with WIAL, given that WIAL either own the land on which the sites are located, or their operation could be impacted by locating a facility on those sites.
- Group B sites: consultation was undertaken with representatives from Southern Landfill which identified key constraints for the site options that had been selected, and as result, the majority of the Group B sites were excluded from further consideration. Additional technical investigations were then undertaken on the remaining viable Group B Sites.

The analysis that was adopted for these sites demonstrated that both sites, being the existing WWTP and Southern Landfill, were still feasible options to pursue at this stage.

6.4 Stage 3: Identifying a short list of combined process and site options

6.4.1 Collating the process and site options

The next step in the process was to overlay the long list of viable process options onto the site options to create a definitive long list which could be evaluated using a Multi-Criteria Assessment (MCA). The resulting long list of combined process and site options is shown in Table 6.4 below. For consistency, the option

numbers for the process options above have been retained and an “M” or “C” added to show whether the plant would be located at Moa Point or Carey’s Gully. Note: process option 10 could only be located at Moa Point while process option 8 could only be located at Carey’s Gully due to technical limitations.

Table 6.4: Combined longlist of process and site options

Moa Point site	Carey’s Gully site
Option 7M: Autothermal Aerobic Digestion + Thermal Drying	Option 7C: Autothermal Aerobic Digestion + Thermal Drying
Option 10M: Lysis-Digestion + Thermal Drying	Option 8C: Mesophilic Anaerobic Digestion + Composting
Option 12M: Digestion-Lysis-Digestion + Thermal Drying	Option 12C: Digestion-Lysis-Digestion + Thermal Drying
Option 17M: Mesophilic Anaerobic Digestion + Thermal Drying	Option 17C: Mesophilic Anaerobic Digestion + Thermal Drying (option 17)
Option 18M: Thermal Dryer Only (option 18)	Option 18C: Thermal Dryer Only (option 18)
Option 19M: Thermal Drying + Gasification	Option 19C: Thermal Drying + Gasification
Option 23M: Wet Air Oxidation	Option 23C: Wet Air Oxidation
Option 25M: Incineration	Option 25C: Incineration

6.4.2 Multi-criteria assessment analysis

An MCA workshop was held in July 2020 with key stakeholders to identify a preferred option from the longlisted process and site options. The basis of the MCA was collaboratively developed by Connect Water, Veolia, Wellington Water Limited and iwi stakeholders based on the key investment objectives for the project.

The combined long list of process and site options were scored against five criteria and 10 sub-criteria. These criteria and sub-criteria, including the associated weightings that were applied to each, were determined based on feedback received from the key stakeholders involved in the MCA workshop. This exercise was undertaken prior to the workshop by circulating a survey to the workshop participants requesting them to rank each criterion and sub-criterion (1 = least / less important, 5 = most / very important), and provide any additional feedback on the interpretation of each.

Table 6.5 provides a summary of the agreed assessment criteria and baseline weightings that were adopted.

Table 6.5: Summary of assessment criteria and baseline weightings

Criterion	Sub-criterion	Baseline weighting (based on feedback from all stakeholders)	
Function	Sludge minimisation	12%	21%
	Biosolids re-use	9%	
Mana whenua values	Mana whenua values/principles	20%	20%
Complexity	Operation and technological complexity	21%	21%
Environmental	Carbon emissions	5%	17%
	Ecological effects	5%	
	Community impacts	3%	
	Consenting and planning	4%	
Cost	Whole of lift cost	11%	21%
	Staging to meet budget	10%	

To test the MCA process, alternative weightings were then applied and incorporated into the final rankings of the short-listed options, to provide a sensitivity analysis of how outcomes of the assessment might change if criteria weightings are changed. These set of alternative weightings were based on the key differences gathered from the MCA criteria survey feedback. The alternative weightings assessed are as follows:

- Alternative Weighting 1 – Weighted towards core project objectives and comments from individual participants.
- Alternative Weighting 2 – 100% towards core project objectives.
- Alternative Weighting 3 – Environmental and mana whenua values at 100%.
- Alternative Weighting 4 – Environmental and mana whenua values at 60%.

The alternative weightings are shown in Table 6-6 below.

Table 6.6: Alternative weightings

Criteria	Sub-criteria	Alternative weighting 1		Alternative weighting 2		Alternative weighting 3		Alternative weighting 4	
Function	Sludge minimisation	25%	**35%**	23%	**33%**	0%	**0%**	15%	**20%**
	Biosolids re-use	10%		10%		0%		5%	
Mana whenua values	Mana whenua values/principles	20%	**20%**	0%	**0%**	50%	**50%**	25%	**25%**
Complexity	Operation and technological complexity	5%	**5%**	33%	**33%**	0%	**0%**	10%	**10%**
Environmental	Carbon emissions	15%	**20%**	0%	**0%**	25%	**50%**	20%	**35%**
	Ecological effects	2%		0%		8%		5%	
	Community impacts	2%		0%		8%		5%	
	Consenting and planning	2%		0%		8%		5%	
Cost	Whole of life cost	15%	**20%**	23%	**33%**	0%	**0%**	5%	**10%**
	Staging to meet budget	5%		10%		0%		5%	

Based on the results summary in Tables 3-7, 3-10, 3-12 of the Concept Design Report, Option 12M the Digestion-Lysis-Digestion + Thermal Drying (**DLD+TD**) option appears consistently the highest. Option 19M Thermal Drying + Gasification (**TD + Gasification**), Option 10M Lysis-Digestion + Thermal Drying (**LD + TD**), and Option 17M Mesophilic Anaerobic Digestion + Thermal Drying (**MAD + TD**) fall into second, third, and fourth place consistently, with less than one-point difference in total weighted scoring between these options. Within an RMA context, all four options consistently scored highly for mana whenua and environmental values. The scores for each option for these criteria and sub-criteria were relatively similar with a one point difference between each. However, the TD + Gasification option ranked 3 to 4 points lower for mana whenua values. All four options were taken forward to assess the economic benefits of each. However, at this point it was concluded that the preferred option is a DLD + TD to be located at Moa Point given that it was the highest scoring option.

As noted by a technical specialist at the MCA workshop, the selection of a lysis-digestion (**LD**) plant versus a digestion-lysis-digestion (**DLD**) plant is typically based on scale. Plants for smaller populations favour LD. However, the size of the plant required for Wellington is close to the crossover point at where a DLD becomes financially viable, and therefore either process option would be feasible. An LD + TD facility plant

would require fewer process elements and associated infrastructure than the base DLD +TD plant, which presents a capital cost reduction opportunity, while still achieving the project objectives of sludge minimisation, stabilisation, odour and carbon reduction. Following further analysis and discussion with Wellington Water, and in response to this opportunity, a LD + TD plant located at Moa Point was considered to be an alternative preferred option to a DLD + TD plant.

6.5 Stage 4: Shortlist option analysis

6.5.1 Assessing shortlist options against the objectives

The final stage of the process was to assess the economic benefits of the four shortlisted options from the MCA and option 1 (the Base Case) from the original long list of potential options. A Cost Benefit Analysis (CBA) and a Qualitative Assessment (QA) were used to undertake this economic assessment. These methods and the results from each are discussed in the following sections.

6.5.2 Cost benefit analysis

The options assessed in the CBA are listed below:

1. Option 1 - Base Case – dewater sludge and dispose at Southern Landfill until 2026, and thereafter, Bonny Glen landfill.
2. Option 2: Lysis-Digestion + Thermal Drying, located at Moa Point (formerly option 10M from the MCA Assessment).
3. Option 3: Digestion-Lysis-Digestion + Thermal Drying, located at Moa Point (formally option 12M from the MCA Assessment).
4. Option 4: Mesophilic Anaerobic Digestion + Thermal Drying, located at Moa Point (formally option 17M from the MCA Assessment).
5. Option 5: Thermal Drying + Gasification, located at Moa Point (formally option 19M from the MCA Assessment).

Options 2, 3, 4 and 5 are collectively referred to as the investment options.

In terms of incorporating a Base Case, this is a fundamental requirement of any economic analysis as it provides a realistic interpretation of what costs, benefits and impacts would accrue if no investment was made. In this instance, the Base Case is to continue to dispose of dewatered sludge at the Southern Landfill until 2026, and then to truck dewatered sludge to the Bonny Glen Landfill, a regional landfill facility near Marton, for disposal from 2026 onwards.

The results of the CBA findings are provided in Tables 13 and 14 of **Appendix E**. Table 13 shows the undiscounted values (magnitude of actual costs over the life of the asset) while Table 14 shows the discounted values (comparison of the options in today's dollars on a like for like basis) to represent the time value of money. Both Tables have incorporated thirteen cost categories and two economic benefit categories that were assessed against the base case and investment options. The cost and economic benefit categories are also shown within Tables 13 and 14. Note: the benefit categories were only considered for the investment options. For ease of reference the total operating and benefits costs for each option are provided in Table 6.7 and Table 6.8 below.

Table 6.7: Undiscounted costs and benefits

Undiscounted cost and benefits	Options ($'m) 1 Base Case	10M LD+TD	12M DLD+TD	17M MAD+TD	19M TD+Gas
Total operating costs	615.3	287.7	284.1	337.3	292.8
Capital costs	0	186.5	208.1	210.6	201.8
Total costs	615.3	474.2	492.2	547.8	494.6
Total benefits	0	72.4	78.9	76.9	36.8
Net costs	**615.3**	**401.8**	**413.3**	**471.0**	**457.8**
Ranking	**5**	**1**	**2**	**4**	**3**

Table 6.8: Discounted costs and benefits

Discounted cost and benefits	Options ($'m) 1 Base Case	10M LD+TD	12M DLD+TD	17M MAD+TD	19M TD+Gas
Total operating costs	220	107.7	106.7	123.2	109.5
Capital costs	0	162.1	180.8	183.0	175.4
Total costs	220.1	269.8	287.5	306.2	284.9
Total benefits	0	22.7	24.7	24.1	11.8
Net costs	**220.1**	**247.1**	**262.8**	**282.1**	**273.1**
Ranking	**1**	**2**	**3**	**5**	**4**

6.5.3 Qualitative assessment

Six Critical Success Factors (CSFs) were chosen to form the basis of the framework required for the QA. These CSFs have been used to determine which investment option best delivers the essential elements required to ensure the success of the project. All CSFs were assigned a weighting and scores of -2 (does not meet) and +2 (exceeds) were applied to each option. The CSFs and their weightings are shown in Table 6.9.

Table 6.9: CSFs and weightings

Critical success factors	Weightings
Achieving strategic fit	20%
Meeting community and business needs	20%
Value for money	15%
Achievability	10%
Affordability	15%
Mana whenua values	15%

In terms of mana whenua values, each option was assessed to ensure they align with the following principles:

- Traditional Māori values and methods of human waste management, and the principles of rahui in disposing of human waste and the issues of transferring human waste from one rohe to another;
- Ability to harness and use the resources available from the sludge to give them another life (such as energy utilisation from the sludge);
- Having a positive impact on the environment and our communities through the action we take (kaitiakitanga); and

- Understanding and mitigating the potential impacts on areas of settlement (marae, papakainga), use (food gathering areas), wāhi tapu, statutory acknowledgements, rohe boundaries and sites of significance.

The base case and investment options were assessed qualitatively against the CSFs with the results and commentary to support this assessment being provided in Table 15 of **Appendix E**. In summary, the LD + TD and DLD + TD options were ranked first equal, followed by MAD + TD, TD + Gasification, and the Base Case respectively. Each investment option was given a scoring of +2 (exceeds) for mana whenua values.

6.6 Preferred option

The CBA indicated that the Base Case is the best economic outcome, with option 10M being the best performing investment option, followed closely by option 12M. The difference in the economic outcomes between the Base Case and option 10M is $43 million, and between options 10M and 12M is $15.7 million.

The CSF analysis indicated that options 10M and 12M delivered the best qualitative outcomes of the investment options. The base case performed very poorly in this qualitative analysis, being the only option to deliver a negative weighted average outcome. The qualitative analysis of the Base Case indicated some very significant issues around delivering against desired strategic and community outcomes, and concerningly is the only option assessed that fails to meet mana whenua values. The investment options all had positive weighted average scores.

Options 10M and 12M are similar in that they require similar types of plant items, but they are configured differently. Option 12M is a hybrid process of the more ‘traditional’ configuration of thermal hydrolysis and digestion process represented by Option 10M. Option 12M has been adopted in larger municipalities, but there are fewer examples of it being used globally. Wellington’s sludge volumes puts it right at the size where it is possible to technically consider DLD + TD (Option 12M).

However, when considering the relative merits of options 10M and 12M side by side:

- Option 12M requires more investment in infrastructure (essentially more plant) and the tight constraints on the Moa Point site are likely to increase costs further because squeezing more plant on a tight site creates engineering complexity.
- Option 12M would add more operational complexity, and as it is employed less globally, it would be harder for WCC to access the technical expertise to design and operate the plant.
- The additional benefit of option 12M over Option 10M are that Option 12M would produce slightly less end product that requires disposal.

Option 12M involves additional complexity, capital investment, and engineering design development, all of which contribute to higher cost of this option.

Therefore, based on the above analysis, Option 10M a LD + TD located at Moa Point was the preferred option to take forward for the future of sludge management in Wellington.

7 Consultation and engagement

7.1 Approach

The approach has been to engage and connect early with key stakeholders and community groups most affected by the project in order to:

- build awareness and understanding of the project, its drivers and benefits ahead of the public consultation process;
- provide an opportunity to ask questions and provide feedback that can be factored into the design process;
- build trust; and
- establish preferred lines of communication ensuring efficient and effective delivery of information throughout the project.

7.2 Engagement with community groups

The following is a summary of groups that have been engaged through face-to-face meetings and with ongoing communication established.

7.2.1 Moa Point Road Residents' Association

Two meetings have been held with this group given they represent the closest neighbours to the treatment plant and planned sludge facility. These residents have historical issues with odour from the Moa Point WWTP and will also be most impacted by construction of the new facility with noise and traffic. WCC will continue to work closely with them to address the historical concerns and any new odour issues that arise.

7.2.2 Strathmore Park Residents' Association

This group represents residents in proximity to the treatment plant and have an interest in the new facility. At a meeting with representatives of the Association and a subsequent presentation on the project at the AGM, concerns were raised around odour from the pump station at the Moa Point wastewater treatment, when the pump station is open.

7.2.3 Owhiro Bay Residents' Association

These residents have a strong interest in sludge and waste management due to the proximity of their dwellings to the Southern Landfill. Members of this association are also particularly sensitised to the issue of sludge and trucking sludge having been impacted by the 2020 Moa Point sludge transfer pipeline failures.

7.2.4 Residents Association of Wellington

This association is made up of representatives from all of Wellington City's residential associations and an important conduit to the wider Wellington community. Association representatives have been met with and briefed about the project helping build awareness and understanding of the project ahead of wider community consultation.

7.2.5 Guardians of the Bay

In the meeting with the Guardians of the Bay they identified their main interest was with Wellington International Airport and development of the airport. The SMF is within the airport precinct and the project will involve purchasing land from the airport. While supportive of the environmental outcomes of the project they did express concern over the potential removal of the hillock between the airport terminal and freight centre.

7.3 Engagement with iwi

Iwi stakeholders were engaged during the initial optioneering process to determine a preferred process and site option. This included consultation with iwi to assist in the short listing of process options to understand cultural concerns with sludge management that might influence process selection. The short list of sites and process options was then considered as part of a multi criteria analysis (MCA). The basis of the MCA criteria was collaboratively developed with iwi and other key stakeholders based on the project objectives, and iwi representatives led the assessment of options against those criteria at the MCA workshop. Mana whenua values formed a single criterion with a weighting of 20% which is a similar weighting given to the other key criteria for evaluating each process and site option. The selected site and process option was the highest scoring site and process technology ranked against mana whenua values[10].

The principal issue for mana whenua relates to how the stabilised biosolids, arising from the SMF process, are to be disposed or re-used for other purposes. Whilst the SMF process enables beneficial re-use of stabilised biosolids, it is not within the scope of the project to confirm how this is to occur in the long term. WCC is therefore seeking to engage with both Taranaki Whanui and Ngati Toa to work collaboratively on developing a 'Biosolids Reuse and Management Plan'. This will form part of a broader Takai Here Partnership Agreement with each iwi, which will detail how all parties will engage on key issues moving forward on both the SMF project and wider long term waste management and minimisation initiatives for the city.

7.4 WCC Long-Term Plan consultation

In June 2021, Wellington City Council's engagement on its Long-Term Plan stated its preferred option for the project to be the construction of the facility at Moa Point, to be paid for by the Crown Investment Fund (IFF) and paid back over time through a special levy on rates. Subsequently, between Friday 8 April and Tuesday 19 April 2022, ratepayers were invited to provide feedback via WCC's Let's Talk portal on the updated IFF levy structure and the wider SMF project.

Information was provided clarifying the levy structure – with costings and how the levy would be shared across commercial and residential ratepayers.

Information was also provided on the project's context as part of WCC's waste programme, and wider aspirations for the city.

Both the Wellington Chamber of Commerce and the Property Council of New Zealand were invited to provide separate feedback given their representative roles for Wellington commercial ratepayers.

Forty two (42) individual responses were received alongside a substantive submission from the Chamber. A separate summary of submissions has been published by WCC in June 2022.

7.5 Engagement with other stakeholders

7.5.1 Wellington City Council consents team

Engagement has been undertaken with WCC officers in developing the proposal and this AEE. This has involved regular meetings with planning staff to discuss the consenting approach as well as providing draft documentation for comment, including proposed designation conditions.

[10] Digestion – Lysis – Digestion + Thermal Dryer scored 9 out of 10 at the Moa Point site ((Autothermal) Aerobic digestion + Thermal Dryer and Mesophilic Anaerobic Digestion + Thermal Dryer also scored 9 out 10 at the Moa Point site.

Draft technical reports and proposed conditions were also provided to council's experts covering transport, landscape and visual assessment, noise and vibration, air quality, ecology, earthworks, stormwater and flood risk (Wellington Water officer), contaminated land and natural hazards.

7.5.2 Regional Public Health

Regional Public Health has been briefed and regularly updated about the project, particularly around odour management

7.5.3 Wellington International Airport Limited (WIAL)

As a key stakeholder in the project, lines of communication and briefings were established early in the project with ongoing briefings and updates. The SMF proposal has been developed in close consultation with WIAL to ensure that it will not adversely impact airport operations. This has included requirements such as ensuring all structures and air discharge velocities are below the Obstacle Limitation Surface (OLS). WCC has also consulted WIAL on proposed landscaping and sediment retention controls. The proposal has also been designed to ensure that it does not prejudice planned airport activities, including the WIAL 2040 Masterplan.

The construction of the SMF is likely to overlap, at least in part, with the construction of the proposed WIAL freight / logistic hub building. Both parties will work collaboratively as required to manage effects on one another, as well as the wider environment.

As owners of Stewart Duff Drive, consultation with WIAL will continue around road safety measures during both construction and operational phases of the SMF.

7.5.4 Cyclotek Industries

Engagement has been early and ongoing with Cyclotek Industries working with this business of national significance located next to the SMF site to minimise impacts.

7.6 Next steps

The existing designation placed an obligation on WCC to establish a Community Liaison Committee (CLC) which represents the interests of those persons affected by the Moa Point WWTP (Refer to Condition 16 of Designation 58). The role of the CLC is to work with WCC staff and consultants to establish ways to avoid, remedy or mitigate any adverse effects of the plant on adjacent communities. It is understood that the CLC is active and continues to work closely with the existing WWTP operator and Council on matters of interest.

Whilst this CLC has not been directly engaged as part of pre-lodgement discussions regarding the SMF project specifically, it is understood that some members on the CLC are also representatives of the residents' associations engaged with to date.

The intention is to use the existing CLC to engage with the local community through the construction and operation of the SMF. Accordingly, proposed SMF designation conditions will continue to provide opportunities for the CLC to work with WCC to provide input and establish ways to avoid, remedy or mitigate any adverse effects of the construction and operation of the SMF on adjacent communities.

8 Assessment of environmental effects

8.1 Introduction

This chapter provides a summary of the environmental effects of the SMF.

For each topic, an assessment has been undertaken and the assessment reports are contained in **Appendices F to T**. Details on the assessment approach and methodology are provided in these reports.

8.2 Positive effects

The establishment of the proposed SMF will play an integral part in the management of sludge across Wellington City's wastewater treatment network. As the population of Wellington City continues to increase, so will the volume of sludge and solid waste, and the need to dispose of this to landfill. Currently, partially dewatered sludge is disposed of at the Southern Landfill where it is mixed with solid municipal waste. As discussed in Chapter 2 of this AEE, there are a number of adverse effects and issues with the current sludge disposal pathway. The proposal will address many of these issues and have the following positive effects:

- substantially reducing carbon emissions from the disposal of the city's sludge;
- substantially reducing odour emissions at the landfill associated with the disposal of sludge;
- substantially reducing leachate to land and groundwater at the landfill from the disposal of sludge;
- removing the risk of environmental degradation (particularly to streams) posed by failure of the existing sludge transfer pipelines between the Moa Point WWTP and Carey's Gully;
- substantially reducing the volume of material needing to be disposed of to landfill; and
- treating odour which is currently periodically emitted from the existing Inlet Pump Station adjacent to Stewart Duff Drive.

The key benefit of SMF will be to reduce the total volume of sludge, while enabling it to be 'de-coupled' from its current disposal method (to landfill) which is not sustainable in the long-term for the reasons outlined in Chapter 2. The characteristics of the final sludge product (dried granules) means that it can be handled and transported to alternative disposal sites (other than a landfill) and/or beneficially re-used, including other by-products, such as biogas, in the future, either commercially or domestically. As a result of the proposed sludge treatment and disposal process, carbon emissions from the disposal of product at landfill are expected to be reduced by 63%.

In addition to the above, the SMF is a new regionally significant wastewater infrastructure, and in light of the low level of resilience and recent failures of the existing sludge management infrastructure, it will provide a sustainable and resilient long-term solution for sludge management in Wellington City.

8.3 Air quality effects

This section provides a summary of the actual and potential adverse effects from discharges to air during the construction, commissioning and operational phases of the SMF. A detailed Air Quality Assessment has been prepared and is attached as **Appendix F**.

The main potential discharges to air from the SMF during commissioning and operation are:

- odour from the sludge treatment process;
- contaminants generated from the combustion of biogas; and
- dust from the storage and loading of the dried sludge product and construction activities.

8.3.1 Existing environment

The site is largely flat and surrounded by the steep slopes of the former quarry to the east. The coastal site is highly exposed with the predominant wind being from the north and north-east. The average wind speed is 7m/s which is high.

The main sources of air contaminants in the vicinity are the airport, road traffic, domestic heating (eg fires) and the existing WWTP (odour). Reflecting low emission levels and the well-ventilated coastal nature of the area, air contaminant concentrations are highly unlikely to exceed any relevant health and environmental air quality criteria levels, as set out in the National Environmental Standard for Air Quality (NESAQ) and Greater Wellington's Proposed Natural Resources Plan (PNRP).

Odour from the existing Moa Point WWTP is sometimes observed beyond the WWTP boundary. Since 2018, three odour complaints have been received, an average of 0.75 complaints per year. This is a low number of complaints for a WWTP suggesting odour from the plant is well controlled.

Potential air quality receptors (existing and future) in the vicinity of the SMF site are:

- Wellington International Airport users and staff;
- Cyclotek, immediately abutting the SMF site to the south;
- Moa Point WWTP staff;
- nearby residents on Moa Point Road and Kekerenga Street;
- Miramar Links Golf Course users;
- SMF construction workers (construction only); and
- SMF staff (operation only).

8.3.2 Effects during construction

In terms of dust during construction, the contractor will use standard dust mitigation techniques to minimise the generation and emission of dust beyond the site boundary. These techniques will be included within the ESCP and will include the use of water sprays and dust suppressants, minimising areas of exposed surfaces, and stabilising exposed surfaces as soon as practicable. The DHL Express Building and the Cyclotek building are the closest commercial receptors to the site. The Cyclotek laboratory services are expected to have a higher sensitivity to potential dust contamination during earthworks, which may occur via the building's ventilation air intakes. The applicant is currently in discussions with Cyclotek to identify what additional mitigation measures could be implemented to minimise the adverse effects of dust during earthworks. This mitigation may include additional maintenance of the buildings ventilation system filters.

8.3.3 Effects during commissioning

Higher odour emissions may occur during the commissioning phase of the SMF, particularly when wet sludge is present. The commissioning of the anaerobic digestors (when heat is initially applied to the sludge to start the anaerobic process) is expected to be the primary source of odour. Odour emissions from the digestors will be relatively short-term in duration and will occur for a period of up to 30 days. At the end of this period, methanogenesis (an anaerobic respiration process that generates biogas) will begin and biogas will be generated. For the next four to five days, the generated biogas will be odorous as it will have a low methane content and would not yet be combustible by onsite sources. Therefore, the total duration of odour emissions during the commissioning phase of the SMF will be 34 to 35 days.

Odour emissions during the commissioning of the digesters could occur as a result of sludge spillage, off gas leaks and biogas leaks. Each has the potential to cause adverse odours on nearby residential areas, being Moa Point Road and Kekerenga Street, if emissions from these sources are discharged to the atmosphere. To prevent these emissions, instrumentation and alarms will be installed to detect changes in the levels of the digester tanks outside of normal parameters, as well as biogas monitoring to detect any leaks/issues. A temporary odour control system will also be installed to capture and treat any emissions/gases from the

digesters during commissioning. However, any effects would only be experienced for a comparatively short period of time and would be predominantly within the immediate vicinity of the SMF. The frequently high wind speeds that occur at the site are also expected to help minimise the risk of adverse odours. Moreover, the applicant has volunteered a resource consent condition requiring the submission of a Commissioning Odour Management Plan (COMP) to GWRC[11] prior to the commissioning of the SMF. The COMP will detail the management practices that will be used to minimise odour emissions during commissioning, the monitoring that will be undertaken, the results of community consultation, and the complaint response procedures.

Provided the above mitigation is implemented, odour that is generated during the commissioning of the digesters can be effectively managed and the risk of objectionable or offensive odour occurring outside the site boundary minimised. No adverse odour is expected to occur at the boundary of nearby residential properties. It is possible that an odour may at times be observed (during commissioning) however, these odours will be short in duration and will occur in the immediate vicinity of the site. No adverse odour is expected to occur at the nearby residential properties due to the expected scale of the emissions, the sheltering effect of the intervening terrain, and distance between the site and the dwellings.

8.3.4 Effects during operation

The potential air quality effects from the SMF during operation include the effects from odour on nearby sensitive receivers (including residential properties and the surrounding commercial area), adverse health effects from the discharge of biogas, and nuisance effects from dust.

Odour emissions from the SMF OCU and Moa Point OCU

The SMF will provide a very high standard of odour treatment which will treat odour from the new facility as well as from the existing IPS. The proposed odour treatment system will treat and minimise odour emissions by enclosing the sources of odour and mechanically ventilating these sources to the proposed SMF Odour Control Unit (OCU) or the existing Moa Point OCU. The SMF OCU will use a bio-trickling filter (BTF) followed by activated carbon (AC) scrubbing control technology. This technology is widely used to control WWTP odour in New Zealand and internationally and can typically be expected to have odour reduction efficiencies of greater than 99%.

In terms of the existing Moa Point OCU, this comprises a three-stage chemical scrubber which is generally performing well based on current monitoring. The primary odour which is emitted from this stack can be attributed to the chlorine content of scrubbing fluid rather than wastewater odours. The overall performance of the Moa Point OCU is not expected to change once the SMF is commissioned. Consequently, odour emissions from the Moa Point OCU are also unlikely to vary to any extent from the existing discharges and its impact on the surrounding residential areas (Moa Point Road and Kekerenga Street). The emissions from the proposed SMF OCU are predicted to have a negligible impact on the peak odour concentration which occur at these residential areas. The results of the dispersal modelling indicates that no increase in the frequency or intensity of odour would be expected at these areas. The modelling results also show that the emissions of odour from the SMF OCU and Moa Point OCU would comply with the relevant Ministry for the Environment (MfE) odour guidelines concentration limits. Based on the modelling results, emissions from the SMF would not have an adverse odour effect outside the site boundary.

Overall, given the proposed odour treatment system, the discharge of odour from the SMF will not be offensive or objectionable outside the site boundary, and will result in less than minor adverse odour effects.

[11] A regional consent is required for discharge of contaminants to air, including odour

Combustion emissions

The effects associated with the flaring or combustion of biogas are primarily related to health effects. The main contaminants discharged to air will be nitrogen oxide, carbon monoxide, and sulphur dioxide and particulate matter. The potential discharges of these contaminants to air were assessed using dispersion modelling methods. The results of this modelling showed that emissions during the flaring or combustion of biogas would not exceed any of the relevant air quality standards or guideline limits and would not have any adverse health effects, particularly if the combustion sources (for biogas) are operated and maintained in accordance with the manufacturers specifications.

Moreover, the existing onsite emergency generator will be utilised and is a potential source of combustion generated air contaminants. However, the generator would only operate infrequently during a power outage, or for short periods of time during scheduled maintenance. Therefore, it is unlikely that discharges from the generator will occur during the worst-case dispersion conditions when the contribution of stack conditions to ground level concentrations would be the greatest. The height of the generator exhaust stack and the buoyancy of the emission plume will provide a high level of dispersion for the emitted contaminants. Emitted contaminants will also disperse and dilute with increasing distance downwind.

Overall, based on the results of the modelling and the frequency of the operation of the emergency generator, and provided the proposed combustion sources are operated and maintained in accordance with the manufacturer's specifications, the adverse health effects of emissions from the combustion sources will be less than minor.

Operational dust

Dust will be generated during the handling of the dry sludge cake. This will occur indoors, making the management of dust much easier. Peak emissions are expected to occur during truck load-out operations which are expected to occur approximately 2 to 3 times per day (or up to 17 times per week). The primary concerns would be the potential for dust nuisance effects. Emissions of dust will be minimised by enclosing the sludge conveyer, export silos and the loadout building. The export silos will also be vented to a bag filter and the truckloads covered before exiting the site. The closest residential properties which can be considered to have a high sensitivity to dust are located approximately 160m from the loadout building and would not be impacted by any of the site operations. Provided the above measures are adhered to, the adverse effects of dust emissions during the operation of the SMF will be less than minor.

Cumulative effects

The cumulative effects of discharges from the Moa Point OCU, SMF OCU and the IPS (which will be vented to the SMF OCU) have also been assessed using dispersion modelling methods. The results of the modelling show that cumulative odour emissions from both the Moa Point and SMF OCUs do not exceed any of the MfE odour dispersion modelling guideline limits. The maximum cumulative odour concentration at any dwelling is predicted to be 1.04OU/m^3, or 52% of the MfE odour modelling guidance concertation of 2OU/m^3 for high sensitivity receptors.

Additionally, the geographical separation of the SMF site from the existing Moa Point site, both horizontally and vertically, would minimise the potential of cumulative effects occurring. Any fugitive emissions from the two sites would be unlikely to have a cumulative impact on air quality outside the site boundary. The character of the odour emitted from the SMF would also be expected to vary from the WWTP. Consequently, the source of any odour experienced outside the boundary would be expected to be identifiable as coming either from the WWTP or the SMF.

As noted in the air quality assessment, the existing IPS and wet wells will be enclosed (by a new building structure) and vented to the new SMF OCU, with the existing IPS OCU being decommissioned. This will

provide a higher level of containment and control of the odour generated from the IPS, particularly with regard to odour from the wet wells.

This site upgrade, coupled with the proposed mitigation and management practices for preventing or minimising odour emissions during commissioning and operation, will result in an overall improvement in the ambient air emissions from within the WWTP and SMF sites, and the surrounding residential and commercial areas. Therefore, the cumulative effects of the proposal are considered to be less than minor.

8.3.5 Summary of effects

A summary of residual air quality effects is provided at Table 8.1.

Table 8.1: Residual air quality effects

Potential effect	Management/mitigation approach	Specific condition(s) required	Level of residual effect
Effects during construction	The use of standard dust mitigation techniques during construction activities which will be incorporated into the ESCP.	Yes	Less than minor
Effects during commissioning	The submission of a COMP prior to the commissioning and operation of the SMF that provides details of the proposed odour mitigation, monitoring, and procedures for communicating with the community, and responding to odour complaints.	Yes	Less than minor
Effects during operation	Emissions of odour to air will be minimised by enclosing sources of odour and mechanically ventilating these sources to the proposed SMF OCU. The SMF OCU will also use a bio-trickling filter followed by activated carbon scrubbing control technology. Operating and maintaining combustion sources in accordance with the manufacturers specifications to minimise biogas emissions. Enclosing the sludge conveyer, export silos and the loadout building. Venting the export silos to a bag filter and covering truckloads before exiting the site.	Yes	Less than minor

8.4 Archaeological effects

8.4.1 Existing environment

An Archaeological Assessment is attached at **Appendix T.** The purpose of this assessment is to identify any potential risk of encountering archaeological deposits within the project footprint, based on a desk top analysis and a site inspection. The assessment notes that the majority of the site has been heavily modified from its original topography due to historical quarrying. The assessment confirms that there are no recorded

archaeological sites within the site and there is little to no potential for unrecorded in-situ deposits to be present given the extensively modified nature of the site.

8.4.2 Summary of effects

As there appears to be little to no extant original ground within the proposed works footprint, the Archaeological Assessment concludes that there are likely to be no effects on archaeological deposits. There is therefore no requirement to apply to Heritage New Zealand (HNZPT) for an authority to modify archaeological deposits for the proposed works. This has also been confirmed by HNZPT through pre-lodgement engagement. Notwithstanding, this AEE recommends that the standard accidental discovery protocol is followed during construction and a condition to this effect is proposed in **Appendix D**. A summary of residual archaeological effects is provided at Table 8.2.

Table 8.2: Residual archaeological effects

Potential effect	Management/mitigation approach	Specific condition(s) required	Level of residual effect
Adverse effects on archaeological values	Accidental discovery protocol	Yes	Negligible

8.5 Landscape and visual effects

The landscape and visual effects of the proposal are covered in detail in the Landscape and Visual Assessment (LVA) at **Appendix G** and the findings are supported by a series of visualisations included in the assessment.

8.5.1 Baseline environment

As outlined in the LVA, the proposal site is unique, located within a closed quarry at the landscape change point between the highly modified flat area and the mixed natural and partially urbanised hill country. The landscape of the site has almost been completely modified, formerly through quarrying and latterly through the placement of industrial buildings and hardstand on the former quarry floor. The site is partially enclosed to the east by the former quarry headwall which forms a scrubby, partly vegetated backdrop. For these reasons, any natural character values are considered to have been largely extinguished. As such, any potentially adverse landscape effects of the proposal need to be considered against the site's baseline condition.

The immediate landscape context is dominated by extensive urban development including Wellington International Airport and the Moa Point wastewater treatment plant (WWTP) partly above and partly within the site. The contextual setting also includes the Miramar Links golf course, the seaside Moa Point residential community, and the western end of the Moa Point landform.

As previously highlighted within Chapter 3 of this AEE and the LVA, the degree of visibility of the proposal is likely to change over time due to future planned development at the airport, which includes the removal of an intervening 'hillock' within the airport grounds and the construction of a new regional freight hub, both of which are within the immediate surroundings of the proposal site and are anticipated to occur in the short-term. As the proposed regional freight hub is a permitted activity under the WCDP, the LVA has assumed it forms part of the baseline environment. As the removal of the hillock requires resource consent under the WCDP, which has yet to be obtained at the time of writing, the LVA has considered the landscape and visual effects of the proposal in scenarios where the hillock is removed and also with the hillock remaining.

8.5.2 Summary of effects

The proposed permanent changes to the site are not finalised and an 'envelope' approach has therefore been taken to the assessment of landscape and visual effects. A conceptual plant design and series of development parameters therefore informs the basis of the LVA. In this regard, a 'reasonable worst-case scenario' is allowed for in the proposal and the assessment of effects as outlined below.

The 'receiving environment', which includes locations where any landscape and visual effects of the proposal have the potential to be adverse comprises the following areas:

- the southern part of Miramar Links golf course;
- part of the residential suburb of Strathmore Park;
- sections of the public tracks on the hills to the east of the site;
- Stewart Duff Drive (road and footpath); and
- the southern part of Wellington International Airport including part of the terminal building and the airspace.

Whilst the proposal will be visible outside of these areas, any potential effects outside of the 'receiving environment' are deemed to be acceptable, largely due to the view distance from the site and the nature of other intervening or nearby urban development which will dilute the visual prominence of the proposal within its setting.

Landscape effects

Landscape effects relate to physical changes to the setting and are synonymous with effects on landscape character and levels of amenity derived from such character. Landscape character results from a combination of landform, land cover and land use (or cultural patterns).

The key physical changes to the landscape arising from the proposal will include:

- removal of part of the ridgeline (approximately 13,000m³) between the flat part of the site and the southern side of the access road to the upper wastewater treatment plant;
- demolition of existing on-site buildings and construction of several industrial buildings up to 22m in height; and
- scaling of parts of the former quarry headwall and slope stabilisation works.

As previously highlighted, any potentially adverse landscape effects of the proposal need to be considered against the site's baseline condition which is a highly modified one. The site is however close to two highly natural areas including Wellington Harbour and the slopes above the site on Moa Point. The effects of the built forms proposed, together with associated earthworks and alterations to the former quarry headwall have the potential to generate adverse landscape effects. Whilst the subject site already comprises buildings, the proposal will increase the amount of on-site built volume and footprint. The quantum of earthworks will also be substantial, including the removal of a section of ridgeline.

Notwithstanding, the site is already highly modified and has a degraded landscape character. Further, the proposed buildings are consistent with other buildings nearby including the existing WWTP, which sits in an elevated position comparative to the site, and neighbouring Cyclotek building. There are also other large, utilitarian-style buildings located opposite the site on WIAL land both currently and as part of the future baseline environment. The design and composition of the SMF will have similar characteristics to surrounding built development. A recessive, low reflectivity colour palette is also proposed, to draw from colours found naturally in the setting. Whilst some vegetation removal will occur along the headwall where slope remediation is proposed, such vegetation will reinstate overtime through the proposed slope stabilisation solution.

The LVA concludes that for these reasons adverse landscape effects result in a 'Moderate-Low' landscape effect.

Visual effects

Visual effects concern the effects on landscape values and amenity that an activity may have on specific viewpoints in the surrounding environment. Viewing audiences vary in type and location and include both static and transient views, active and passive.

As outlined in the LVA, the proposal will be visible to some extent from various viewpoints to a variety of typical viewing audiences. Table 8.3 outlines the level of effect of the proposed SMF on each identified viewing audience. Unless otherwise stated, the level of permanent effect assumes the removal of the WIAL 'hillock' which will open views to the proposal which may have previously been screened by the landform. There are however instances where the removal of the hillock would partly mitigate the visual effects of the proposal.

The visual assessment also considers cumulative visual effects arising from the proposal, namely the removal of the hillock and the erection of the WIAL logistics hub, which cumulatively alter the balance of natural versus built forms and the level of screening provided by both features.

The LVA considers that adverse permanent visual effects generated by the proposal will be, at worst, 'Moderate-High' for identified viewing audiences.

Table 8.3: Summary of visual effects on individual viewing audiences

Viewing audience	Assessment	Level of permanent effect (with mitigation)
Strathmore Park residents	The LVA acknowledges that the southwest outlook for the occupants of several dwellings on Bunker Way, Raukawa Street and Kekerenga Street will include the golf course, airport, Lyall Bay and Cook Strait. Due to the removal of a section of ridgeline on the northern edge of the site, these occupants will have views of part of the proposal. The outlook will comprise a stepping down of built forms between the existing WWTP and onto and across WIAL land. The upper parts of the proposal will also partly block coastal views. When considered cumulatively with the proposed WIAL freight hub, the proposal will occupy part of a large gap which currently exists between the subject site and the hillock. The implementation of a recessive colour palette will however have a degree of compatibility with surrounding natural features. As a result, the adverse visual effects on this viewing audience will be Moderate-High. The removal of the hillock will increase the visibility of Lyall Bay and Cook Strait for some residents, helping to offset the increased built forms.	The LVA concludes that the proposal will have a moderate-high adverse visual effect with the hillock in place. The removal of the hillock will enhance sea views for some residents and thus, the adverse residual visual effect in this scenario would be moderate for those persons.
People on public tracks	Several public tracks link Stewart Duff Drive with Strathmore Park, via Kekerenga Street. The site is largely screened from view behind and below a low ridge. The northern end of the Proposal will be partly visible from various locations along the track network. Natural elements and patterns currently enjoyed will be replaced	The LVA concludes that the proposal will have a moderate adverse visual effect, with or without the hillock remaining.

Viewing audience	Assessment	Level of permanent effect (with mitigation)
	by built forms. The WIAL freight hub and wider airport land will provide a backdrop to the proposal from higher track views. As such, the proposal will be seen as an intensification of built forms in the setting. The SMF will be finished in natural colours which will appear more visually recessive than surrounding buildings. The effects on this viewing audience are therefore considered to be Moderate. The removal of the hillock will result in more of the airport grounds and buildings being visible, with a loss of natural elements and patterns in the field of view from the tracks.	
People travelling along Stewart Duff Drive	From this road, views into the site are influenced by the presence of various industrial buildings, infrastructure, and activity. Views towards the site from the southern end of Stewart Duff Drive (SDD) therefore hold low amenity values. The hillock and low ridge bordering the site screen views of the site from the northern end of SDD. The proposal will therefore be visible to a greater degree from the north due to the ridgeline removal. Views however will also feature the golf course in the foreground and Moa Point in the backdrop, as well as the existing WWTP. Given that SDD adjoins the site boundary, levels of visibility will range from the entirety of the proposal to upper parts of the SMF only from distant views. At 'day one' of opening, the proposal will have a moderate adverse visual effect. The retention of the hillock would assist in providing a balance between natural versus built forms.	The LVA concludes that the proposal will have, at worst, a moderate-high adverse visual effect on persons passing by the site on foot, with the hillock removed. This effect would be reduced further for motorists.
People travelling along Moa Point Road	Views towards the site from Moa Point Road hold low amenity values due to the presence of industrial buildings and activities. The upper parts of the proposal will be glimpsed from Moa Point Road where it will be seen behind and rising above existing industrial buildings.	The LVA concludes that the proposal will have a low adverse visual effect, regardless of whether the hillock is removed or retained.
Views from within the airport terminal building	The retention of the hillock would result in views of the proposal from the airport terminal being almost entirely screened, which would result in very low to nil effects from these receptors. With the hillock removed, the SMF would be fully visible from the airport terminal. Whilst the SMF would appear muted in appearance to neighbouring buildings, cumulative effects would come into play given the proximity to existing and planned built development.	The LVA concludes that the proposal will have at worst, a moderate-high adverse visual effect, in a scenario where the hillock is removed.

Viewing audience	Assessment	Level of permanent effect (with mitigation)
Air travellers' views	The site is visible to varying degrees on the tarmac from the south of the main terminal building for air travellers boarding or embarking from aircraft and when aircraft is stationary or taxiing. Such views of the site would however be brief glimpses. Whilst in flight, the site would be highly visible for some air travellers from a 'birds eye' view. The removal of the hillock would likely increase views of the site for this viewing audience, particularly from the air. These views would nonetheless be fleeting, limited to take-off and landing periods. When engaged in air travel, whether stationary, taxiing or in flight, the site would be seen in the context of other industrial activity and wider airport environment.	The LVA concludes that the proposal will have a low adverse visual effect, regardless of whether the hillock is removed or retained.
Views from Miramar Links golf course	The industrial part of the site cannot be seen from the golf course due to the intervening ridge above the WWTP access road. As a result of the partial removal of this intervening ridge to facilitate the proposal, approximately 19m of the upper parts of the northern SMF buildings will be visible from varying degrees from the southern half of the golf course. The effect of this built change will increase as one gets closer to the SMF. The existing Moa Point WWTP and proposed WIAL freight hub would also be seen in these views, albeit at different elevations. The visual effects of the proposal from 'day one' would therefore be moderate-high. Whilst there will continue to be views of the proposal which will affect current levels of amenity enjoyed from the course, the views will be transient. The hillock removal will impact the balance of natural vs industrial development in the locality and would therefore worsen the visual effects.	The LVA concludes that the proposal will have at worst, a moderate-high permanent adverse visual effect, regardless of whether the hillock is removed or retained.

Coastal environment

The Wellington City Proposed District Plan (WCPDP) has mapped the 'coastal environment' for the purposes of Policy 1 of the NZCPS. Under this policy, the coastal environment includes areas where coastal processes, influences or qualities are significant. Figure 8.1 shows the extent of the coastal environment in the WCPDP in the vicinity of the SMF site.

Figure 8.1: Extent of the coastal environment (blue hatching) and high coastal natural character areas (purple hatching) as mapped in the WCPDP

The WCPDP also identifies 'High Coastal Natural Character Areas' within the coastal environment using the criteria of the NZCPS and the Wellington Regional Policy Statement (RPS) and well as identifying Coastal or Riparian Margins in relation to Policy 6(1)(i) of the NZCPS (ie for development to be set back from). The SMF is not identified in the WCPDP as being within either of these areas.

The LVA has assessed the natural character values of the SMF site as being 'low'. This is due to the highly modified site context, largely attributed to airport activities, as well as modification of the natural topography

and other built development. Consequently, the LVA concludes that there would not be adverse effects on the natural character of the coastal environment.

Conclusion

The level of effects generated by the proposal vary depending on the particular viewing audience and whether the residual effect arising from the removal of the hillock provides a benefit (such as increasing sea views) or disbenefit, enabling direct views of the proposal where the hillock currently provides screening. As summarised in Table 8.4, the mitigation proposed seeks to reduce potential adverse effects to an extent which is, at worst, 'moderate' for all parties with or without the hillock in place. Due to proximity of the site to the airport, it has not been possible to propose tree planting as a method of partially mitigating such effects for relevant viewing audiences.

Table 8.4: Residual landscape and visual effects

Potential effect	Management/mitigation approach	Specific conditions required	Level of residual effect with hillock retained	Level of residual effect with hillock removed
Adverse effects on landscape values	• Design sympathetic with surrounding environment • Recessive, low reflectivity colour palette • Reinstatement /regeneration of cleared vegetation	Yes	Moderate-Minor	Moderate-Minor
Adverse visual effects from Stewart Duff Dr			Moderate	Moderate
Adverse visual effects from Moa Point Road			Minor	Minor
Adverse visual effects from airport terminal building			Minor	Moderate
Adverse visual effects from Air travellers' views			Minor	Minor
Adverse visual effects from Miramar Links Golf Course			Moderate	Moderate
Adverse visual effects from Strathmore Park			Moderate	Moderate
Adverse visual effects from public tracks			Moderate	Moderate

8.6 Ecology

8.6.1 Existing environment

An Ecological Impact Assessment (EIA) **(Appendix H)** has been carried out to assess the ecological values of the site that may be impacted by the proposal and to determine ecological effects and the need for any management measures. A site visit was undertaken by Beca ecologists in October 2021 as part of the preliminary ecological assessment to provide a high-level indication of baseline ecological condition. The EIA is supported by a Lizard and Threatened Plant Surveys report **(Appendix I)**, produced by Wildlands who carried out focused herpetofauna and rare plant surveys in March 2022. A subsequent targeted survey was

undertaken in July 2022 specifically targeting an 'At Risk-Declining' species, the barking gecko (*Naultinus punctatus).* The survey area was undertaken in the area potentially affected by SMF activities, as well as representative adjacent habitat (due to the topographical constraints accessing all land within the boundaries of the SMF site).

Terrestrial vegetation, herpetofauna and avifauna were identified as important ecological features at the site.

Vegetation

Within the site extent, there is moderate vegetation coverage on the steep, rock embankments. The site comprises largely of regenerating mixed/native shrublands and grassland and is relatively homogenous within the Site.

One threatened plant species, Pōhutukawa, was identified during the survey. This plant has a national-level threat classification which is understood to be a precautionary measure based on the threat posed by risk of infection. Pōhutukawa are currently common and widespread in the local environment and to date have not been greatly affected by infection.

The broader terrestrial vegetation is assessed as having low ecological value.

Herpetofauna

The survey conducted by Wildlands found two lizard species present within the survey area, with a particularly dense skink population recorded.

Two Raukawa gecko were captured in a funnel trap close to a rocky outcrop where the slope has been cut away to accommodate the exposed wastewater pipes. It is envisaged that a higher population of this species may be likely given the inaccessible nature of similar habitat along the former quarry headwall.

Sixty northern grass skink were also detected within the survey area, although it is acknowledged that some of them could have been recaptured over the three day lizard survey period.

Both the lizard species detected are abundant and widespread around the lower North Island and upper South Island and are classified as 'Not Threatened'.

No barking gecko *Naultinus punctatus* were detected in the targeted survey.

Avifauna

The EIA confirms that no avifauna was observed during the site visits by Beca or Wildlands, and there are no available records within the site extent. Whilst a high number of coastal birds have been observed in proximity to the site, along the Wellington coastline, based on recent surveys, all such species are coastal wader and other shorebirds that prefer open coastal sites close to mud and sandflats, as well as open grassy areas close to feeding areas. Given the SMF site is comprised of concrete ground, structures and a scrubby embankment, suitable shorebird habitat is limited. Neither are there any trees suitable for nesting or roosting habitat.

Rocky outcrops at the toe of the embankment could potentially provide some low quality, nesting habitat for the Northern and white-flippered blue penguins (*Eudyptula minor minor* and *albosignata*), due to the crevices created by the rocks and vegetation.

8.6.2 Summary of effects on lizards

The two species of lizards are present throughout the site, in areas both accessible and inaccessible for the survey. The survey report suggests that these species are likely to be present in moderate numbers on the SMF site.

Both lizard species detected are abundant and widespread around the lower North Island and upper South Island and are classified as 'Not Threatened'. Whilst there were no 'Threatened' or 'At Risk' species

identified during the survey, given that some areas of the site were inaccessible, it is possible some 'At Risk' species are present in low numbers in these areas.

The proposed development of the site has the potential to result in the following adverse effects on lizards:

- Disturbance, injuries and/or deaths of lizards during vegetation clearance and associated earthworks, particularly slope stabilisation and colluvial rubble clearance.
- Temporary displacement and social disturbance of lizards and their populations.
- Permanent loss and modification of lizard habitat.
- Increased predation risk to lizards by introduced predators due to increased movements/ displacement (however this effect is low due to effective mammal pest control throughout Te Motu Kairangi/Miramar Peninsula).
- Disturbance during construction including dust/vibration and noise.

The magnitude of the potential for effects on both species has been ranked as moderate in the survey report in the absence of avoidance or mitigation measures being implemented.

Due to the inaccessibility of the site and challenges associated with capturing the lizards, Wildlands advise that it would be difficult to efficiently avoid or minimise impacts on lizards using conventional mitigation techniques, such as salvage and relocation. Wildlands therefore suggest the preparation and implementation of a Lizard Management Plan (LMP) to avoid, mitigate or compensate for the identified adverse effects. The LMP will be implemented prior to the clearance of vegetation and commencement of construction work and is expected to ensure the effects on the lizards to be no more than minor. Best practice (and evidence-based, where available) lizard management planning is likely to be able to achieve these outcomes. Development of a science-based monitoring programme is to be a key objective in the LMP.

8.6.3 Summary of effects on terrestrial vegetation including threatened plants

The earthworks, slope stabilisation and ground pipe installation will require vegetation clearance within the site, which will result in the permanent loss of a maximum of 0.33 ha of vegetation. Much of this will be exotic grasslands and native shrublands, and will therefore lead to a small loss of botanical value associated with nationally and locally common indigenous species. It will also reduce the overall provision of ecosystem services by the vegetation network along the Wellington Coast. However, any reductions are expected to be proportionally small, given the large amount of vegetation in the immediate surroundings and wider environment. Therefore, the EIA assesses the magnitude of effect on terrestrial vegetation to be low.

8.6.4 Summary of effects on coastal birds

Whilst the site may provide potential nesting habitat for Northern and white-flippered blue penguins along the bottom of the embankment, this area is limited in size (approximately 0.03 ha) and considered to be of low quality due to surrounding land uses. There is also considered to be a lack of habitat connectivity and safe pathways between recorded locations of adult penguins and nests across the coastline, due to the severance created by the road and airport infrastructure. Moreover, given the large amount of high-quality nesting and roosting habitat that exists along the coastline, there is considered to be little incentive for the penguins to risk injury and mortality to search for nesting habitat inland to establish a nest within the site which is of poorer, comparable habitat quality. Accordingly, the proportion of habitat loss in the context of the wider available habitat is considered to be negligible.

Notwithstanding, the EIA considers their presence cannot be expressly ruled out. Given the 'At Risk-Threat' status of Northern and white-flippered blue penguins, the EIA therefore recommends that any works which affect the limited area of penguin habitat occur outside of the peak penguin breeding season. Where this is not possible, a pre-works nest survey is recommended on a precautionary basis. In the event that an active penguin nest is found, the area cannot be used for construction and must be clearly marked, and a 100m

buffer cordoned off until the nesting birds have fledged, or the nest has been naturally abandoned. These precautionary measures will be secured through conditions.

8.6.5 Summary of ecological effects

A summary of residual ecological effects is provided in Table 8.5.

Table 8.5: Residual ecological effects

Potential effect	Management/mitigation approach	Specific condition(s) required	Level of residual effect
Adverse effects on lizards	• Lizard Management Plan	Yes	Minor
Adverse effects on avifauna	• Where practicable, the clearance of vegetation and loose rock along toe of embankment to avoid avifauna breeding season (July to Feb). • If works cannot be avoided within the breeding season, pre-works penguin nest survey to occur one week prior to works. • If any active penguin nests are found, the area to be cordoned off until the nesting birds have fledged, or the nest has been naturally abandoned.	Yes	Minor
Adverse effects on terrestrial vegetation	n/a	No	Less than minor
Adverse effects on threatened plants	n/a	No	Negligible

8.7 Noise and vibration (Construction)

A Construction Noise and Vibration Assessment **(Appendix J)** has been carried out to assess the potential construction noise and vibration effects arising from the development of the SMF.

8.7.1 Summary of effects (Noise)

In assessing noise, National standard *NZS6803:1999 Acoustics – Construction Noise* is the prevailing advice in assessing potential noise effects from construction activities and setting guidelines for reasonable noise emissions.

The construction phase of the original WWTP was controlled through conditions attached to Designation 58. With respect to noise, condition 18.7 (refer to Figure 8.2) limited general construction work hours, with the carrying out of ‘blasting’ subject to a further timing restriction under condition 18.4. These restrictions are considered alongside NZS6803:1999 in the Construction Noise Assessment where relevant.

18.7 Hours of Operation

Construction on the site shall be restricted to the following hours:

Monday to Friday	7.00am to 6.00pm
Saturday	9.00am to 3.30pm
Sundays	no work

Figure 8.2: Extract - Designation 58, Condition 18.7 (Applying to the construction phase of the WWTP)

Noise sensitive receptors in the vicinity of the site are considered to be limited to residential activities on Moa Point Road and Kekerenga Street. As the construction works are scheduled to occur for a period exceeding 20 weeks, the long-duration construction noise limits within NZS6803:1999 apply to dwellings. NZS6803:1999 places noise limitations depending on the time of the day that any such works would be occurring. The standard limitation Monday-Saturday during the hours of 07:30-18:00 is 70 LAeq dB and 85 LAFmax dB.

NZS6803:1999 also prescribes noise limitations for commercial and/or industrial areas, which would be relevant to nearby activities including Cyclotek and WIAL buildings.

A calculation of construction noise was informed by an indicative construction methodology and associated list of equipment and durations for each construction phase (refer to Section 4.6 of this AEE). This is considered to provide a reasonable baseline for an average noise level arising from each construction phase.

As confirmed in the Construction Noise and Vibration Assessment the noise levels predicted to be experienced by nearby dwellings are in all cases less than the recommended daytime noise levels specified in NZS6803:1999 during typical daytime hours.

The construction noise level experienced by Cyclotek is predicted to be between 68 and 84 dB LAeq subject to the location of construction equipment on the site. This calculation exceeds the guideline noise levels for industrial/commercial sites by up to 14 decibels. As Cyclotek has a concrete enclosure, this is likely to afford some reduction in this decibel level. Notwithstanding, it is recommended that mitigation is employed to reduce noise levels to the guideline 70dB LAeq or less, other than in circumstances where higher noise levels have been agreed by Cyclotek directly. It is considered that such measures can be agreed through the preparation and implementation of a Construction Noise and Vibration Management Plan (CNVMP).

Due to the scale of the proposal, key milestones within the construction phase will involve on-site construction works outside of the hours of 07:00 to 18:00. This will include the concrete pours of the two digester foundations and the building foundations, which will require around 100 trucks per day and 40 trucks per day respectively. To allow for the continuous pour of the concrete and complete a single foundation in one day, this would require construction activity to commence as early as 03:00. Such works are only expected to occur five to ten times (on five to ten days in total) over the whole construction period.

Construction traffic movements will also need to occur during airport curfew hours of 00:00 to 06:00 to utilise the airport runway for the transportation of oversized equipment.

Due to constraints posed by the Obstacle Limitation Surface, it will also be necessary to operate significant crane lifts on site for the installation of oversized equipment during airport curfew hours.

The predicted noise levels arising from concrete pouring and plant movements during the evening may exceed the night-time recommended noise limits by 7 and 4 decibels respectively. Given the infrequent nature of such works occurring, the Construction Noise and Vibration Assessment recommends that residents are advised of the time that such activities will occur well in advance, and that the anticipated

duration of each activity is well communicated. It is recommended that such a commitment is included within a CNVMP.

Whilst designation condition 18.7 sought to limit construction hours of operation in the construction phase of the existing WWTP, the guidelines within NZS6803:1999 (developed after the designation conditions) allow for construction work outside of such hours, subject to adherence to recommended noise levels. Accordingly, it is recommended that the designation is subject to a condition which requires adherence to the noise guidelines in NZS6803:1999. As works are anticipated which cannot meet these noise guidelines during essential night-time works, a further condition is recommended which requires the preparation and adherence to a CNVMP which incorporates a plan to communicate such effects to local residents, whilst seeking to mitigate effects during these times as far as practicable. Table 8.6 provides a summary of residual construction noise effects.

Table 8.6: Residual construction noise effects

Potential effect	Management/mitigation approach	Specific condition(s) required	Level of residual effect
Adverse noise effects on dwellings during construction (daytime works)	• Compliance with NZS6803:1999 Acoustics – Construction Noise	Yes	Less than minor
Adverse noise effects on dwellings during construction (night-time works)	• Compliance with NZS6803:1999 Acoustics – Construction Noise, as far as practicable • Adherence to a Construction Noise and Vibration Management Plan	Yes	Minor - temporary periods only
Adverse noise effects on Cyclotek during construction	• Adherence to a Construction Noise and Vibration Management Plan	Yes	Minor - temporary periods only

8.7.2 Summary of effects (Vibration)

In assessing vibration effects, appropriate guidance can be found in German Standard DIN 4150- 3:2016 “Vibration in buildings – Part 3: Effects on structures”, which is understood to be widely used in New Zealand and by Wellington City Council in resource consent conditions.

The guideline values for evaluating effects of long-term vibration are expressed in peak particle velocity (PPV) and are intended to avoid superficial damage to buildings, such as cracking in paint or plasterwork. Of note, the PPV criteria is well below the level at which structural damage would occur. Different PPV criteria applies depending on the land use activity potentially affected. Given the surrounding land uses, the Assessment considers PPV vibration levels for commercial/industrial uses and residential buildings.

The Construction Noise and Vibration Assessment also acknowledges that whilst the primary vibration concern is the potential for building damage, vibration may also have the potential to cause adverse amenity effects to people at vibration levels which are less than the PPV criteria for superficial building damage. British Standard *BS 5228- 2:2009 “Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration”* provides guidance on the amenity effects of vibration and sets out a level of PPVs which range from just perceptible to likely to be intolerable for any more than a very brief period.

Construction activities which may cause perceptible levels of vibration within neighbouring buildings include piling and the use of plate compactors. Rock breaking will also occur at the northern end of the site as part of the removal of part of the former quarry headwall. The vibration levels caused by these works are likely to

be perceptible at times to neighbouring industrial buildings, namely Cyclotek and the proposed WIAL freight hub[12], however this is considered to be to acceptable levels, particularly where prior notice is given to these neighbouring uses. The Construction Noise and Vibration Assessment does not expect vibration from construction to be an issue at residences within the local community. The Assessment therefore recommends that the contractor prepares a vibration management plan which ensures vibration levels remain reasonable at neighbouring properties and that a communications plan ensures adequate communication with immediately surrounding land uses to protect the amenity of staff working in the vicinity. Table 8.7 provides a summary of residual construction vibration effects.

Table 8.7: Residual construction vibration effects

Potential effect	Management/mitigation approach	Specific condition(s) required	Level of residual effect
Adverse vibration effects on dwellings	• N/A	No	Negligible
Adverse vibration effects on Cyclotek and WIAL	• Adherence to a Construction Noise and Vibration Management Plan	Yes	Minor - temporary periods only

8.8 Noise (Operation)

8.8.1 Existing environment

A survey of the existing noise environment has been carried out to provide context for the assessment of operational noise effects arising from the proposal.

As discussed in other topic summaries, the site is largely flat and surrounded by the steep slopes of the former quarry to the east/south. The noise survey confirmed that the existing noise environment within the vicinity of the site is dominated by airport activities and road traffic noise. The operation of the existing wastewater treatment plant (WWTP) provides a level of steady noise due to its 24-hour operation. During airport curfew hours (00:00 to 06:00), the operational noise from the existing WWTP was found to be audible to certain receptors between traffic events. Existing noise emissions from the WWTP therefore form part of the 'existing environment' for the purposes of assessing noise.

The WCDP defines a 'noise sensitive activity' as any residential activity, visitor accommodation and early childhood centres. Sensitive noise receptors within the locality comprise residential properties along Moa Point Road and Kekerenga Street, with both roads separated from the subject site by significant topographic features. These properties are also within the air noise boundary depicted on Map 35 in the WCDP, which includes schools and elderly care facilities within the definition on noise sensitive activities. Whilst other properties within the vicinity of the site may not be noise sensitive, such activities should be protected from noise by best practicable options to a reasonable level, consistent with the existing noise environment.

The existing designation is currently subject to a condition requiring the WWTP to comply with a set of noise standards which are to be measured from any land zoned for residential purposes (refer to Figure 8.3). When monitoring noise levels, the designation condition states that the methods prescribed in NZ Standard 6801:1991 for 'Acoustics – Measurement of sound' shall be used. 'L95' as a noise level descriptor relates to the noise level exceeded for 95% of the time and represents the background noise level. It is considered unworkable to have in place a limitation based on 'L95' as the background noise level is out of the control of the site/project. 'L10' is the noise level exceed for 10% of the measurement period. The NZ standard

[12] Whilst the construction of the proposed WIAL freight hub is likely to overlap with the SMF in part, freight hub expected to be completed whilst SMF still under construction

referenced in the designation has now been superseded by a 2008 version (ref. NZS6801:2008, Acoustics – Measurement of environmental sound).

Noise levels, with corrections applied, measured on any land zoned for residential purposes:

	7am-6pm	6pm-10pm	10pm-7am
L95	45dBA	40dBA	35dBA
L10	55dBA	50dBA	45dBA
Lmax			65dBA

When monitoring noise levels, the methods prescribed in NZ Standard 6801:1991 shall be used.

Figure 8.3: Extract from Designation 58 Condition 5 (Noise)

The WCDP adopts the 2008 noise measurement standard and WCDP condition 11.1.1.8 prescribes permitted activity noise limits within the Airport Area for non-aircraft operations (refer to Figure 8.4). These limits use noise level descriptors which reflect NZS6801:2008. It ought to be noted that a limitation on background noise (as per the 'L95' noise level descriptor within the designation) does not form part of the noise restrictions under Airport Area permitted activity condition 11.1.1.8.

Land based activities

11.1.1.1.8 Noise emission levels, from any activity within the Airport area, other than aircraft operations, engine testing and the operation of APUs (as provided for in rule 11.1.1.1.9) when measured at any residential site shall not exceed the following limits:

Monday to Saturday 7am to 10pm	55 dB $L_{Aeq(15min)}$
At all other times	45 dB $L_{Aeq(15min)}$
All days 10pm to 7am	75 dB L_{AFmax}

Figure 8.4: Extract from WCDP Airport Area Rules, Permitted Activity Condition 11.1.1.8

The key difference between the two standards for measuring noise exceedance within a measurement period is that the former standard (L10) would fail to sufficiently reflect loud activities which occur for less than 10% of the measurement period (such as a jet plane taking off), therefore not fully accounting for potential noise nuisance. Whereas the current standard (LAeq) allows for measurements in a subjectively relevant way, averaging out both steady noise sources and loud activities which may be short in duration. NZS6801:2008 is therefore considered to provide a more robust means of analysis and assessment. Notwithstanding, for steady noise sources, such as will be dominant at the Wellington SMF, the two descriptors are expected to be numerically similar for the purposes of assessing the effects of the SMF.

For completeness, the Noise Effects Assessment **(Appendix K)** therefore considers the noise effects of the proposal in the context of the existing designation condition and underlying Airport Zone noise standard for land-based activities.

8.8.2 Summary of effects

A calculation of proposed noise levels arising from the SMF operation was modelled and calculated on the basis of the proposed plant/equipment to be used within the SMF site, including plant within and outside of the proposed buildings, and took account of proposed changes in topography as a result of the proposal.

The sound power level of equipment inside each building is summed and used to determine a reverberant level which is then radiated by openings in building elevations, such as louvres and doors. Accordingly, noise effects arising from all proposed plant within an individual building is treated as an 'area power source' within the noise model.

Outdoor plant is treated as an individual noise source and placed within the noise model in the location proposed on the General Arrangement Plan, ref. 3258521-DA-000-K1201 Rev A[13].

The noise model produces calculated noise levels at noise sensitive locations and takes into a range of factors including distance, air absorption, intervening shielding and ground attenuation. The calculation presumes that all plant runs all of the time (ie 24/7).

As set out in Sections 5.3 and 6 of the Noise Effects Assessment, the calculated sound pressure level at all dwellings with the potential to be affected is less than the 45 dBA L_{10}[14] night-time noise limit, referenced in the designation conditions. Accordingly, the sound pressure level is also well within the equivalent daytime noise limit of 55 dBA L_{10}.

The calculations assume that no tones or impact sounds are present or are masked by noise from other items of plant or the ambient environment. It will therefore be necessary to ensure that the loudest items of plant, particular outdoor odour control fans, are free from such character.

The measured background noise levels for residents at both Kekerenga Street and Moa Point Road suggest that the SMF noise would be largely masked by ambient noise during daytime hours and any increase in noise level resulting from the SMF would be negligible. Whilst the SMF would be audible during the night-time, where background noise is reduced, any effects would be at a reasonable level and well within the noise limitation imposed by both the existing designation conditions and the WCDP Airport Zone noise standards. Noise effects on residents at Kekerenga Street and Moa Point Road are therefore considered to be less than minor.

The noise levels experienced by Cyclotek immediately adjoining the SMF site to the south will be 69 dBA. These do not exceed the noise limitations within the designation and WCDP Airport standard as such limitations do not apply to activities which are not defined as 'noise sensitive'.

In order to ensure that the noise effects arising from the operation of the SMF are less than minor to noise sensitive activities, it is recommended that a condition is imposed on the eventual designation which requires the SMF to comply with the noise limits of the WCDP for non-aircraft related activities in the Airport Zone, when measured from the boundary of land zoned for residential purposes. This will ensure that the condition reflects the latest New Zealand noise standards. This approach is supported by the Acoustic Engineer within the Council's City Consenting and Compliance Team through pre-application engagement.

Conclusion

The level of noise effects generated by the proposal during operations will comply with existing noise standards in the WCDP within the Airport Zone. Sensitive noise receptors within the vicinity of the site comprise dwellings only. The proposed condition will apply a performance standard which the SMF must adhere to during operations at all times. This will ensure that effects on the occupiers of neighbouring dwellings will be less than minor. Table 8.8 provides a summary of residual operational noise effects.

[13] The Noise Effects Assessment is also informed by indicative equipment / floor layouts for modelling purposes

[14] Ranging between 26 and 42 dBA L_{10}.

Table 8.8: Residual operational noise effects

Potential effect	Management/mitigation approach	Specific condition(s) required	Level of residual effect
Adverse noise effects on dwellings during operations	• Compliance with WCDP Airport Zone noise limitation for land based, non-aircraft related activities (Rule 11.1.1.8).	Yes	Less than minor

8.9 Transport and traffic

This section considers both construction and operational effects in relation to traffic movements to and from the site.

8.9.1 Existing environment

Stewart Duff Drive provides direct access to the site frontage, as well as the existing WWTP via an access track. Stewart Duff Drive can be accessed from Moa Point Road to the south.

There are a number of constraints around the Airport precinct and at the site, including narrow and tortuous roads to the east of the site and a tunnel with restricted height and width on the west of the site. Vehicles are also constrained travelling via the Airport precinct to the north which has automatic gate machines which also restrict vehicle heights and widths, being marginally narrower than the tunnel. It is therefore anticipated that the main access for construction traffic would be via the Stewart Duff Drive/Moa Point Road intersection, thereby avoiding the automatic gate machines. This access option also reflects existing designation condition 18 which required construction vehicles associated with the original Moa Point WWTP construction to access the site via Moa Point Road only. Oversized goods/materials would however need to be transported to site via the WIAL runway on an as needed basis, which could only occur during airport curfew hours (00:00 to 06:00 hours).

In order to inform the assessment of transport effects during both operation and construction, two heavy vehicle routes have been identified, both of which connect to SH1.

In order to consider effects on the surrounding road network, the Transport Assessment considers traffic data available for SH1 and roads within the vicinity of the site, as well as the safety of key intersections to be used by construction traffic. The assessment also considers the potential for conflict with vehicular and pedestrian traffic associated with schools and day-care facilities along the two identified heavy vehicle routes, as well as the potential for conflict with cyclists through assessment of cycleway routes and cycle counts.

8.9.2 Summary of effects (Construction)

As previously highlighted, due to constraints for heavy vehicles in the surrounding road network, it is anticipated that the main access for construction traffic would be via the Stewart Duff Drive/Moa Point Road intersection via two potential routes identified in Figure 8.5. Over dimension vehicles /loads would need to be transported via the Airport runway during airport curfew hours, as per the identified ‘Airport Runway 34’ route.

Figure 8.5: Proposed construction traffic routes

An estimation of anticipated traffic generation and traffic distribution arising from the construction phase has been carried out on the basis of the indicative construction methodology, previously outlined in section 4.6.

The daily construction truck movements are generally expected to be around 5 to 14 per day, on average, across the whole construction programme, other than where the digester construction is anticipated to overlap with the building foundation construction and subsequent plant installation activities. The expected highest heavy truck movements would be the foundation construction for the digesters and biogas storage (including concrete pours) which would have a total of approximately 200 heavy vehicle movements per day. In the most intense period, the average hourly traffic volumes during the daytime are estimated to be 18 truck movements per hour, including daily construction trucks and the concrete trucks for digester construction. These estimates, for the most intense period, are based on trucks operating between 3:00am to 6:00pm on the estimated five to ten days that concrete pours will be required during the construction programme.

The existing designation is subject to a condition which restricted the construction hours for the development of the existing WWTP to Monday to Friday 07:00 to 18:00 and Saturday 09:00 to 15:30. Accordingly, new conditions are proposed for the SMF construction which allow for the above construction activities to occur (**Appendix D**).

Whilst the two construction routes identified are considered to be appropriate for daily construction traffic, the Transport Assessment considers that there is the potential for adverse safety impacts on the road network due to the increase in heavy trucks for the intensive concrete pour activities. The key potential safety issues identified include:

- an increase in heavy truck movements along routes which will already contain a high level of pedestrian activity during peak school drop off and pick up times, including children making their own way to and from school; and

- an increase in heavy truck movements along routes which are anticipated to have an increased level of recreational users, particularly Lyall Parade throughout weekends (other than winter) and throughout the summer break (especially the Christmas holiday period).

Land to the north-west of the application site (the hillock) is proposed to be used as the main off-site construction yard for the proposal. As there will be a need for staff to cross Stewart Duff Drive to move between the site and the main yard, a reduced speed limit and temporary crossing point is recommended for the safety of construction staff.

During construction it is anticipated that Stewart Duff Drive will need to be closed to the public for prolonged periods to facilitate construction traffic movements, heavy lifts, pre-cast panel erection and other similar activities, particularly where the construction of the SMF overlaps with the construction of the proposed WIAL freight hub. It is assumed however that staff vehicles associated with the construction will still be able to access the site from both directions of Stewart Duff Drive.

Staff vehicle movements associated with the SMF construction will occur before and after the core construction work hours of 07:00 and 18:00 (ie before construction work commences and after it finishes). This will be outside of the peak hours of general traffic and will therefore have a minor impact on the transport network. The busiest time for staff vehicles across the whole construction phase is anticipated to be between 06:00 and 07:00 during the plant installation phase which will involve the greatest number of construction personnel, and which will also involve the crossover of some night and day shifts. Given the volumes of traffic on the surrounding network and that staff traffic will be distributed via several roads, such effects should be satisfactorily accommodated. It is anticipated that staff vehicle parking can occur on the main off-site construction yard. Notwithstanding, car/van pooling will be encouraged as part of the contractor's construction traffic and parking management plan.

The Transport Assessment therefore proposes that the SMF is subject to a condition requiring the preparation of a Construction Traffic Management Plan (CTMP) which commits to a range of mitigation measures to manage all identified safety concerns and potential for conflict between road users. The CTMP will be guided by a range of road safety objectives and will include the following measures:

- Site specific traffic management, temporary speed limit and pedestrian management measures on Stewart Duff Drive and around the site office.
- On-site parking management, together with a staff travel management plan.
- Driver training and induction will need to be provided to the truck drivers to make them aware of the potential for school children crossing the road at certain locations and times.
- For all concrete pour activities, heavy vehicle routing via Lyall Parade, Onepu Road and Evans Bay Parade (Route 1) is recommended as the preferred route.
- Outside of the summer break, proposed concrete pours should only take place on weekdays and should finish before 10:00am on Saturdays. During the summer break, proposed concrete pours should finish prior to 10:00am Monday to Saturday.

Cumulative construction traffic effects

The construction of the proposed WIAL freight hub is likely to overlap, at least in part, with the construction of the SMF. This would inevitably result in other additional heavy vehicles on the network and may also require the closure of the southern extent of Stewart Duff Drive at times. This will result in users of this section of Stewart Duff Drive, particularly those accessing the airport, to travel to WIAL from the north. The scale and phasing of the construction traffic from the WIAL activity is not yet known. If it is to be significant, additional mitigation measures may be required. Accordingly, a requirement of the proposed designation conditions is for WCC to coordinate with WIAL in the preparation and submission of a Construction Traffic Management Plans to WCC (as the road controlling authority) which will manage both the effects of the SMF construction and the cumulative effects arising from any overlap with WIAL construction activities.

The Transport Assessment also notes a number of planned construction activities and road improvements/maintenance along the proposed construction routes. The CTMP, as required by condition, will therefore require coordination with Wellington City Council to understand how such construction activities may impact SMF site traffic.

Table 8.9 provides a summary of residual construction traffic effects.

Table 8.9: Residual construction traffic effects

Potential effect	Management/mitigation approach	Specific condition(s) required	Level of residual effect
Adverse effects on pedestrians using Stewart Duff Drive during construction	• Construction Traffic Management Plan (CTMP) – including closure of footpaths with alternative routes or appropriate protection provided / managed.	Yes	Minor
Adverse effects on the safety of construction staff during construction	• Construction Traffic Management Plan (CTMP) • Construction vehicles to adhere to a 30km/h speed limit along Stewart Duff Drive • Create a temporary crossing point	Yes	Minor
Adverse effects on local road network arising from construction staff parking	• CTMP will encourage staff car/van pooling • Liaise with WIAL regarding potential to utilise airport parking	Yes	Minor
Adverse effects of heavy vehicle traffic on inappropriate local roads	• CTMP to detail appropriate construction routes, as recommended in Transport Assessment	Yes	Minor
Adverse effects of construction traffic passing schools	• CTMP to detail driver training to raise awareness of this risk	Yes	Minor
Adverse effects of intensive periods of construction traffic due to concrete pour activities	• CTMP will identify Route 1 for the use of concrete trucks • CTMP to restrict concrete pour activities so that outside of the summer break, they only occur during weekday general construction hours and finish prior to 10:00 on a Saturday. During the summer break, concrete pours will need to finish prior to 10:00 on weekdays and Saturdays. • CTMP will recommend closure of Stewart Duff Drive to the public or appropriate management.	Yes	Minor

Potential effect	Management/mitigation approach	Specific condition(s) required	Level of residual effect
Adverse cumulative effects on traffic and transport, and users of Stewart Duff Drive, as a result of overlapping WIAL construction activities	• Preparation of a joint CTMP with WIAL to coordinate construction activities	Yes	Minor
Adverse effects on Onepu Road transitional cycleway construction and other construction activities along the proposed construction routes	• CTMP to require coordination with WCC to understand timing and nature of construction activities to occur along the proposed construction routes	Yes	Minor

8.9.3 Summary of effects (Operation)

During the operational phase, heavy vehicles will need to access the site for the collection/export of dried sludge, access for chemical loading and access to the plant for general maintenance. Vehicle movements associated with the SMF will also occur for the import of sludge from Western (Karori) WWTP, however this sludge will be handled at the existing Moa Point WWTP and such movements would not require access to the SMF site specifically. Notwithstanding, total operational trips associated with the SMF will be in the region of seven heavy vehicles per day (total of 14 movements in and out). Further to this, a 12m general service vehicle is expected to access the site occasionally.

For maintenance purposes, a one-week shutdown is anticipated to occur once a year where there is the potential for a low bed truck, or hiab truck and/or a mobile crane for equipment removal and replacement, depending on the type of maintenance work been undertaken. It is anticipated that normal operational movements will occur during this maintenance period.

In summary, there is expected to be no more than 14 truck movements (seven trucks) per day during general operation. An additional truck is anticipated per month for general service purposes. No more than one truck per day is anticipated per day during the one-week shutdown period.

In terms of light vehicle movements, it is envisaged that the SMF will have two staff on site at all times, operating on a shift basis. This is anticipated to result in 12 light vehicle movements per day, if all staff commute to site using private vehicles. Due to site constraints, there is currently no parking identified within the SMF site boundary. As the design is further refined, there may be opportunities to provide on-site parking for operational staff. There would however be an opportunity for staff to utilise parking at the existing WWTP.

Staff numbers are expected to increase to 10 to 12 persons during the annual one-week shutdown period. Depending on the nature of maintenance to be undertaken during the shutdown period, staff vehicle movements are likely to involve trade vans or utes and potentially a low bed truck, Hiab truck and/or mobile crane for equipment removal/replacement. It is anticipated however that such staff would park their service vehicle within the site to provide direct access to the plant being maintained. This has the potential to cause conflict between service vehicles and standard operational movements that continue and require movements internal to the site. The Transport Assessment recommends that a detailed management plan is prepared and adhered to during the shutdown period, which will form a condition of the altered designation. The management plan should include the schedule of the maintenance activity and the normal truck operation, anticipated movements of the maintenance trucks and the management of the temporary on-site parking.

The proposal has also been assessed in terms of potential safety issues or areas of conflict at site access/egress points and internal traffic circulation. This exercise has relied on vehicular tracking on an indicative site plan. Whilst the final design and layout of the SMF is yet to be finalised, this site plan is considered to be sufficient to determine potential safety issues with site access/egress and vehicle movements within the site itself. The indicative site plan proposes four access points, three from Stewart Duff Drive and one from the WWTP access road. As the proposal will introduce new truck movements along the WWTP access road for the import Karori sludge to the existing WWTP, potential safety or conflict issues associated with these movements are also considered.

The Transport Assessment identifies the following safety issues:

- Restricted sight distance at Stewart Duff Drive/WWTP access road intersection
- WWTP Access Road not currently suitable for two-way use
- Whilst only required on an as needed basis, maintenance truck movements will be required to reverse into the site from Stewart Duff Drive for the repair of the IPS pumps. This could pose a risk to pedestrians within driver blind spots and creates potential for rear-end crashes with southbound vehicles.
- The southernmost access/egress along Stewart Duff Drive is over 10m wide and will place pedestrians in potential conflict with vehicles for an extended time.

On the basis of the above, a condition is proposed which requires the preparation and submission of an Operational Traffic Management Plan (OTMP) which commits to a range of mitigation measures to manage all identified safety concerns and potential for conflict between road users.

Table 8.10 sets out proposed mitigation measures to address all operational traffic safety issues to ensure that the level of residual effect is no more than minor. These measures would be secured through conditions to ensure that the final design and layout of the SMF will ensure any potential adverse traffic and transport effects are managed to an acceptable level.

The WIAL 2040 masterplan proposes the realignment of Stewart Duff Drive which may affect the existing WWTP access and any SMF access points towards the northern end of the site. This however can be addressed at an appropriate time in the future between WIAL and WCC (and relevant Moa Point WWTP and SMF operators).

Table 8.10: Residual operational transport effects

Potential effect	Management/mitigation approach	Specific condition(s) required	Level of residual effect
Adverse effects on traffic and transport during general operations	• Operational Traffic Management Plan which considers the following safety issues, where relevant to the final design: – Measures to alert other road users and pedestrians along Stewart Duff Drive (SDD) of operational traffic – All operational vehicles to adhere to a 30km/h speed limit along relevant section of Stewart Duff Drive (SDD). – Managing potential for conflict of two-way traffic	Yes	Minor

Potential effect	Management/mitigation approach	Specific condition(s) required	Level of residual effect
	along the WWTP access road – Managing the potential for conflict with other road users through site access/egress points		
Adverse effects on pedestrians during operation	• OTMP – Including driver training to yield to pedestrians when exiting the site from Stewart Duff Drive	Yes	Minor
Adverse effects on transport and traffic during annual maintenance period	• Traffic Management Plan for annual shutdown period	Yes	Minor

8.10 Land contamination effects

8.10.1 Summary of Detailed Site Investigation

A Detailed Site Investigation (**Appendix R**) has been carried out to identify current or historical land uses which have the potential to cause land contamination within the site and determine whether any of the proposed works pose a risk to human health or the environment.

A desktop assessment of the site found that the existing Aviation Ground Services (AGS) building is identified as a contaminated site in Appendix 5 of the Airport and Golf Course zone chapter of the WCDP. The AGS is currently in use as an airport mechanics workshop and was previously used as a milliscreen facility in the 1980s. A range of waste and debris was observed around the AGS building during the walkover of the site, which has accumulated between the latest historical photography in 2000 and the present day.

The inlet pump station (IPS), forming part of the wider Moa Point WWTP, is also identified on the Greater Wellington Regional Council Selected Land Use Register (SLUR). The IPS stores corrosive chemicals in above ground tanks but has concrete bunding beneath each tank that appear clean and well-maintained. There is a diesel underground storage tank (UST) at the IPS to fuel the emergency generator within the building. It has a capacity of 15,000L and is double walled. However, the depth and condition of the UST is unknown.

The AGS building and all above ground structures associated with the IPS are to be demolished as part of the project and the UST is to be extracted.

Given the extent of historical soil excavation and earthworks that has occurred on site, there is very little soil remaining beneath the site. An intrusive investigation was carried out where possible from a shallow surface (<0.3 m below ground level) around the AGS building. According to the samples analysed, these soils are unlikely to pose a risk to human health or the receiving environment. The investigation was unable to carry out groundwater sampling due to groundwater depths being below the piezometer screen depth.

Since the samples were undertaken, the project footprint was expanded to incorporate the aforementioned IPS building and removal of the northern section of the former quarry headwall. It however was considered unnecessary to conduct additional soil sampling around the IPS facility due to the good condition of the building itself and the shallow bedrock / minimal soil issue experienced with the original sampling regime.

Given the uncertainty around the depth and condition of the UST, it is unknown how much soil, if any, would be disturbed to extract it.

8.10.2 Summary of potential land contamination effects

Whilst the nature of the site has only allowed limited soil sampling to occur, on site soil is likely to meet the definition of clean fill and accordingly any proposed soil disturbance would not give rise to adverse effects on human health or the receiving environment.

Notwithstanding the above, given the uncertainties around the original installation of the UST, the lack of groundwater sampling that could occur and the historical land uses, an unexpected discovery approach is considered appropriate during the proposed earthworks and UST extraction. The UST removal would also be preceded by a soil investigation, which is a requirement of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NESCS) permitted activity standards. This will inform options for disposal and/or reuse of soil disturbed in and around the IPS. It is anticipated that the UST extraction will comply with permitted activity standards under the NESCS given the shallow soil and bedrock at the site.

These precautionary measures are contained within a Contaminated Soils Management Plan (CSMP), as appended at **Appendix S**. A designation condition is therefore proposed to ensure that the SMF works are carried out in accordance with the CSMP.

Table 8.11 provides a summary of residual land contamination effects.

Table 8.11: Residual land contamination effects

Potential effect	Management/mitigation approach	Specific condition(s) required	Level of residual effect
Risk to human health or the environment through unexpected discovery of contaminated soils or groundwater during construction	All earthworks and extraction of diesel UST to be undertaken in accordance with a Contaminated Soils Management Plan	Yes	Less than minor

8.11 Erosion and sedimentation effects

Earthworks to facilitate the construction of the SMF have the potential to discharge sediment laden run-off to the coastal marine area and local authority stormwater network. With regard to potential effects on the coastal marine area, this can cause a local and temporary increase in turbidity and suspended solid concentrations, thereby reducing coastal water quality. High sediment concentrations can have adverse effects on aquatic ecology, including the smothering of organisms, reducing the abundance and diversity of macroinvertebrates, and harming fish populations as many fish are visual feeders.

Earthworks also have the potential to carry dust and dirt by wind, water or construction vehicles which can cause a nuisance to neighbouring properties, on roads and footpaths, in drainage channels and sumps, and in the stormwater system.

Erosion and sediment control measures, as outlined in the draft ESCP (**Appendix M**), will be implemented on site throughout the duration of the construction activities to avoid or minimise the above effects. The specific erosion and sediment controls implemented will vary depending on the stage of construction works and will be targeted appropriately towards the different earthworked areas. However, the primary treatment device will be a Decanting Earth Bund (DEB) positioned at the lowest point of the catchment area, to contain and treat sediment laden run-off from the majority of the disturbed areas. The DEB will be chemically treated to allow for the effective removal of sediment entering this device. Perimeter silt fencing, silt socks and geofabrics will also be installed to minimise sediment from leaving the site or entering the local authority

stormwater network. All controls will be designed, constructed, and maintained in accordance with GWRC's Guidelines.

Table 8.12 provides a summary of residual erosion and sediment effects.

Table 8.12: Residual erosion and sediment effects

Potential effect	Management/mitigation approach	Specific condition(s) required	Level of residual effect
Discharges of sediment run-off to the stormwater network and coastal marine area.	Implementation of erosion and sediment controls	Yes	Less than minor

8.12 Flooding and stormwater

An assessment of the actual and potential flooding and discharges of operational stormwater effects is attached at **Appendix N**.

The model results for the 20 and 50 year average recurrence intervals (ARI) (post development), shows very little ponding occurring within the site. The only ponding that does occur is in the vicinity of the proposed digesters. The onsite stormwater network is under or near capacity in the 20 year ARI event, and thus has capacity to convey the additional flows from the ponding around the digesters. In the 50 year ARI event, several pipes surcharge however, the stormwater pipeline from the WWTP to the outfall along Stewart Duff Drive has capacity available for these additional flows. Moreover, the results show that no flow enters the airport from the SMF site.

Flooding effects during a 100 year ARI event with climate change have also been considered. During this event, the primary drainage network (ie pipes, manholes, and sumps) are surcharged due to the exceeded capacity of this infrastructure. However, the pattern of flooding onsite is generally similar to the modelled 20 and 50 year ARI events and is considered to be minor - it is less than 50mm across the entire site.

Stormwater quality treatment will be provided by a proprietary treatment device (a Stormfilter) to minimise contaminants, from roads, accessways, and carparking, entering the stormwater network, and ultimately the coastal marine area, from new impervious areas within the site. This device is comprised of a manhole structure that contains rechargeable, media-filled filter cartridges which are designed to absorb and retain contaminants from stormwater run-off. Stormwater entering this device is siphoned through these media filled cartridges, with the treated stormwater then being discharged through an outlet pipe to the stormwater network.

The digester tanks may result in residual ground contamination and a risk to the stormwater system if there was a breach or leak of wastewater from the tanks. Therefore, this area will be bunded and isolated from the primary stormwater system and discharged to the WWTP.

A summary of residual flooding and stormwater effects are provided at Table 8.13.

Table 8.13: Residual flooding and stormwater effects

Potential effect	Management/mitigation approach	Specific condition(s) required	Level of residual effect
Flooding of, and damage to, downstream infrastructure and property	Upgrading existing stormwater infrastructure within the site to increase its capacity to convey additional stormwater flows and ensure that no flow enters the Airport from the site.	Yes	Less than minor

9 Statutory assessment

9.1 Financial responsibility

With respect to section 168A(1)(a), WCC has financial responsibility for the SMF.

9.2 Section 168A(3) matters

Section 168A(3) of the RMA sets out the matters to be covered by the NoR:

> *When considering a requirement and any submissions received, a territorial authority must, subject to Part 2, consider the effects on the environment of allowing the requirement, having particular regard to -*
>
> *(a) any relevant provisions of -*
>
> > *(i) a national policy statement:*
> >
> > *(ii) a New Zealand coastal policy statement:*
> >
> > *(iii) a regional policy statement or proposed regional policy statement:*
> >
> > *(iv) a plan or proposed plan; and*
>
> *(b) whether adequate consideration has been given to alternative sites, routes, or methods of undertaking the work if -*
>
> > *(i) the requiring authority does not have an interest in the land sufficient for undertaking the work; or*
> >
> > *(ii) it is likely that the work will have a significant adverse effect on the environment; and*
>
> *(c) whether the work and designation are reasonably necessary for achieving the objectives of the requiring authority for which the designation is sought; and*
>
> *(d) any other matter the territorial authority considers reasonably necessary in order to make a decision on the requirement.*

9.2.1 Section 168A(3)(a) – Relevant planning documents

An assessment of the proposal against the relevant national, regional and local planning documents and Part 2 of the RMA is provided later in this chapter. The assessment concludes that the proposal is consistent with the objectives and policies within the NZ Coastal Policy Statement, the National Policy Statement on Urban Development, the Wellington RPS, the Operative Wellington City District Plan and the Proposed Wellington City District Plan, as well as Part 2 of the RMA.

As previously identified, an application under the NES-CS is not required and thus no assessment against this national environment standard has been undertaken.

9.2.2 Section 168A(3)(b) – Consideration of alternatives

A consideration of alternative sites and process options and sites for undertaking the proposed works has been undertaken and is summarised in Section 6 of this AEE. This demonstrates that a robust process has been undertaken in relation to identifying the nature and location of the proposed works, and there has been adequate consideration has been given to alternative sites, routes, or methods of undertaking the work.

9.2.3 Section 168A(3)(c) – Reasonably necessary to achieve project objectives

The proposed works and designation must be reasonably necessary for achieving the objectives for which the designation is sought. The objectives of the requiring authority for which the designation is sought are to:

1. Significantly reduce the operational impact of sludge management at Southern Landfill.
2. Provide a sustainable and resilient long-term solution for sludge management from Wellington's WWTPs, that:
    a. Has appropriate capacity to provide for projected population growth, and aligns to associated infrastructure planning; and
    b. Can be integrated into the wastewater network in a cost-effective manner.
3. Reduce the environmental impact of sludge disposal, particularly in terms of:
    a. Carbon emissions; and
    b. Odour at the disposal site.

The proposed designation is reasonably necessary for achieving the project objectives because:

- The designation will enable the proposal to be constructed, operated and maintained in accordance with the conditions. Following its construction, the designation will provide WCC the flexibility to undertake required operation and maintenance activities without having to apply for a new consent every time.
- The designation enables the work to be undertaken in a comprehensive and integrated manner.
- The designation provides certainty through identifying in the WCDP the location, nature and extent of the SMF proposal and the intended use of the land.

Overall, the proposed works are considered reasonably necessary to meet the project objectives.

9.2.4 Section 168A(3)(d) – other matters

An assessment of the proposal is also undertaken below against the following other documents, which are considered to be of relevance to the proposal as regionally significant infrastructure:

- Aotearoa New Zealand's First Emissions Reduction Plan
- Wellington Region Waste Management and Minimisation Plan (WMMP) 2017 – 2023 (2017)
- Te Atakura - First to Zero, Wellington's Blueprint for a Zero Carbon Capital (June 2019) and First to Zero Implementation Plan (August 2020
- Wellington City Council's Long-term Plan 2021-2031 (June 2021).

9.3 NZ Coastal Policy Statement

The NZ Coastal Policy Statement (NZCPS) came into force on 3 December 2010. The NZCPS sets out the objectives and policies for managing New Zealand's coastal environment under the RMA.

Objective 1 aims to safeguard the integrity form, functioning, and resilience of the coastal environment and sustains its ecosystems. Additionally, Policy 22 aims to manage the effects of sedimentation and its impacts on the coastal environment from land use and development. Discharges from the site will ultimately enter the CMA via the existing stormwater network. An ESCP has been developed in accordance with the relevant guidelines for the Wellington Region to minimise sedimentation and run-off entering the CMA during the earthworks to construct the SMF. The actual and potential adverse effects of sedimentation will be managed through a suite of erosion and sediment controls which are described and shown within the ESCP as well as the monitoring that will be undertaken for each control/treatment device to ensure sediment loadings within the run-off is reduced prior to it discharging off site.

Objective 2 seeks to preserve the natural character of the coastal environment and protect natural features and landscape values. Policy 13 directs the avoidance of effects on areas of outstanding natural character, and also of significant effects on the natural character values of other areas. With respect to Policy 1 of the NZCPS, the WCPDP identifies the SMF site and surrounds as being with the coastal environment. However, the site is not within a 'High Coastal Natural Character Area', and the LVA assessed the site as having 'low' natural character. The LVA concludes that the proposal would not adversely affect the natural character of the coastal environment, largely due to the highly modified nature of the site. As such, the proposal is consistent with the natural character objective and Policy 13 of the NZCPS.

In relation to Policy 6(1)(i) of the NZCPS, the site is not within, or near to, any areas of Coastal or Riparian Margin.

Objective 3 and Policy 2 aim to ensure that the principles of the Treaty of Waitangi and the concept of kaitiakitanga have been provided for. In this regard, iwi stakeholders were engaged during the initial optioneering process to determine a preferred process and site option. This included consultation with iwi to assist in the short listing of process options to understand cultural concerns with sludge management that might influence process selection. The short list of sites and process options was then considered as part of a multi criteria analysis (MCA), with the basis of the MCA criteria collaboratively developed with iwi and other key stakeholders.

The SMF project has sought to align with key mana whenua principles through the following measures, of relevance to the coastal environment:

- removing need to use existing sludge transfer pipelines as part of waste management and therefore removing environmental risks associated with recurring failure of these pipelines;
- ensuring that the quality and quantity of treated wastewater discharged to sea as part of current Moa Point WWTP is not materially altered by the proposal.

Overall, the proposal is consistent with the relevant objectives and policies of the NZCPS.

9.4 National Policy Statement on Urban Development

The National Policy Statement on Urban Development 2020 is "about ensuring New Zealand's towns and cities are well-functioning urban environments that meet the changing needs of our diverse communities. It removes overly restrictive barriers to development to allow growth 'up' and 'out' in locations that have good access to existing services, public transport networks and infrastructure".[15]

Objective 6, in particular, promotes the integration of urban development with infrastructure planning. The SMF is a key piece of infrastructure in enabling 50,000 to 80,0000 more people to live in Wellington City over the next 30 years. As such, the proposal is consistent with promoting and enabling well-functioning urban environments.

The NPS also promotes urban environments that support reduction in greenhouse gas emissions (Objective 8). The SMF will make a significant contribution to reducing greenhouse gas emissions from sludge disposal and is consistent with this objective.

9.5 Regional Policy Statement for the Wellington Region

The Regional Policy Statement (RPS) sets the direction for the future management of the Wellington Region's natural and physical resources and became operative on 24 April 2013. Its purpose is to promote

[15] Ministry for the Environment (2022) *National policy statement on urban development* [online] available at: https://environment.govt.nz/acts-and-regulations/national-policy-statements/national-policy-statement-urban-development (Accessed July 2022).

the sustainable management of natural and physical resources through establishing a framework to manage these resources.

The objective and policies of the RPS seek to avoid, remedy, or mitigate adverse effects on habitats and the quality of water within the coastal environment as well as discharges of odour to air and its impacts on human health and amenity. Additionally, it contains overarching provisions which recognise and protect the social, economic, and environmental benefits of regionally significant infrastructure and provide for the interests and responsibilities of tangata whenua such as facilitating their role as kaitiaki.

A detailed assessment of these provisions is provided at Table 9.1. Overall, the proposal is considered to be consistent with the relevant provisions of the RPS.

Table 9.1: Assessment of the relevant objectives and policies of the RPS

Relevant provisions	Assessment
Objective 1 Discharges of odour, smoke and dust to air do not adversely affect amenity values and people's wellbeing.	Objective 1 and Policy 2 seek to ensure discharges of odour to air do not adversely affect human health, amenity values and people's values, and any adverse effects associated with the discharge of odour is reduced. As noted in the air quality assessment, good practice measures will be implemented on site during the commissioning phase of the SMF to minimise offensive or objectionable odours on nearby residential dwellings. In terms of dust during earthworks, standard dust mitigation techniques will minimise the generation and emission of dust beyond the site boundary. These techniques will be included within the ESCP and will include the use of water sprays and dust suppressants, minimising areas of exposed surfaces, and stabilising exposed surfaces as soon as practicable.
Policy 2 Reducing adverse effects of the discharge of odour, smoke, dust, and fine particulate matter.	
Objective 6 The quality of coastal waters is maintained or enhanced to a level that is suitable for the health and vitality of coastal and marine ecosystems.	Objective 6 and Policies 5 and 40 seek to ensure coastal water quality is maintained or enhanced to a level that it supports and safeguards coastal and marine ecosystem health. The proposal maintains coastal water quality and safeguards coastal and marine ecosystem health through the implementation of onsite erosion and sediment controls during the earthworks to avoid or minimise discharges of sediment laden run-off to the coastal marine area. These controls will be constructed and maintained in accordance with the relevant guidelines for the Wellington Region and are described and shown within the ESCP appended to this AEE.
Policy 5 Maintaining and enhancing coastal water quality for aquatic ecosystem health.	
Policy 40 Safeguarding aquatic ecosystem health in water bodies	
Objective 10 The social, economic, cultural and environmental, benefits of regionally significant infrastructure are recognised and protected.	Objective 10 and Policy 7 recognise and seek to protect the social, economic, and environmental benefits of regionally significant infrastructure. It is considered that the proposal itself will be regionally significant infrastructure, contributing to both local and regional waste minimisation targets, as well as local and national emissions reduction targets. The social and economic benefits are recognised through the provision of a resilient and long-term solution of sludge management in Wellington City for its current and future population. In terms of its environmental benefits, the proposal will
Policy 7 Recognising the benefits from renewable energy and regionally significant infrastructure.	

Relevant provisions	Assessment
	significantly reduce the adverse environmental effects associated with current sludge disposal. The main benefits are virtually eliminating the odour effects at the landfill and substantially reducing leachate to land. Overall, the project reduces the total volume of sludge and has enabling benefits, such as its ability to reuse processed sludge for alternative uses, rather than continuing to be disposed of to landfill.
Objective 24 The principles of the Treaty of Waitangi are taken into account in a systematic way when resource management decisions are made.	Objectives 24 and 25 and Policies 48 and 49 seek to ensure that the principles of the Treaty of Waitangi and the concept of kaitiakitanga, including matters of significance to tangata whenua, have been provided for. Taranaki Whanui and Ngati Toa were involved in the selection and framing of the proposal through the MCA process. The SMF project has sought to align with key mana whenua principles through the following measures: • removing need to use existing sludge transfer pipelines as part of waste management and therefore removing environmental risks associated with recurring failure of these pipelines; • treating and stabilising the sludge to a state that will result in reduced odour emissions at the disposal site; • treating and stabilising the sludge to a state that will result in reduced leachate at the disposal site • recovering energy and water derived from the treatment process, as alternative power and water sources to service the SMF; • enabling beneficial re-use of the end product, thereby giving the sludge another life and purpose; • ensuring that the quality and quantity of treated wastewater discharged to sea as part of current Moa Point WWTP is not materially altered by the proposal.
Objective 25 The concept of kaitiakitanga is integrated into the sustainable management of the Wellington region's natural and physical resources.	
Policy 48 Consideration of the Principles of the Treaty of Waitangi.	
Policy 49 Recognising and providing for matters of significance to tangata whenua.	

9.6 Wellington City District Plan

The Wellington City District Plan (WCDP) became operative in 2000. It sets the framework for land use planning and contains the current provisions and rules which manage Wellington City's resources and environment.

An assessment of the proposal against the relevant operative WCDP provisions is contained in Table 9.2.

Table 9.2: Assessment of the relevant objectives and policies of the WCDP

Relevant provision	Assessment
Chapter 24: Designations	
Objective 24.2.1 To provide for designations only, where they are necessary, to ensure the efficient functioning and operation of public works.	The NOR seeks to alter the existing Wellington City Council designation 58. The altered designation is necessary to secure the land and to provide for the efficient functioning and operation of the SMF which will significantly reduce the environmental impacts of disposal of Wellington City's wastewater. WCC will have financial responsibility for the SMF. The use of a designation to provide for the SMF is entirely consistent with the objectives and policies for designations in the WCDP. With regards to Policy 24.2.1.3, the altered designation will include a comprehensive set of conditions to manage and mitigate the potential adverse effects of the SMF.
Policy 24.2.1.1 Maintain only those designations for which Council has financial responsibility that are necessary to secure land and to provide for the safe and efficient functioning and operation of public works.	
Policy 24.2.1.3 Avoid, remedy or mitigate adverse environmental effects of public works by including management provisions for their operation in the District Plan.	
Chapter 22: Utilities	
Objective 22.2.1 To provide for the efficient development and maintenance of utility networks and the activities of other utility operators throughout the city while avoiding, remedying or mitigating any adverse effects of activities on the environment.	These provisions recognise the critical role and value that network utilities provide for the city and its residents. The proposal is consistent with these provisions as it will provide for the introduction of an innovative solution for the treatment and disposal of sludge that is currently sent to landfill. The proposal seeks to utilise previously developed land immediately adjacent to the existing Moa Point wastewater treatment plant (WWTP). From a network perspective, locating the SMF next to the existing Moa Point WWTP is particularly efficient and avoids the need to convey untreated sludge significant distances either by pipe or trucks. With regard to Policy 22.2.1.B specifically, the site is not within a highly valued or sensitive environment and is not located on reserve land. The proposal has been designed to avoid, remedy and mitigate potential adverse effects. Unusually for this type of facility, all elements of the process will be completely enclosed within buildings and structures. This will allow for a very high level of odour control to be provided (including odour treatment for the existing IPS structure which is the source of the majority of odour complaints in recent years). Full enclosure of all process equipment also means that noise effects will be minimal and within district plan limits.
Policy 22.2.1.2 Have regard to the operational requirements of utility networks when exercising discretion in any resource consent process. **Policy 22.2.1.1B** To recognise reserve land values (typically zoned as either Open Space or as Conservation Sites) in the siting of utilities. Some utilities may be appropriate on Open Space A land as this land typically contains buildings and/or structures which can be used to mitigate the effects of utilities. On Open Space B and C land and Conservation Sites, utilities are generally discouraged but may be appropriate, where there are no reasonable siting alternatives and where adverse visual effects can be appropriately mitigated, in particular for those utilities associated with the operation of legal roads.	

Relevant provision	Assessment
Policy 22.2.1.3 Encourage utility networks to be sited underground (except for aerials, antennas, masts, utility network apparatus and utility structures, which need to be sited above ground to achieve their function).	The vast majority of the SMF will be above ground due to it not being practical to locate most elements underground. The policy recognises that there will be a functional need for some utilities to be above ground, which is the case with the SMF.
Policy 22.2.1.5 To ensure that utility structures that are critical facilities are not at risk from hazards.	The proposal is considered a 'Critical Facility' (being crucial to the provision of lifeline wastewater utilities) which is not located within any hazard area identified in the district plan, other than being in an identified stormwater flood hazard area. Notwithstanding, it is recognised that the site and the SMF, is subject to a number of hazards being land instability, coastal flooding, tsunami, coastal erosion and seismic activity. The Natural Hazards Risk Assessment considers the vulnerability of the SMF to land instability. Coastal hazards (erosion, flooding and tsunami) are considered in the Coastal Assessment, while the Site-Specific Seismic Hazards Assessment considers the vulnerability of the SMF to seismic hazards. These assessments conclude that the risk to the SMF from these hazards has been reduced to an acceptable level, mostly through design measures, such as seismic design standards and flood levels. The proposal is wholly consistent with this policy.
Chapter 10: Airport & Golf Course Recreation Precinct	
Objective 10.2.1 To promote the safe, effective and efficient operation of the Airport	This set of provisions seeks to protect and provide for airport activities in the Airport Zone. The provisions also recognise that some non-airport activities will be appropriate in the Airport Zone, provided that they do not compromise the primary airport function and purpose of the zone. The vast majority of the SMF site is already designated for wastewater purposes under Designation 58, although it is noted that the site contains the existing aviation ground services (AGS) building which supports the ongoing operation of the Airport. In order to facilitate the proposal, the AGS facility is required to be relocated and the building demolished. These works however have been agreed directly with WIAL and it is understood that the intention is to relocate the existing AGS facility in a new temporary location within the defined Terminal Area of the Airport (anticipated to take place in 2022) The SMF site is not within WIAL's 2040 masterplan. The SMF proposal has been developed in close consultation with WIAL to ensure that it will not adversely impact airport operations. This has included requirements such as ensuring all structures and air discharge velocities are below the Obstacle Limitation Surface (OLS). WCC has also consulted WIAL on proposed landscaping and sediment retention controls.
Policy 10.2.1.1 Provide for activities which will ensure the safe, effective and efficient use of the Airport area as a strategic transport node for the city, region and nation.	
Objective 10.2.3 To provide for non-airport activities and developments within the Airport area of the Precinct.	
Policy 10.2.3.1 Ensure non-airport activities and developments do not compromise the ongoing and strategic transport role of the Airport to the city, region and nation.	
Policy 10.2.3.2 Ensure non-airport activities and developments integrate with, and respond appropriately to, the surrounding environment.	

Relevant provision	Assessment
Policy 10.2.3.4 Manage any potential adverse environmental effects of non-airport activities and developments on the environment.	The Requiring Authority has worked in partnership with WIAL to develop the SMF proposal and ensure that it will not adversely impact airport operations and the future development of the airport. The proposal is therefore wholly consistent with these provisions.
Objective 10.2.4 Protect the character and amenities of identified areas within the Airport area from inappropriate non-airport related uses and development	This objective and policy acknowledge that there are a number of areas on the periphery of the Airport area of the Precinct which may be suitable for non-airport related activities. The Site is located on the periphery of the Airport area and is further separated given its location to the south-east of Stewart Duff Drive, which is a privately owned, publicly accessible road on the eastern land side of the Airport area. The Proposal is limited to the South Coast Area of the Airport Precinct and accordingly only Policy 10.2.4.5 is of direct relevance. The explanatory text which supports this policy acknowledges that the south-eastern entrance to the airport is unattractive and the land and buildings are not of high amenity value. The explanatory text states that there are opportunities to improve and rationalise the use of the land within the South Coast Area. In this setting, it is considered that the Proposal seeks to make efficient use of the subject site through the co-siting of a new SMF alongside the existing WWTP. The Proposal, as a less sensitive land use, is also a suitable activity in this location. In conjunction with the matters outlined in support of this Policy, the Proposal does not involve development directly on land on Moa Point Road, neither does it affect the natural character of the south coast. The Proposals will therefore protect the character of the south coast.
Policy 10.2.4.5 Allow non-airport activities in the South Coast Area in a manner which will protect and enhance the character of the south coast.	
Objective 10.2.5 To protect the amenities of areas surrounding, and within, the Precinct from adverse environmental effects.	This set of provisions seeks to maintain the amenity of the area. Of relevance to the SMF proposal, this relates to visual amenity, acoustic amenity and the potential for odour. This AEE confirms that the adverse environmental effects on the amenities of surrounding uses, namely airport and residential uses, will be appropriately mitigated with regard to landscape and visual effects, transport effects, noise effects and odour. As such, the proposal is consistent with these provisions.
Policy 10.2.5.1 Exercise an appropriate level of control over Airport and ancillary activities for the avoidance or mitigation of adverse effects.	
Policy 10.2.5.3 Control the interrelationship between building forms and the space around buildings to ensure a high level of visual amenity.	
Policy 10.2.5.4 Manage the noise environment to maintain and where possible enhance community health and welfare.	
Objective 10.2.6 To ensure signage is designed and located in a way which will not	Signage for the SMF will be restricted to signs needed for health and safety purposes and for the efficient operation of

Relevant provision	Assessment
detract from the character of the locality, and will not cause a traffic hazard.	the facility and will comply with relevant district plan standards. No advertising signage will be erected.
Objective 10.2.8 To avoid or mitigate the adverse effects of natural and technological hazards on people, property, and the environment.	The site and the SMF is subject to a number of hazards being land instability, coastal flooding, tsunami, coastal erosion and seismic activity. The Natural Hazards Risk Assessment considers the vulnerability of the SMF to land instability. Coastal hazards (erosion, flooding and tsunami) are considered in the Coastal Assessment, while the Site-Specific Seismic Hazards Assessment considers that vulnerability of the SMF to seismic hazards. These assessments conclude that the risk to the SMF from these hazards has been reduced to an acceptable level, mostly through design measures, such as seismic design standards and flood levels. The proposal is wholly consistent with this policy.
Chapter 29: Earthworks	
Objective 29.2.1 To provide for the use, development and protection of land and physical resources while avoiding, remedying or mitigating any adverse effects of earthworks and associated structures on the environment.	The earthworks proposed are required to facilitate the development of the new SMF together with associated works to stabilise the embankment which surrounds the new facility. The development site has been subject to a range of geotechnical investigations to establish geology, ground conditions and stability. These findings have informed the design and method of construction for the SMF.
Policy 29.2.1.3 Ensure that earthworks are designed to minimise the risk of instability.	The earthworks have been designed to minimise the risk of instability, notably through the use of slope stabilising treatments as set out in Chapter 4.
Policy 29.2.1.4 Require earthworks to be designed and managed to minimise erosion, and the movement of dust and sediment beyond the area of the work, particularly to streams, rivers, wetlands and the coastal marine area.	A draft Erosion and Sediment Control Plan has been prepared which proposes a range of measures to minimise erosion, and the movement of dust and sediment beyond the area of the work, during construction. Measures will include the installation and management of sediment control measures before and during construction, through to completion.
Policy 29.2.1.5 Ensure that earthworks and associated structures do not exacerbate flood events in Flood Hazard Areas.	Parts of the development site are defined on the GWRC Flood Hazard Areas map as being within the 1% AEP Combined Flood Hazard Zone for the WCC area. Stormwater modelling has confirmed that flooding is present on site in both 20 and 50 year ARI events based on a pre-development scenario. This appears to be as a result of localised depressions and the under sizing of the existing pipes within the on-site stormwater network. The public stormwater network within Stewart Duff Drive, to which on site flows are directed, does however have sufficient capacity.
Policy 29.2.1.7 Ensure that earthworks and associated structures are designed and landscaped (where appropriate) to reflect natural landforms and to reduce and soften their visual impact having regard to the character and visual amenity of the local area.	Proposed earthworks will result in changes to site levels and an increase in impervious surfaces. However, the site will be appropriately regraded and the design of the stormwater network within the site will be upgraded to capture 20 and 50 year flows and discharged to the stormwater network on Stewart Duff Drive. Hydraulic modelling has confirmed that any increase in stormwater flow can be accommodated within the Stewart Duff Drive stormwater network. No on site or
Policy 29.2.1.10 Ensure the design of structures used to retain or stabilise landslips, reflect	

Relevant provision	Assessment
the character and visual amenity of the local area.	downstream flooding will be exacerbated by the development in both 20 and 50 year ARI events. Flooding effects during a 100 year ARI event with climate change have also been considered and found to be no more than minor. Earthworks are required in the form of the removal of the northern section of the former quarry headwall in order to accommodate the footprint of the SMF. Whilst this will affect the topography of the site, the level area of the site and surrounding embankment is not a natural landform by virtue of its historical quarry use. The removal of part of the ridgeline will increase the visibility of the on-site buildings from certain viewpoints. These effects will however be mitigated through the use of recessive colours and low reflectivity external facing materials. Upon completion, the site will be graded in a manner which largely reflects the existing, lower-level landform. Due to the identification of stability risks associated with some areas of the existing embankment, slope stabilisation measures are also proposed. The embankment is currently covered in vegetation. Once the stabilisation works are complete, the intention is to revegetate the slopes using a media-filled and planted 'wire mattress' type of slope stabilisation technique, pinned down with rock anchors. Lower slopes, visually concealed from the public behind the SMF buildings may be stabilised using 'shotcrete'. Routes for the transport of material from the site are limited but have been selected to minimise the number of residential properties on the route and to connect to the State highway network more efficiently. An archaeological assessment concluded that the archaeological potential of the site is low. An accidental discovery protocol will be put in place to manage the small residual risk. Overall, the proposal is entirely consistent with the earthworks provisions of the WCDP.
Policy 29.2.1.11 Ensure the transport of earth or construction fill material, to and from a site, is undertaken in a way that is safe and minimises adverse effects on surrounding amenity and the roading network.	
Policy 29.2.1.12 Protect koiwi (human remains), taonga, Maori and Non-Maori material and archaeological sites dated from before 1900, by advising applicants of their obligations under legislation and using enforcement powers where necessary.	
Chapter 31: Contaminated Land	
Objective 31.2.1 To manage the remediation, use, development and subdivision of contaminated and potentially contaminated land so as to avoid or mitigate the risk of adverse effects on human health and the environment.	Given the extent of historical soil excavation and earthworks that has occurred on site, there is very little soil remaining beneath the site. An intrusive investigation was carried out where possible from a shallow surface (<0.3 m below ground level) around the AGS building. According to the samples analysed, these soils are unlikely to pose a risk to human health or the receiving environment. The proposal also involves the extraction of a below ground diesel storage tank. The depth and condition of the tank is unknown and it is not possible to confirm such details until the tank is removed. Accordingly, the supporting Contaminated Soils Management Plan (CSMP) sets out a commitment to undertake a soil investigation as soon as the tank is exposed. This will allow the extent of potential contamination to be better understood. In the event that the soil investigation detects contamination,
Policy 31.2.1.2 Minimise and control the adverse effects that may arise from the use, development and subdivision of any contaminated or potentially contaminated land.	
Policy 31.2.1.3 Encourage the remediation and/or ongoing management of contaminated or potentially	

Relevant provision	Assessment
contaminated land as is appropriate for any likely future use of the land.	the CSMP also sets out a pathway for remediation and/or appropriate disposal.
Policy 31.2.1.4 Ensure that the exposure from the ongoing use of land affected by soil contaminants is managed in a manner that avoids or mitigates the risk of adverse effects on human health and the environment.	Overall, the proposal is consistent with the contaminated land provisions of the WCDP.

9.7 Wellington City Proposed District Plan

The Wellington City Proposed District Plan (WCPDP) was notified on 18 July 2022. A draft of the plan was informally consulted on in September 2021. An assessment of the proposal against the relevant objectives and policies is provided in Table 9.3.

Table 9.3: Assessment of the SMF against the objectives and policies of the WCPDP

Relevant provision	Assessment
Strategic City Assets and Infrastructure	
Strategic Objective SCA-O1 Infrastructure is established, operated, maintained, and upgraded in Wellington City so that: • The social, economic, cultural, and environmental benefits of this infrastructure are recognised; • The City is able to function safely, efficiently and effectively; • The infrastructure network is resilient in the long term; and • Future growth and development is enabled and can be sufficiently serviced.	The SMF is a regionally significant infrastructure project which will stabilise and reduce the volume of sludge being disposed to landfill, thus meeting wider waste minimisation initiatives, reducing pressure on landfill and reducing carbon emissions associated with disposal. The treatment of sludge will also reduce odour emissions and leachate at the disposal site. The SMF will therefore result in a range of environmental benefits. The long-term intention is to make beneficial re-use of the stabilised biosolids product to avoid the need altogether to dispose of it to landfill. This is also considered to align with a key mana whenua principle by reducing the environmental impact of sludge treatment and disposal. In terms of other cultural benefits, the proposal will recover energy and water derived from the treatment process, as alternative power and water sources to service the SMF. The SMF will also improve the long-term resilience of Wellington City's wastewater infrastructure network by removing the reliance on existing sludge transfer pipelines which are in poor condition and vulnerable. The facility will have an appropriate capacity to provide for projected population growth. With respect to Strategic Objective SCA-O5, the altered designation will include a comprehensive set of conditions to manage and mitigate the potential adverse effects of the SMF.
Strategic Objective SCA-O4 Regionally significant infrastructure is provided for in appropriate locations and the social, cultural economic, and environmental benefits of this infrastructure are recognised and provided for.	
Strategic Objective SCA-O5 The adverse effects of infrastructure are managed having regard to the economic, social, environmental and cultural benefits, and the technical and operational needs of infrastructure.	
Sustainability, Resilience and Climate Change	
Strategic Objective SRCC-O1 The City's built environment supports:	Approximately 80% of Wellington City Council's carbon emissions are attributed to Southern Landfill. The Council's First to Zero Plan therefore acknowledges that reaching zero carbon by 2050 requires a fundamental change in solid waste

Relevant provision	Assessment
1. A net reduction in the City's carbon emissions by 2050; 2. More energy efficient buildings; 3. An increase in the use of renewable energy sources; and **4.** Healthy functioning of native ecosystems and natural processes.	management, including sludge management. The SMF will reduce carbon emissions from the treatment and processing of the city's sludge by 63%. Accordingly, the project will directly contribute towards meeting this target. The SMF will also make beneficial re-use of energy and water derived from the treatment process as alternative power and water sources to service the SMF. The proposal is therefore considered to accord with this strategic objective.
Strategic Objective SRCC-O2 Risks from natural hazards are: 1. Identified and understood; 2. Planned for through adaptation and mitigation measures to ensure the risks are low; and 3. Avoided where the risks are intolerable.	The AEE is supported by a range of technical assessments which provide an assessment of the risk of the SMF to natural hazards, both now and in a range of future scenarios. The Natural Hazards Risk Assessment, Coastal Hazards Risk Assessment and Seismic Hazard Assessment confirm that the risk to the SMF from natural hazards has been reduced to an acceptable level, mostly through design measures, such as seismic design standards and flood levels. The proposal is therefore entirely in accordance with this strategic objective.
Energy, Infrastructure and Transport – Infrastructure	
Objective INF-01 The national, regional and local benefits of infrastructure are recognised and provided for.	These provisions recognise the benefits of infrastructure and seek to provide flexibility to allow new technologies to be adopted in the upgrade and construction of infrastructure. The SMF is a new regionally significant wastewater infrastructure asset which will deliver a range of range of positive effects at both a regional and local level including: • Substantially reducing the volume of sludge waste needed to be disposed of at landfill and contributing to both regional and local solid waste reduction targets. • Reducing demand on class 4 landfill capacity and in turn, increasing landfill capacity and operating life so they can receive other waste. • Substantially reducing carbon emissions at the landfill associated with the disposal of sludge, assisting Wellington City Council in meeting its zero carbon by 2050 target. • Reducing odour emissions and leachate to land and groundwater at the landfill. • Removing the risk of environmental degradation (particularly to streams) posed by failure of the existing sludge transfer pipelines between the Moa Point WWTP and Carey's Gully. • Treating odour currently periodically emitted from the existing Inlet Pump Station adjacent to Stewart Duff Drive. The SMF will adopt new technologies to provide a sustainable and resilient long-term solution for sludge management in Wellington City. As set out above, it will result in a wide range of environmental benefits and will promote environmentally sustainable outcomes.
Policy INF-P1 Recognise the benefits of infrastructure by: 1. Enabling the safe, resilient, effective and efficient operation, maintenance, repair, minor upgrade or removal of existing infrastructure; 2. Enabling investigation, monitoring and navigation activities associated with infrastructure operations; 3. Providing for significant upgrades to, and the development of new infrastructure; and 4. Providing for the functions and responsibilities of infrastructure as lifeline utilities during an emergency.	
Policy INF-P3 Provide flexibility to adopt new technologies for infrastructure that: 1. Allow for the re-use of redundant services and structures; 2. Increase resilience, safety or reliability of networks and services; 3. Result in environmental benefits or enhancements; or	

Relevant provision	Assessment
4. Promote environmentally sustainable outcomes.	
Objective INF-O2 The adverse effects of infrastructure on the environment are managed, while recognising: 1. The functional and operational need of infrastructure; and 2. That positive effects of infrastructure may be realised locally, regionally or nationally	These provisions seek to manage the adverse effects of infrastructure on the environment whilst acknowledging that there may be situations where all adverse effects cannot be avoided due to the functional and operational need of the infrastructure. In this regard, the SMF site has an operational need to be located in the subject location (close to the existing WWTP), enabling the wastewater from Moa Point to be directly sent to the new SMF without extensive pipework or truck movements. The bulk and scale of the SMF is determined by the treatment technology, processing capacity and extent of plant/equipment required within the building. The requirement for additional building footprint has necessitated an extension of the site platform through the removal of a section of the former quarry headwall. The main potential adverse effect associated with the proposal is the visual effects of the SMF on viewing audiences, particular permanent residents of Strathmore Park. Due to the operational need for the SMF to be of the footprint, bulk and scale proposed, it is not possible to entirely mitigate adverse visual effects. These effects will however be reduced through the use of recessive colours and low reflectivity external facing materials. Whilst it would have been preferable to incorporate tree planting within the scheme to mitigate such effects further, this has not been possible due to proximity to the airport and potential for bird strike. The potential for the emission of offensive odour during the commissioning phase (at the end of construction) and during operation has been identified as a specific risk. This will be managed through specific odour management plans for commissioning and operation. During commissioning this will include the use of temporary odour treatment during commissioning. With these controls in place, there will be no adverse odour effects on residential properties in the area (Moa Point and Strathmore Park). All other potential temporary construction effects, such as dust, noise and vibration and traffic will be managed using standard construction environmental management practices delivered through a suite of management plans. Effects during the operation of the plant, such as noise, transport and odour, will be managed and mitigated through a comprehensive set of conditions to be placed on the altered designation. All of the potentially adverse effects associated with the SMF are considered to be significantly outweighed by the benefits derived from the project, which have positive effects at a local and regional scale, as set out in response to Objective INF-O1 above.
Policy INF-P5 Manage the adverse effects of upgrades to, or the development of new infrastructure, including effects on: 1. Natural and physical resources; 2. Amenity values; 3. Sensitive activities; 4. The identified values of Overlays; 5. The safe and efficient operation of other infrastructure; and 6. The health, well-being and safety of people and communities.	
Policy INF-P6 When considering the adverse effects of infrastructure on the environment recognise that there may be situations where all adverse effects, including construction effects, cannot be avoided, and as such must be remedied or mitigated through having regard to the following: 1. The extent to which adverse effects can be avoided, remedied or mitigated may be constrained by the functional or operational need of the infrastructure; 2. The time, duration, or frequency of adverse effects; 3. The necessity of the infrastructure including: a. The need to quickly repair and restore disrupted services; and b. The impact of not operating, repairing, maintaining, upgrading, removing or developing infrastructure; 4. Existing infrastructure including: a. The complexity and connectedness of networks and services; and	

Relevant provision	Assessment
b. The potential for co-location and shared use of infrastructure corridors; 5. Anticipated outcomes for the receiving environment and the degree to which past modifications have compromised the achievement of those outcomes; 6. The benefits derived from the infrastructure at a local, regional and national scale; and 7. The extent to which the infrastructure is integrated with, and necessary to support, planned urban development.	
Energy, Infrastructure and Transport – Infrastructure – Coastal Environment	
Policy INF-CE-P18 Upgrading of existing infrastructure within the coastal environment: • Outside of high coastal natural character areas; and • Outside of coastal and riparian margins. Allow the upgrading of existing infrastructure within the coastal environment where it is located outside of high coastal natural character areas and outside of coastal and riparian margins.	The site is identified on the PDP Map as being within the 'Coastal Environment'. The site is not however identified as being within a 'High Coastal Natural Character Area' or a 'Coastal or Riparian Margin'. These policies enable new infrastructure, and the upgrading of existing infrastructure, outside of the High Coastal Character Area or a Coastal or Riparian Margin. The proposal is not within a High Coastal Character Area or a Coastal or Riparian Margin and is therefore consistent with these policies.
Policy INF-CE-P24 New infrastructure within the coastal environment: • Outside of high coastal natural character areas; and • Outside of coastal and riparian margins. Allow for new infrastructure within the coastal environment where it is located outside of high coastal natural character areas and outside of coastal margins and riparian margins.	
Energy, Infrastructure and Transport – Infrastructure – Natural Hazards	
Policy INF-NH-P61 Only allow for new infrastructure, and any associated structures in the Natural Hazard Overlays and Coastal Hazard Overlays where the infrastructure or associated structures:	Within the Coastal Hazard Overlays, part of the site is identified as being within a low coastal tsunami hazard area, with other areas of the site within a flood hazard inundation area. The site is not located in an overland flow path, stream corridor or high coastal hazard area. This AEE is supported by a range of technical assessments which consider the hazards identified above as well as land stability, coastal erosion and seismic hazards.

Relevant provision	Assessment
1. Do not increase the risk from the natural hazard to people, or other property or infrastructure; 2. Incorporate design measures to reduce the potential for damage to the infrastructure following a natural hazard or coastal hazard event; and 3. When located in an overland flowpath, stream corridor, or high coastal hazard area, have a functional need or operational need that means the infrastructure's location cannot be avoided and there are no reasonable alternatives.	These assessments conclude that the risk to the SMF from these hazards has been reduced to an acceptable level, mostly through design measures, such as seismic design standards and flood levels. The proposal is wholly consistent with this policy.
Hazards and Risks – Contaminated Land	
Objective CL-01 Contaminated land is identified and managed in order that it remains acceptable and safe for human health and its intended use.	Given the extent of historical excavation and earthworks that has occurred on site, there is very little soil remaining beneath the site. An intrusive investigation was carried out where possible from a shallow surface (<0.3m below ground level) around the AGS building. According to the samples analysed, these soils are unlikely to pose a risk to human health or the receiving environment. The proposal also involves the extraction of a below ground diesel storage tank. The depth and condition of the tank is unknown and it is not possible to confirm such details until the tank is removed. Accordingly, the supporting Contaminated Soils Management Plan (CSMP) sets out a commitment to undertake a soil investigation as soon as the tank is exposed. This will allow the extent of potential contamination to be better understood. In the event that the soil investigation detects contamination, the CSMP also sets out a pathway for remediation and/or appropriate disposal. Overall, the proposal is consistent with the contaminated land provisions of the PDP.
Policy CL-P2 Identify contaminated and potentially contaminated land prior to subdivision, change of use or development by: 1. Working with Greater Wellington Regional Council to maintain the Selected Land Use Register; and 2. Requiring the investigation of contaminant risks for sites with a history of land use or activity that could have resulted in contamination of soil.	
Policy CL-P3 Minimise the risk to human health from the subdivision, change of use or specified development of contaminated land by: 1. Encouraging a best practice approach to site management for sites with elevated contaminant levels, which may include remediation, containment, and/or the disposal of contaminated soil; 2. Ensuring the land is safe for its intended use; and 3. Ensuring that land containing elevated levels of contaminants is	

Relevant provision	Assessment
managed to protect mana whenua's significant sites, waterways, natural resources and associated values and relationships, as well as the general health and wellbeing of their people and rohe.	
Hazards and Risks – Natural Hazards	
Objective NH-01 Subdivision, use and development within the Natural Hazard Overlays reduce or do not increase the risk from natural hazards to people, property and infrastructure.	Within the Natural Hazard Overlays, part of the site is identified as being within a low coastal tsunami hazard area, with other areas of the site within a flood hazard inundation area. This AEE is supported by a range of technical assessments which consider the hazards identified above as well as land stability, coastal erosion and seismic hazards. These assessments conclude that the risk to the SMF from these hazards has been reduced to an acceptable level, mostly through design measures, such as seismic design standards and flood levels. The proposal is wholly consistent with these objectives and policies.
Policy NH-P1 Identify natural hazards within the District Plan and take a risk-based approach to the management of subdivision, use and development based on: 1. The sensitivity of the activities to the impacts of natural hazards; and 2. The hazard posed to people's lives and wellbeing, property and infrastructure, by considering the likelihood and consequences of natural hazard events.	
Policy NH-P2 Subdivision, use and development reduce or do not increase the risk to people, property and infrastructure by: 1. Allowing for those buildings and activities that have either low occupancy or low replacement value within the low, medium and high hazard areas of the Natural Hazard Overlays; 2. Requiring buildings and activities to mitigate the impacts from natural hazards to people, property and infrastructure in the low hazard and medium hazard areas within the Natural Hazard Overlays; and 3. Avoiding buildings and activities in the high hazard areas of the Natural Hazard Overlays unless there is an exceptional reason for the building or activity to be	

Relevant provision	Assessment
located in this area and the activity mitigates the impacts from natural hazards to people, property and infrastructure.	
General District Wide Matters – Coastal Environment	
Objective CE-O1 The natural character and qualities that contribute to the natural character within the landward extent of the coastal environment are maintained and, where appropriate, restored or enhanced.	The site is identified on the PDP Map as being within the 'Coastal Environment'. The site is not however identified as being within a 'High Coastal Natural Character Area' or a 'Coastal or Riparian Margin'. The LVA has assessed the natural character values of the coastal environment proximate to the site to be low. This is due to the highly modified nature of the site and its surrounds, notably airport development. Any potentially adverse effects of the proposal on the natural character of the coastal environment would be negligible. The proposal is therefore consistent with these objectives and policies.
Policy CE-P2 Provide for use and development in the landward extent of the coastal environment where it: 1. Consolidates existing urban areas; and 2. Does not establish new urban sprawl along the coastline.	
Policy CE-10 Avoid the establishment of activities that are incompatible with or detrimental to the natural character and qualities within the landward extent of the coastal environment.	
Policy CE-P8 Manage the removal of vegetation in the coastal environment as follows: 1. Allow for the removal of vegetation in the coastal environment outside of high coastal natural character areas; 2. Allow for the removal of exotic vegetation in the coastal environment within high coastal natural character areas; and 3. Only allow for the removal of indigenous vegetation in the coastal environment within high coastal natural character areas that: a. Is of a scale that maintains the identified values; or b. Is associated with ongoing maintenance of existing public accessways.	The proposal requires the removal of vegetation through earthworks and slope stabilisation measures. Vegetation will reinstate over time, assisted by the installation of seeded mattresses where possible. Additionally, the removal of such vegetation would occur outside of a high coastal natural character area and is consistent with this policy.

Relevant provision	Assessment
Objective CE-O5 Subdivision, use and development in the Coastal Hazard Overlays reduces or does not increase the risk to people, property, and infrastructure.	Within the Coastal Hazard Overlays, part of the site is identified as being within a low coastal tsunami hazard area, with other areas of the site within a flood hazard inundation area. The site is not within a medium or high coastal inundation area. This AEE is supported by a Coastal Hazards Assessment which consider the hazards identified above as coastal erosion. This assessment concludes that the risk to the SMF from coastal hazards is low. The proposal is therefore wholly consistent with this objective and policy.
Policy CE-P12 Subdivision, use and development reduces the risk to people, property, and infrastructure by: 1. Enable subdivision, use and development that have either low occupancy, risk, or replacement value within the low, medium and high hazard areas of the Coastal Hazard Overlays; 2. Requiring mitigation for subdivision, use and development that addresses the impacts from the relevant coastal hazards to people, property, and infrastructure in the low and medium hazard areas; and 3. Avoiding subdivision, use and development in the high hazard area unless there is a functional and operational need for the building or activity to be located in this area and incorporates mitigation measures are incorporated that reduces the risk to people, property, and infrastructure.	
General District Wide Matters – Earthworks	
Objective EW-O1 Earthworks are undertaken in a manner that: 1. Is consistent with the anticipated scale and form of development in the relevant zone; 2. Minimises adverse effects on visual amenity values, including changes to natural landforms; 3. Minimises erosion and sediment effects beyond the site; 4. Minimises risks associated with slope instability; and 5. Protects the safety of people and property.	The earthworks proposed are required to facilitate the development of the new SMF together with associated works to stabilise the embankment which surrounds the new facility. The site is zoned for airport and general industrial purposes and it is therefore considered that the scale of the earthworks are consistent with the anticipated scale and form of development within either zone. Earthworks are required in the form of the removal of the northern section of the former quarry headwall in order to accommodate the footprint of the SMF. Whilst this will affect the topography of the site, the level area of the site and surrounding embankment is not a natural landform by virtue of its historical quarry use. The removal of part of the ridgeline will increase the visibility of the on-site buildings

Relevant provision	Assessment
Policy EW-P4 Require earthworks to adopt effective measures to manage the potential for: 1. Erosion, and the movement of sediment beyond the site, and in particular into surface water, where proposals for earthworks no greater than 3,000m2 in area are concerned; and 2. The movement of dust beyond the site, where all proposals for earthworks are concerned.	from certain viewpoints. These effects will however be reduced through the use of recessive colours and low reflectivity external facing materials. The development site has been subject to a range of geotechnical investigations to establish geology, ground conditions and land stability. These findings have informed the final design and method of construction for the SMF. The earthworks have been designed to minimise the risk of instability, notably through the use of slope stabilising treatments as set out in Chapter 4. Earthworks will be undertaken in accordance with an Erosion and Sediment Control Plan (ESCP) to avoid or minimise the potential to discharge sediment laden run-off to the adjacent coastal marine area or stormwater network. All sediment controls will be designed, constructed, and maintained in accordance with GWRC's good practice guidelines. In terms of dust during earthworks, the contractor will use standard dust mitigation techniques to minimise the generation and emission of dust beyond the site boundary. These techniques will be included within the ESCP and will include the use of water sprays and dust suppressants, minimising areas of exposed surfaces, and stabilising exposed surfaces as soon as practicable.
Policy EW-P5 Require earthworks and associated structures, including structures used to retain or stabilise landslips, to be designed and constructed to minimise adverse effects on natural landforms and visual amenity and where located within identified ridgelines and hilltops ensure the effects are mitigated or remedied.	
Policy EW-P16 Provide for earthworks in Flood Hazard Overlays only where: 1. They would not significantly increase the flooding risk, when compared to the existing situation, to the site or neighbouring properties through the displacement of flood waters; and 2. The ability to convey flood waters along overland flowpaths or stream corridors is not impeded as a result of the earthworks.	Part of the site is identified on the PDP Map as having the potential for inundation. The proposed earthworks, site regrading and proposed on-site stormwater network has been designed to ensure that the risk of flooding on the site or neighbouring properties is not increased. This has been modelled for 20 year, 50 year and 100 year annual recurrence intervals. No overland flowpaths or stream corridors would be affected by the works. The proposal will not increase flood risk to the site or to surrounding properties and is wholly consistent with this policy.
General District Wide Matters – Noise	
Objective NOISE-O1 Amenity values and peoples' health and well-being are protected from adverse noise levels, consistent with the anticipated outcomes for the receiving environment.	The measured background noise levels for local residents suggest that any noise arising from the operation of the SMF would be largely masked by ambient noise during daytime hours and any increase in noise level resulting from the SMF would be negligible. Whilst the SMF would be audible during the night-time, where background noise is reduced, any effects would be at a reasonable level and well within the noise limits in the PDP for activities within the General Industrial Zone or Airport Zone.
Policy NOISE-P1 Enable the generation of noise from activities that: 1. Maintain the amenity values of the receiving environment; and	

Relevant provision	Assessment
2. Does not compromise the health, safety and wellbeing of people and communities.	
Policy NOISE-P3 Allow for higher noise levels to be generated within: 1. General Rural Zone; 2. Commercial and Mixed-Use Zones; 3. Hospital Zone; 4. Tertiary Education Zone; 5. Stadium Zone; 6. Port Zone; 7. Airport Zone and associated airspace; 8. City Centre Zone; 9. Mixed Use Zone; 10. General Industrial Zone; and 11. State Highway and Railway networks.	
Policy NOISE-P2 Enable construction activities while ensuring that unreasonable noise and vibration effects are managed effectively.	During typical construction work hours, all construction activities will adhere to the prevailing guidelines within NZS6803:1999. Some construction activities will however need to occur during the night-time and may be unable to meet recommended noise levels. Where night works are required, any such works will be required to adhere to a Construction Noise and Vibration Management Plan (CNVMP). The CNVMP will set out measures which seek to mitigate noise effects during the night-time as far as practicable, whilst also incorporating a communications plan which provides prior notice to local residents. Whilst vibration from the works is unlikely to be perceptible to local residents, vibration may be discernible to immediate neighbours (Cyclotek and WIAL). The CNVMP will include a communications plan to ensure neighbours are given prior notice that vibration effects may be perceptible for temporary periods. The proposal will therefore effectively manage noise and vibration effects through adherence to recognised standards and through adherence to a CNVMP.
General Industrial Zone	
Objective GIZ-O4 The scale, form and design of new development in the General Industrial Zone positively contributes to creating a well-functioning urban environment and responds to any functional needs or operational needs.	The scale and form of the SMF has been designed to respond to the operational needs of a regionally significant wastewater infrastructure asset. Notwithstanding, the proposed buildings are consistent with other buildings nearby including the existing WWTP, which sits in an elevated position relative to the SMF site, and the neighbouring Cyclotek building. There are also other large, utilitarian-style buildings located opposite the site on WIAL land both currently and as part of the future environment (ie WIAL's freight hub building). The design and composition of the SMF will have similar characteristics to surrounding built development. A recessive, low reflectivity colour palette is also proposed, to draw from colours found naturally in the setting.

Relevant provision	Assessment
	The proposal is therefore considered to be consistent with this objective.
Objective GIZ-O5 Adverse effects from use and development of the General Industrial Zone are compatible with the local neighbourhood and managed effectively, particularly in relation to any sensitive activities in neighbouring zones. **Policy GIZ-P6** Require uses and developments within the General Industrial Zone to maintain a reasonable level of amenity for adjoining Residential Zones or other sensitive activities.	The proposal has been designed to maintain a reasonable level of amenity for adjoining Residential Zones through the use of a range of mitigation measures both during construction and operation. The potential for the emission of offensive odour during the commissioning phase (at the end of construction) has been identified as a specific risk. This will be managed through a specific commissioning odour management plan which will require the use of temporary odour treatment during commissioning. With these controls in place, there will be no adverse odour effects on residential properties in the area (Moa Point and Strathmore Park). All other potential temporary construction effects, such as dust, noise and vibration and traffic will be managed using standard construction environmental management practices and via a suite of management plans. During operation, the main potential adverse effects on residential amenity are dust, odour, noise, traffic and visual amenity effects. Given the facility will be fully enclosed, dust (mostly from the loading of stabilised biosolids into trucks) and odour will be able to be managed. Odour from all odorous activities will be treated via a comprehensive odour treatment system. Operational noise levels will be within proposed district plan limits. The SMF will have a low volume of operational traffic, other than during annual scheduled maintenance events. A specific traffic management plan for this maintenance period will be developed. The visual effects of the proposal have been considered from residential receptors including scenarios with and without the hillock. The visual effects of the SMF when viewed from Strathmore Park will be, at worst, 'moderate-high'. The landscape and visual impact of the proposal will however be reducing through the use of recessive colours and low reflectivity external facing materials. It is considered that the development will maintain a reasonable level of amenity for adjoining Residential Zones and is consistent with these provisions.
Airport Zone	
Objective AIRPZ-O3 Airport related and non-airport activities are: 1. Compatible with the efficient operation, maintenance, and upgrading of the Airport and its associated effects; 2. Compatible with the efficient and integrated functioning of other transport networks; and	This set of provisions seeks to protect and provide for airport activities in the Airport Zone. The provisions also recognise that some non-airport activities will be appropriate in the Airport Zone, provided that they do not compromise the primary airport function and purpose of the zone. The vast majority of the SMF site is already designated for wastewater purposes under Designation 58, although it is noted that the site contains the existing aviation ground services (AGS) building which supports the ongoing operation of the airport. In order to facilitate the proposal, the AGS facility is required to be relocated and the building

Relevant provision	Assessment
The operation of the Airport is protected from reverse sensitivity effects outside the Airport Zone.	demolished. These works however have been agreed directly with WIAL and it is understood that the intention is to relocate the existing AGS facility in a new temporary location within the defined Terminal Area of the Airport (anticipated to take place in 2022) The SMF site is not within WIAL's 2040 masterplan. The SMF proposal has been developed in close consultation with WIAL to ensure that it will not adversely impact airport operations. This has included requirements such as ensuring all structures and air discharge velocities are below the Obstacle Limitation Surface (OLS). WCC has also consulted WIAL on proposed landscaping and sediment retention controls. WCC has worked in partnership with WIAL to develop the SMF proposal and ensure that it will not adversely impact airport operations and the future development of the airport. The proposal is therefore wholly consistent with these provisions.
Policy AIRPZ-P3 Discourage new non-airport related activities that: 1. Compromise the long-term availability of land for airport or airport related activities; 2. Give rise to adverse effects on the safety and efficiency of the transportation network; 3. Significantly compromise the achievement of carbon neutral outcomes in the Airport as a whole; or **4.** Are incompatible with the overall urban form of adjacent zones.	
Policy AIRPZ-P5 Manage activity, building and structure effects in the Airport Zone, having regard to: 1. Design, scale and location, and associated public and private effects, including the impacts of construction; 2. Compatibility with the role and function of the Airport Zone; 3. Whether the activity, building or structure is ancillary to and/or supports airport activities. 4. Safety, security and resilience of the Airport (and supporting infrastructure) as an air and land transport hub; 5. Efficiency and capacity of the Airport and other infrastructure and services; 6. Potential conflict with established or permitted activities on adjoining and adjacent land outside the Airport Zone; and **7.** The need to measure, report and pursue decarbonisation of airport related activities, including embedded emissions from construction, and activity attracted by the Airport (such as public and private transport).	

9.8 Aotearoa New Zealand's First Emissions Reduction Plan

Aotearoa New Zealand's First Emissions Reduction Plan is a matter of relevance to the proposal as it outlines a series of strategies, policies and actions to reduce emissions within the next three to four years, with one key action seeking to reduce emissions through minimising the disposing of organic waste to landfill.

The Climate Change Response Act 2002 legislates emissions reduction targets for New Zealand which seek to achieve net zero greenhouse gas emissions (except biogenic methane) and a 24% to 47% reduction in biogenic methane by the year 2050. The overarching purpose of these targets is to contribute to the global effort to limit global warming to 1.5°C. The Act also sets interim emissions budgets which set the permissible quantity of emissions which can be released during each budget period.

In response to these targets, the New Zealand Government has published its first Emissions Reduction Plan (May 2022) which contains strategies, policies and actions to achieve New Zealand's first emissions budget for the period 2022 to 2025. The next emissions budget period is between 2026 and 2030.

The Reduction Plan states that in 2019, 94% of waste emissions were biogenic methane – largely generated by the decomposition of organic waste, such as food, garden, wood and paper waste. The main sources of waste emissions from organic waste related to solid waste disposal (82%) followed by wastewater treatment (11%).

Accordingly, one of the initial key actions in the Reduction Plan is to reduce the amount of organic waste going to landfill. A further action is to invest in waste infrastructure.

The SMF will directly respond to these actions through the reduction of sludge waste being deposited to landfill. Carbon emissions from the disposal of the product at landfill, as a result of the treatment process, are also expected to be reduced by at least 60%. The SMF will also enable alternative pathways for the beneficial re-use of sludge to be explored. As previously highlighted, this change to sludge management in Wellington will also remove a key inhibitor to ongoing wider solid waste minimisation commitments[16].

9.9 Wellington Region Waste Management and Minimisation Plan (WMMP)

The WMMP has been jointly produced by all territorial authorities in the Wellington region and is of direct relevance to the proposal as it identifies a specific commitment to reduce solid waste sent to landfills, including the diversion of sewage sludge.

The plan's primary regional target is to reduce the total quantity of waste sent to Class 1 landfills from 600kg per person per annum to 400kg per person by 2026. In order to achieve this objective, a range of secondary targets are identified, one of which is the reduction of sewage sludge sent to landfill.

The WMMP identifies sewage sludge as comprising 10.5% of waste sent to landfill and considers it to comprise the second largest divertible component of waste, after kitchen and food waste. A specific action is therefore identified for Wellington City Council to investigate options that would divert biosolids from landfill disposal.

As previously discussed, the current sludge treatment and disposal method is also an inhibitor of solid waste minimisation efforts due to the need for four times as much solid waste as sludge to meet an existing consent condition requiring a set mixing ratio.

The proposed SMF directly helps to achieve regional waste minimisation objectives and targets and responds to locally identified strategic goals.

[16] Due to the need for four times as much solid waste as sludge to meet the mixing ratio consent condition.

9.10 Te Atakura – First to Zero

Wellington City Council's 'Te Atakura - First to Zero' strategy is of relevance as it specifically identifies the need for the Council to fund a sewage sludge processing solution for the city, in the context of reducing emissions from waste activities and reducing landfill waste.

First to Zero is a blueprint which aims to make Wellington City a zero-carbon capital (net zero emissions) by 2050. The overarching blueprint is supported by an Implementation Plan which guides the first phase of this journey up to 2030.

Approximately 80% of Wellington City Council's carbon emissions are attributed to landfilled waste. Reaching zero carbon therefore requires a fundamental change in solid waste management including sludge management. The Implementation Plan therefore states that the immediate priority in reducing the Council's own emissions is to fund a viable sewage sludge processing solution. As referenced in the WMMP, the Plan also reiterates that a sludge processing solution will remove a current inhibitor to wider solid waste reduction targets being realised. In this vein, the plan also sets a commitment to reduce landfill waste by a third by 2026, thereby contributing to the primary regional waste minimisation target identified in the WMMP.

9.11 Wellington City Long Term Plan (2021-2031)

'Our 10-Year Plan' is WCC's Long-Term Plan (LTP) for 2021-2031. The plan seeks to meet the challenges of today whilst preparing for challenges of the future, including building a more resilient three-waters network and mitigating climate change.

One of the key projects within the LTP is to deliver a new sewage sludge plant in years 2 to 5 (by 2026), and directly responds to the waste and carbon reduction commitments identified in the regional WMMP and Te Atakura First to Zero strategy.

It is anticipated that the SMF will be fully operational in 2026. The SMF is key project within the LTP whilst also enabling a range of key secondary benefits.

9.12 Part 2 of the RMA

Part 2 of the RMA defines the purpose and the principles to promote the sustainable management of natural and physical resources. It outlines the matters of national importance that shall be recognised, other matters that particular regard must be had to, and the principles of the Treaty of Waitangi that shall be taken into account for all persons exercising their functions and powers under the RMA.

9.12.1 Section 5 purpose and principles

The purpose of the RMA, as set out in Section 5, is to promote *"the sustainable management of natural and physical resources*".

Sustainable management means:

managing the use, development and protection of these resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while -

> *a) Sustaining the potential of natural and physical resources to meet the reasonably foreseeable needs of future generations; and*
>
> *b) Safeguarding the life-supporting capacity of air, water, soil and ecosystems; and*
>
> *c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment.*

The proposal is critical to reducing the total volume of sludge disposed to land from Wellington's WWTPs and reducing the carbon emissions from treatment and disposal.

It will provide a sustainable and resilient long-term solution for sludge management which is critical for sustaining and restoring natural resources, while providing the ability for current and future generations to meet their social, economic, and cultural needs. The proposed solution for sludge treatment and disposal also provides for future anticipated population growth in the city. The proposed works haven been designed, and will be undertaken in a manner which avoids, minimises, and remedies adverse effects on the environment.

The proposal meets the purpose of the RMA.

9.12.2 Section 6 matters

Section 6 sets out the matters of national importance which must be recognised and provided for. Of these, the following are relevant to the proposal:

> *a) the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development.*
>
> c) *The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna.*
>
> *e) The relationship of Māori and their culture and traditions with their ancestral lands, water, sites waahi tapu, and other taonga.*
>
> *h) The management of significant risks from natural hazards*

With respect to section 6(a), the proposal will not adversely affect the natural character of the coastal environment and is not an inappropriate use of, or development in, the coastal environment.

With respect to section 6(c), while the site is not identified within the WCDP or other RMA documents as comprising significant indigenous vegetation or fauna, a herpetofauna survey has detected the presence of two non-threatened lizard species within the site boundaries. The proposed ridge removal and slope stabilisation works will have the greatest impact on lizard habitat. Accordingly, the project will mitigate effects on lizards and associated habitat through a translocation strategy and habitat compensation scheme.

The site is adjacent to the coastal marine area which may contain significant marine habitat. The proposal protects this coastal environment and its associated habitat through the implementation of erosion and sediment controls on site during the proposed activities, namely earthworks, to manage erosion risk and minimise discharges of sediment laden run-off to coastal water.

With respect to section 6(e), early consultation with iwi, both Taranaki Whanui and Ngati Toa, identified that the existing sludge treatment and disposal method of disposing raw sludge to landfill is not aligned with key mana whenua principles. Iwi also raised concerns with the potential impact to the environment in the event of future failure of the sludge pipelines, as well as odour release from the existing sludge disposal. A further concern was the potential for sludge disposal to affect local waterways.

A key mana whenua principle relates to the ability to harness and use the resources available from the sludge to give them another life (such as the recovery of energy or nutrients).

The proposal is considered to result in, at worst, neutral cultural effects. With respect to discharges of treated wastewater to the sea, the SMF treatment process would not result in any material change to the quantity or quality of treated wastewater to be discharged to the coast. The wider Moa Point WWTP will therefore continue to operate within the limitations of the existing regional resource consent.

The proposal will enable the potential beneficial re-use of stabilised biosolids and diversion of such waste to landfill, which is more aligned with traditional mana whenua values. Whilst material may continue to be disposed of to landfill, at least in the short term, it will be in a biologically stable form, thereby reducing odour

and carbon emissions at the point of disposal. Moreover, the SMF process will recover energy and water from the treatment process for beneficial re-use including biogas and disinfected effluent. As the proposal will no longer require the transfer of sludge via the existing pipelines to Carey's Gully, this will remove a further key concern associated with future potential failures.

With respect to section 6(h), technical consideration has been given to the range of potential natural hazards which could pose a risk to the subject site during its design life including earthquake, tsunami, coastal erosion and inundation, flooding and sea level rise. As identified in Section 3 of this AEE, the site is not considered to be at significant risk from natural hazards. Where potential natural hazard risks have been identified, these will be addressed through detailed geotechnical engineering design and structural design.

Section 6(a) state that "*the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development*" is a matter of national importance. As previously discussed in relation to the NZCPS, the site is not deemed to be within the coastal environment. Notwithstanding, the proposal would nevertheless maintain the natural character of the coastal environment and therefore recognise and provide for this matter.

In summary, the relevant matters of national importance have been recognised and provided within this proposal.

9.12.3 Section 7 matters

Section 7 provides a list of further matters that particular regard must be given to.

Section 7 matter	Assessment
(b) the efficient use and development of natural and physical resources.	In substantially reducing the volume of sludge needing to be disposed of, the proposal will result in the more efficient use of land and landfill capacity compared to the existing situation. Given the severely limited landfill capacity in the city, this is a substantial benefit.
(c) the maintenance and enhancement of amenity values.	The proposal has been designed to integrate into the existing built and natural environment and will maintain visual amenity values. The proposal will maintain amenity values through a comprehensive odour treatment system which treat all odour from the SMF. Advanced processes within the SMF will also enable improved capture of fugitive emissions during the breakdown of sludge in a controlled way, thereby reducing the risk of odour emissions during sludge processing. As the end product will be in a biologically stable form, odour emissions from the disposal of sludge to landfill will also be substantially reduced. The proposal will also enhance amenity values by treating odour originating from the existing inlet pump station which has been the source of a small number of odour complaints in recent years. Amenity values will also be maintained through the enclosure of key pieces of plant and equipment to reduce noise effects and ensure that the plant can operate within national noise performance standards.

Section 7 matter	Assessment
(d) intrinsic values of ecosystems.	While the proposal will disrupt the habitat of native lizards, effects on them are able to be mitigated such that adverse effects will be minor.
(f) maintenance and enhancement of the quality of the environment.	While the proposal's primary purposes is as part of the regionally significant infrastructure network, the proposal has been designed to minimise effects on the environment and the proposal will not have any significant adverse effects.
(i) the effects of climate change	The proposal will significantly reduce carbon emissions from sludge disposal compared to the existing situation.

9.12.4Section 8

Section 8 requires that the principles of the Treaty of Waitangi be taken into account in relation to managing the use, development, and protection of natural resources. The principles of the Treaty of Waitangi include the duty of the Crown to actively protect Māori interests and make informed decisions (which in most cases will require consultation).

Iwi stakeholders were engaged during the initial optioneering process to determine a preferred process and site option. This included consultation with iwi to assist in the short listing of process options to understand cultural concerns with sludge management that might influence process selection. The short list of sites and process options was then considered as part of a multi criteria analysis (MCA). The basis of the MCA criteria was collaboratively developed with iwi and other key stakeholders based on the project objectives, and iwi representatives led the assessment of options against those criteria at the MCA workshop. Mana Whenua values formed a single criterion with a weighting of 20% which is a similar weighting given to the other key criteria for evaluating each process and site option. The selected site and process option was the highest scoring site and process technology ranked against Mana Whenua values[17].

A key issue for Mana Whenua is how the stabilised biosolids, arising from the SMF process, are to be disposed or re-used for other purposes. Whilst the SMF process enables beneficial re-use of stabilised biosolids, it is not within the scope of the project to identify how this is to occur in the long term. WCC is seeking to engage with both Taranaki Whanui and Ngati Toa to work collaboratively on developing a 'Biosolids Reuse and Management Plan'. This will form part of a broader Takai Here Partnership Agreement which each iwi, which will detail how all parties will engage on wider long term waste management and minimisation initiatives for the city. The SMF is a key enabler of reducing the environmental impact of treating and disposing with the city's wastewater.

9.13 Summary

The proposed works have been assessed against the relevant provisions of the planning framework. The findings of these assessments conclude that the proposed works are consistent with the relevant provisions.

[17] Digestion – Lysis – Digestion + Thermal Dryer scored 9 out of 10 at the Moa Point site ((Autothermal) Aerobic digestion + Thermal Dryer and Mesophilic Anaerobic Digestion + Thermal Dryer also scored 9 out 10 at the Moa Point site.

www.beca.com