Minerals, Waste and Water Study

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Appendix A

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Acronyms

Term	Description
CCC	Crushed concrete aggregates
CD&E	Construction, demolition and excavation
CDEW	Construction, demolition and excavation waste
CO_2	Carbon dioxide
DMR	Duly Motivated Request
DO	Deployable output
DRL	Dune Restoration 2020 Limited
DRR	Duly Reasoned Request
DYAA	Dry Year Annual Average
ECI	Environmental cost indicator
EU	European Union
GoJ	Government of Jersey
GHE	Growth, Housing and Environment
GVA	Gross value added
Ha	Hectares
IBA	Incinerator bottom ash
LCA	Life cycle assessment
mAOD	Metres above ordinance datum
Ml	Megalitres
Ml/d	Megalitre per day
OFWAT	Water Services Regulation Authority
PET	Potential evapotranspiration
PFOS	Perfluorooctanesulfonic acid
RCA	Recycled concrete aggregates
SELL	Sustainable Economic Level of Leakage
SWMP	Site waste management plan
t	Tonnes
TFS	Transfrontier Shipment of Waste
t.p.a.	Tonnes per annum
UK	United Kingdom
UKCP	UK Climate Projections Report
UKWIR	UK Water Industry Research Limited
UV	Ultraviolet
WAFU	Water Available For Use
WRAP	Waste and Resources Action Programme

Term	Description
WRMP	Water Resources Management Plan
WTW	Water Treatment Works

Executive Summary

Overview

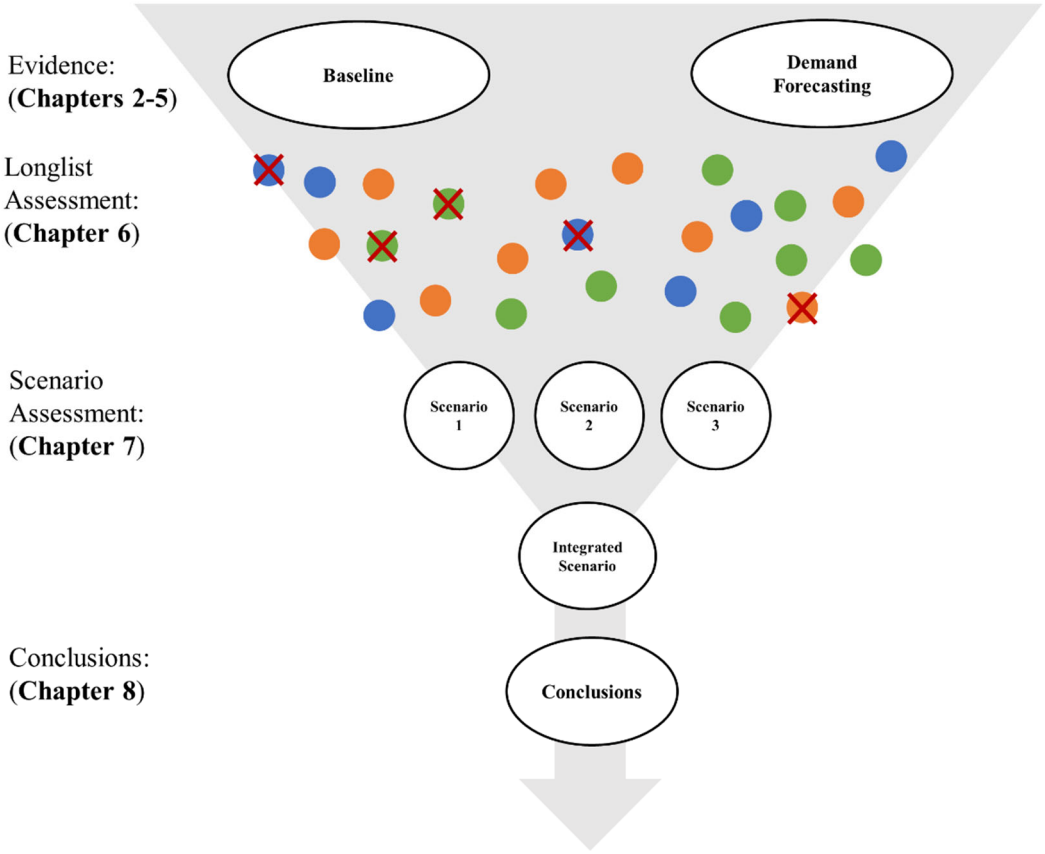
The Government of Jersey is currently undertaking a review of its Island Plan. The new Bridging Island Plan will set out and plan to meet the community's needs over the plan period, and provide the framework against which planning decisions are made.

The Government of Jersey has commissioned an integrated Minerals, Waste and Water Study that is intended to support land use proposals and planning policies in the emerging Bridging Island Plan. The Study is formed of two elements, as set out below.

Part 1 of the Study (**Sections 2-4**) establishes the current baseline with regards to minerals, inert waste and potable water, drawing on a number of sources of information.

Part 2 of the Study (**Sections 5-8**) look forward to the future requirements for minerals, inert waste and potable water, and how they might be met in an integrated fashion.

The implications of the various options for meeting the demand for minerals, inert waste management and potable water have been tested through the three scenarios (presented in **Section 7**), and refined through a fourth 'integrated scenario'. It should be reiterated that neither the scenarios nor the integrated scenario were designed for the Government of Jersey to 'pick' as a single, complete solution. However, the Study makes a series of conclusions and recommendations.



Conclusions

Regardless of the exact package of interventions, there are a number of learning points arising from the assessment:

- There is real value in considering minerals and inert waste management demands as an integrated system, in terms of making best use of available resources and meeting net zero and circular economy aspirations.
- On balance, the future of La Gigoulande Quarry as an integrated minerals and waste asset, rather than as an additional reservoir, better meets the island's needs. There are a number of reasons for this, including the existing permission at La Gigoulande which supports inert waste management uses, the environmental and economic impacts associated with a more aggregates import-focussed solution; and the other options available to meet future water demand without requiring La Gigoulande to be used as a reservoir.
- Dual use of La Gigoulande, as an integrated minerals and waste asset, has the potential to increase traffic on the constrained local road network. Mitigation is likely to be possible through access route management (making use of set routes or circuits), avoidance of peak periods where possible, and shared vehicles and trips.
- The environmental impact of the interventions, and in particular the impact of increasing the capacity of Val de la Mare Reservoir, will need to be considered further. Criteria-based policies in the Bridging Island Plan should

be included to guide applicants on the type and level of supporting information that will be required.

- Use of Simon Sand and Gravel's existing permitted works as an integrated extraction, waste management and restoration site would make best use of the available resource whilst also planning for its long term future. Consideration should be given to the types of inert waste it would accept and the condition it would be restored to (including whether it should retain or reduce the extent of the current water bodies), as well as the impact of waste management operations in the context of the Coastal National Park.
- If the decision is made to retain the existing end date for Simon Sand and Gravel of 2023, there is strong case not to retain the restoration end date of 2025. Such a short restoration date is likely to compromise the potential quality of the restoration, and disrupt the market for inert waste on the island, by requiring waste to be diverted from other processors and secondary users.
- There are a number of protential drivers for land reclamation; primarly to develop coastal defences (as set out in the Shoreline Management Plan), but also to provide further developable land and to act as a site for inert waste management. The case for further land reclamation to allow for inert waste management *alone* does not appear to have been made. However, if a wider case is made for reclamation then there is clearly an opportunity to also incorporate inert waste management. However, there may be a tension between requiring a long-term solution for inert waste disposal and the aspiration for land reclamation projects to be completed quickly so that the land can be put to use.
- The Bridging Island Plan should include policies on demand management for inert waste and water – good practice from other jurisdictions (such as UK's BREEAM) should be drawn from. Beyond planning policy and building bye-laws, inert waste management should be supported through wider fiscal and legislative tools such as higher gate fees or an operator's landfill tax.

1 Introduction

1.1 Overview of the Island Plan Review and Bridging Island Plan

The Government of Jersey is currently undertaking a review of its Island Plan. The new Bridging Island Plan will set out and plan to meet the community's needs over the plan period, and provide the framework against which planning decisions are made. It will help to steer Jersey through its recovery from the Covid-19 social and economic crisis, as well as delivering sustainable development, balancing future economic, environmental and social needs.

The Island Plan is one of the most important documents shaping the future of the island, and a key element of Jersey's long-term strategic framework. Given its significance, the process of developing the Bridging Island Plan is thorough, open and rigorous, exposing its content to representations from anyone and to scrutiny by a planning inspector as part of an independent examination, before the draft plan is lodged for consideration by the States Assembly.

1.2 Overview of the Minerals, Waste and Water Study

The Government of Jersey has commissioned an integrated Minerals, Waste and Water Study that is intended to support land use proposals and planning policies in the emerging Bridging Island Plan. The Study is formed of two elements, as set out below.

Part 1 of the Study (**Sections 2-4**) establishes the current baseline with regards to minerals, inert waste and potable water, drawing on a number of sources of information. Part 1 includes:

- an overview of existing regulation, policy and strategy pertinent to minerals, inert waste and water;
- a baseline of the island's known mineral resources and supply, by provider;
- an assessment of the capacity of Ports of Jersey to accommodate minerals importation and inert waste exportation;
- a baseline of the island's inert waste management facilities and their existing capacity; and
- a baseline of the island's current demand and capacity for the supply and storage of potable water.

Part 2 of the Study (**Sections 5-8**) looks forward to the future requirements for minerals, inert waste and potable water, and how they might be met in an integrated fashion. It includes:

- forecast demand over a twenty year time horizon (**Section 5**);
- an assessment of options to meet demand (**Sections 6-7**); and

- recommendations to the Government of Jersey, in relation to the Bridging Island Plan.

PART 1

2 Minerals Baseline

2.1 Evidence Base

The primary sources of evidence that inform the minerals baseline are:

- Jersey Island Plan (Revised), Chapter 10, Mineral Resources (Government of Jersey, 2014)
- Minerals Planning Review (Ove Arup and Partners, 1999)
- Dune Restoration 2020 Limited – Outline Restoration Plan of Simon Sand and Gravel Quarry (DRL, 2019)
- Contribution of Recycled and Secondary Materials to total aggregates supply in Great Britain (Mineral Products Association, London, 2019)
- Consultation with representatives from Granite Products Limited (February 2020 followed by their written responses to written questions)
- Consultation with a representative of Ronez Quarry (February 2020 together with their written comments on draft report text)
- Consultation with a representative of Simon Sand and Gravel (February 2020 together with their written comments on draft report text)
- Consultation with representatives from AAL Recycling (February 2020)
- Consultation with representatives of WP Recycling (March 2020 together with their consultant's written comments on draft report text)
- Consultation with Ports of Jersey (June 2020)

2.2 Regulation, Policy and Strategy

2.2.1 Legislative and Planning Context

Regulation of development, including minerals, in Jersey takes place under the auspices of the Planning and Building (Jersey) Law 2002 which makes provision for an Island Plan, which is revised every ten years. The current plan is the 2011 Island Plan (as revised in 2014). The present report is therefore addressing the legal requirement to revise this and contribute to the emerging Bridging Island Plan.

The existing Plan sets out the following strategic objectives:

- **Sustainable Development**, which sets out: where development should be located; how different forms of development will be assessed; and how land and buildings should be used in energy efficient and carbon-neutral ways[1];
- **Protection of the Environment**, which sets out how the Island's identity and character of its natural and historic environment, should be protected;
- **Economic Growth and Diversification**, which sets out how management of land and new developments will best support the island's economy;

[1] On 31 December 2019 the States of Jersey published its Carbon Neutral Strategy which sets out steps toward achieving broad-based carbon neutrality for the Island. As will be seen later in this report, this commitment will provide context to minerals supply scenarios within this Study.

- **Travel and Transport**, which sets out how the planning system can help to reduce the need to travel, provide choice in travel modes, and encourage reduced dependence on the private car
- **Quality of Design**, which sets out urban design principles to ensure that all development delivers quality in design and architectural terms.

While all of these objectives have some relevance to minerals planning, those on sustainable development, protection of the environment and providing for economic growth and diversification are the most pertinent.

2.2.2 Background to Current Minerals Policy

The Jersey Mineral Strategy was derived from a study undertaken by Arup Consultants in 1999 and subsequent work by the Jersey Environment Department. It aimed to provide a framework for the future provision of construction aggregates and was lodged for States debate in March 2001 (P.51/2000). Although the strategy was never debated by the States, it was used to inform the statutory 2002 Island Plan which contained the first minerals planning policies.

Current minerals policy is contained in the 2011 (revised) Island Plan. Chapter 10 of this Island Plan, entitled: Mineral Resources, explains how the Island's Strategic Objectives are applied in formulating both a general policy framework and specific planning guidance for minerals extraction, processing and distribution in the island. Based on an appreciation of the expected demand for construction aggregates over the planning period 2011-2020, the document sets out the way in which the different sources of materials will contribute to meeting the demand. These sources include on-island producers of primary aggregates, producers of recycled, or secondary, aggregates, together with the option for imports supplementing on-island resources.

At the heart of this present exercise is the need to revisit these supply and demand scenarios in the light of present realities. What follows is a brief review of how the guidance in the current (2011) and previous (2002) planning periods was developed. The following chapters then review each of the suppliers of construction minerals in Jersey, including both primary and secondary (or recycled) sources.

Figure 1 lists these suppliers, showing a combined primary and secondary aggregates production total of 480-485,000t, of which 290-295,000t is primary quarried material, and 190,000t of generally lower grade, secondary production. Though of lower specification, all recycled products must meet the desired specification of the end users and sometimes also the standards of the UK government's Waste and Resources Action Programme (WRAP)[2].

[2] See: http://www.wrap.org.uk

Figure 1: Minerals suppliers in Jersey

Site / company	Recent average annual output	Basis of operation, permission etc.	Economically winnable reserves
Ronez Quarry	110,000t	Ref. 4/ 0 / 16, July 1965, (pre-dating current mineral planning framework)	300,000t; < 3years
Granite Products' La Gigoulande Quarry	125,000t	Permission P/2006/1273, activated in 2007 Waste management licence: WML026	900,000t; < 8 years
Simon Sand and Gravel	55-60,000t	Permission P2003/1318 as revised by RC2018/0818	165-180,000t[3]; < 3 years
AAL Recycling Limited	90,000t	Waste management licence: WML008	Based on arisings and processing of stockpiles
WP Recycling	70,000t	Waste management licence: WML011	Based on arisings
Recycling – other (includes: Barette Plant Hire; La Collette Land Reclamation Site; and some informal recycling for on-site uses)	30,000t	Barette WML039 La Collette WM001	Based on arisings (The La Collette site is primarily inert waste disposal; very small amounts recycled).
Total	**480-485,000t**	-	-

2.2.3 The 2002 Island Plan Minerals Policy

The minerals guidance provided in the 2002 Island Plan was based on the 1999 Arup report: Jersey Mineral Study. This was the first comprehensive study of the minerals production sector in Jersey and led to the island's first evidence-based minerals policies.

Drawing on prevailing production patterns and on the general approach of UK minerals planning, the 2002 Plan provided guidance as to how the various possible supply sources could meet expected demand. The main feature was to ensure that existing and proposed permissions could supply the expected demand of some 450,000 tonnes per annum (tpa) over the coming ten-year planning period, and that, as far as possible, planning for a ten year 'landbank' of supply would remain to ensure continuity of supply through into the following decade.

The main components of the 2002 Plan were:

- Continued long-term production of primary aggregates at Ronez Quarry.
- Continued production, but with limited lifespan, at La Gigoulande Quarry.

[3] In the site in Simon Sand and Gravel ownership / permission. A further estimated 400,000t may be present in adjacent land holdings.

- Encouragement of the secondary aggregates sector, with La Gigoulande Quarry identified as a location for inert waste storage and recycling.
- Preparation for winding down of production at Simon Sand and Gravel, but with a policy (MR1) retaining protection for the reserves in the meantime.
- Preparation for imports of sand and gravel to replace the Simon Sand and Gravel's output and eventually the crushed rock from La Gigoulande.

2.2.4 The 2011 Island Plan Minerals Policy

The 2011 Island Plan did not involve any major review of minerals policy and, initially, it resulted in little change to the provisions of the 2002 plan[4]. However, in the years following its publication, changes in policy emphases across the whole planning sector led to the need to consider some modifications to the above strategy. The main policy drivers of the limited revision were to balance security of supply of construction materials with a greater emphasis on the sustainability objectives of:

- Replacing primary aggregates wherever practicable by recycled, or secondary, aggregates.
- Recognition of the need to integrate polices for mineral extraction with requirements for void space for inert waste arisings[5].
- Reconsideration of the importing option in the light of the energy/CO_2 impacts of the transport involved as compared to local extraction.
- Recognition that expansion of existing production sites entails much less environmental impact than any attempt to open works at any new location.

The only specific adjustments to the plan to give expression to these policy priorities was the granting of a permission (P2012/0121) to La Gigoulande Quarry, with the aim of allowing it in future to combine primary and secondary aggregates production. This would entail managing inert waste storage, and recycling as part of a restoration programme.

Notwithstanding the recognition of the environmental implications of imports, and presumably to underpin its commitment to make provision for importation of sand in anticipation of the possible closure of Simon Sand and Gravel in 2018, in addition to potential shortfalls in rock quarrying capacity in the longer term, the option of making provision for importing was retained.

In the light of these considerations, the (revised) 2011 plan's recommended scenario for meeting demand over the plan period was as follows:

[4] This was, in part, a reflection that the planning permission to prolong life on mineral extraction at La Gigoulande in 2007 meant thatboth La Gigoulande and Ronez had already been identified as long-term sources of local production.
[5] Although La Gigoulande Quarry is identified as the preferred location, it is noted that there could be additional proposals from the private sector including from other quarry operators. The Simon Sand site is mentioned as a location where managed landfill using inert waste could be combined with restoration of the dune ecosystem (Policy 11.85).

- Continued production at Ronez Quarry with provision for extension to enable production well into the long-term.
- Extended lifespan at La Gigoulande Quarry for the long-term but with a timeline for incorporating waste storage and secondary aggregates production into this facility.
- Further encouragement of the recycled, secondary aggregates sector but with growing appreciation of trade-offs between the demand for inert fill material for the La Collette reclamation, and recycling into aggregates.
- December 2018 confirmed as the date when production at Simon Sand and Gravel ceases.
- A more moderated commitment to securing import capability at St. Helier.

2.2.5 Developments Leading to the Current Update

Since the above revision of the 2011 minerals policy, certain developments have taken place which now form part of the context for the present study.

Firstly, the Government of Jersey planners agreed a revision to a condition attached to the planning permission for Simon Sand and Gravel to provide for a further five years of production life (reflecting a lower-than-expected rate of extraction) – with December 2023 the new deadline for operations to cease[6], and December 2025 for restoration to be completed.

Secondly, La Collette reclamation scheme coming to the end of its current (do nothing) capacity is leading to a new appreciation that commercial and planning policy trade-offs may need to take place in the context of the following objectives and pressures:

- The ongoing need for fresh supplies of primary aggregates to the construction industry.
- Land reclamation projects needing regular supplies of inert waste.
- Construction projects under time pressure to remove on-site arisings, without separation into recyclable and other streams.
- Secondary aggregates production, under policy pressure to substitute primary aggregates wherever technically feasible.
- Primary aggregate producers balancing the commercial objectives of extraction with potentially equally valuable inert waste management and recycling businesses.
- Jersey's December 2019 commitment to CO_2 neutrality, promoting reassessment of the relative merits of local versus imported production.

[6] It should be noted, however, that policy MR1 which prevents developments that might cause serious hindrance to the extraction of mineral reserves at Ronez, La Gigoulande and Simon Sand, remains in place. The policy states that the extraction of aggregates from these reserves prior to permanent forms of development will be encouraged.

- The need for additional water security.

Commercial projects that illustrate some of the above dilemmas include:

- A proposal has been made to acquire Simon Sand and Gravel and combine reception and storage of inert waste with a plan to produce secondary aggregates and restore the site to a dune landscape.
- La Gigoulande Quarry's desire to combine implementation of its planning permission for inert waste storage and secondary aggregates production with a new quarrying permission that allows production to continue while releasing much of the current void space to the new activities.
- Proposed higher value developments of reclaimed land at La Collette could result in displacement of secondary aggregates processing.

2.3 Granite Products – La Gigoulande Quarry

2.3.1 Overview of the Current Situation

La Gigoulande Quarry, owned by Granite Products Limited, is located in the 'Green Zone' in St. Peter's Valley, on the parish boundary between St. Mary and St. Peter. It is one of only two local producers of crushed rock products for the construction industry. Operational since 1946, La Gigoulande produces ready-mixed concrete, aggregates and concrete blocks for use in infrastructure, housing and civil engineering projects.

Approximately 40% of the average annual quarry output of around 125,000 tonnes, is used for ready-mixed concrete, 30% is used for concrete products and the remaining 30% is sold as graded loose aggregates.

The La Gigoulande granite body is all non-alkali-silica reactive and as such provides reliable, high performing concrete mixes without the need for either selective quarrying or the use of additives to mitigate the reaction.[7]

A July 2001 planning permission made two million tonnes of rock available, or some 16 years of supply at the time. This was supplemented by a further permission in 2007 (P/2006/1273), which allowed for an increase in the depth of mineral extraction at the western end of the quarry by 7m to provide an additional ten years of reserves (1.4m tonnes).

By the time that the 2007 permission was activated, almost a decade of production would have taken place, more or less extinguishing the supply envelope created by that new permission. By 2020, after 18-19 years' output since the 2001 permission, or approximately 2.3 million tonnes, the quarry is once again facing

[7] While some alkali silica reactive mineral occurs at known locations within the granite body at Ronez Quarry, the practice of selective quarrying eliminates the potentially reactive mineral and mitigates the risk of the reaction completely.

the need for further permitted resources if its role as a major local supplier of aggregates is to continue[8].

Granite Products' estimate of reserves currently remaining is 900,000 tonnes, or just seven years. This falls short of the Minerals Strategy's requirement that a landbank of at least 10-year production should be maintained.

In 2016 approval was obtained (based on permission P/2012/0121) to install an inert waste recycling facility for the production of secondary aggregates and soils, and to provide material to allow for the restoration of the western part of the quarry. In reporting this, the revised Minerals Strategy notes that the quarry's life could be extended from a life of 27 years (but see above paragraph and footnote) to 40 years. This is based on the assumption that secondary, recycled aggregates production could result in a 50% reduction in primary aggregates output from the quarry (para 10.10, p 379, section on La Gigoulande).

In line with this permission, the Island Plan identified La Gigoulande Quarry as a future alternative inert waste recycling location for when the recycling operations at La Collette had to close.

However, in the light of this Study's analysis of recycled aggregate production in the Island (see Section 2.6), the above assumptions appear questionable. This is because secondary, recycled aggregates production is already providing a major contribution to meeting overall demand, and this with both crushed rock quarries producing around 120,000 tonnes per annum.

As will be seen in the section on recycling, secondary aggregates already account for a high proportion of total aggregates demand in Jersey, at between 38-40% and it may not be feasible to increase this much more, given the range of product specifications that the market requires. Notwithstanding this, Granite Products note that there will, in future, be some scope for the development of blended aggregate products containing varying proportions of primary and secondary material.

Moreover, future production of secondary aggregates at La Gigoulande may well simply replace production taking place elsewhere, given the fact that the current production site of WP Recycling in St Peter is facing demands for alternative use of their sites (see Section 2.6 Recycled / Secondary Aggregates).

In addition to it being considered in current minerals planning guidance to be a future centre of recycled aggregates production, Jersey Water have expressed a desire to use La Gigoulande Quarry void for future water storage. Granite Products comment further that while the void space available for water storage is 240,000 cubic metres, some one million cubic metres (or 1.5 million tonnes) of inert waste could be accommodated; the difference residing in the fact that the solid inert material can be used for both slope and void restoration.

[8] In the light of this analysis, Granite Products draw attention to the fact that the current Minerals Strategy (para 10.10, section on La Gigoulande), overestimates the life expectancy of the quarry, in that account is not taken of quarry output in the period between the granting of the permissions and the currency of the (2014 revised) Minerals Strategy.

2.3.2 Perception of Future Demand

Questioned about future aggregates demand, Granite Products expressed the view that current levels of demand (thought to be around 500,000 tonnes of all products) are 'holding up well'. Major growth is not anticipated; nor is any significant decline[9]. In a small Island market like Jersey, it is spikes in production caused by individual major projects that are more significant for producers than is the overall demand trend.

Production at La Gigoulande has been as high as 180,000 tonnes in a single year. With Ronez known to be capable of responding similarly, Granite Products expresses confidence that the Island's hard rock quarries are able to respond satisfactorily to whatever levels of demand might emerge.

2.3.3 Aspirations for the Future

Granite Products wish to secure a further extension of the current primary aggregates extraction works. In this regard an application is being prepared for permission to work a field to the south of the present quarry ('Field 966'), before applying for the waste licence which is a pre-requisite to activating the recycling permission.

The estimated resource potential of Field 966 is 4 million tonnes, sufficient for over 30 years production at the current average rate. This would more than meet the requirements of maintaining a 10-year landbank.

The proposal is that this extension would be worked separately to current operations, thus allowing for simultaneous work on transforming the existing quarry into a facility for inert waste reception, recycled aggregates production and restoration of the quarry to natural uses, in accordance with permission P/2012/0121, approved in September 2016. There are two options for the extension: one to work it separately from existing quarry (retaining the road between the two sites, but resulting in a lower yield); and one to work it from the existing quarry (optimising yield).

2.3.4 Response to Loss of Simon Sand and Gravel

Engagement with Granite Products as part of this Study covered how the possible closure of the Simon Sand and Gravel works in December 2023 might affect their business.

Granite Products (together with Ronez Quarry) currently accounts for about 50% of the total sales of Simon Sand and Gravel, or some 30,000 tonnes. Simon Sand and Gravel's products are used in ready mixed concrete production and manufacture of concrete blocks. If Simon Sand and Gravel material were no longer available Granite Products would respond by turning to:

[9] For present purposes, the impact of the current COVID-19 'corona virus' on markets is best treated as an incident within long term trends to which markets will adapt as best they can.

- sand manufactured from their own granite, with additives to simulate some of the beneficial characteristics of natural sands; and
- a certain amount of importing, especially of 'soft' sand for mortar. This would likely be undertaken in one tonne bagged form or truck trailers aboard roll-on roll-off ferries.

In this regard, see also Section 2.7 Requirements for Imports, which takes a preliminary look at options for imports to replace Simon Sand and Gravel sand and gravel production. For its part, Granite Products appeared to be of the view that both the major primary aggregate suppliers in the island would be able to manage the impacts of the expected closure of the Simon Sand and Gravel works without recourse to expensive arrangements for bulk import of sand and gravel. (See also Section 2.7, which takes a preliminary look at options for imports to replace Simon Sand and Gravel production.)

2.4 Ronez Quarry

2.4.1 Overview of the Current Situation

Ronez is a longstanding supplier of construction aggregates and manufactured construction products in the Channel Islands. In Jersey itself, quarrying in St. Johns has been traced back to the 1650s: the current works go back to 1869. After many and varied commercial ownerships and mergers, the company today known as Ronez became the owner and operator of the Ronez Quarry in 1967. Its current parent company is SigmaRoc Plc, an international asset company specialising in construction materials supply and headquartered in London.

In addition to being a quarry, Ronez produces a wide range of processed and manufactured products to the construction industry including: a wide range of fill and higher specification aggregates, asphalt, ready-mixed concrete and precast concrete products. Along with Granite Products' La Gigoulande Quarry, it is one of just two suppliers of crushed rock products in the island.

Ronez's role in minerals supply to Jersey's construction sector is provided for in the current Island Plan Minerals Strategy (para 10.22) in the following terms:

- (generally) maximising local production of crushed rock required for the local construction industry, within environmental constraints;
- (specifically) continued production of aggregate at Ronez Quarry, St. John beyond the Island Plan period and probably well into the long-term.

Ronez' annual output over the past five years has been in the range 95,000 – 120,000 tonnes (2019 came in at 122,000 tonnes). This is somewhat lower than in the preceding five-year period and also well below the quarry's peak output which has exceeded 200,000 tonnes on a number of occasions. Current installed processing capacity could still allow up to 200,000 tonnes in a year if such a future demand peak were to occur.

Unconstrained reserves available within current permissions amount to only 0.3 million tonnes, or less than three years production at current rates. This falls well

short of supplying the forthcoming planning period, let alone the planning requirement to leave in place a landbank of reserves available for the longer term.

In geological terms, further granite reserves are present in the existing quarry but in order to work them the current processing plant, asphalt plant and associated ancillary infrastructure would need to be demolished. The asphalt plant would need to be relocated and new crushing and screening plant purchased before it would be possible to work these remaining reserves.

2.4.2 Perception of Future Demand

Ronez's perception of construction market prospects is for stable or only slowly growing demand. The very broad range assumed in the current Minerals Strategy, of between 400,000 and 500,000 tonnes is considered to be a reasonable framework for continued minerals planning purposes. Ronez expects to continue supplying a similar proportion of market demand to that at present (but see Section 2.4.4 below).

2.4.3 Application for New Permission

In accordance with the long-term role assigned it in the current Minerals Strategy, and explicitly recognised in the 2011 Island Plan, Ronez has submitted a comprehensive planning application for permission to extend the present quarry westwards. The proposals would release up to 2.5 million tonnes of product, extending the life of the quarry by around 15 to 20 years, depending on annual output. At the production level assumed in the current Minerals Strategy (Table 10.2 Potential Aggregate Supply Structure) this would add 14-18 years. At the 2019 level (120,000 tonnes) it would add 21 years.

If granted, this would meet the requirements of the new planning period as well as the ten-year landbank requirement. The application is currently being determined by the Government of Jersey.

2.4.4 Response to Loss of Simon Sand and Gravel

Currently Ronez sources between 15,000-20,000 tonnes of sand products from Simon Sand and Gravel. These are used as constituents in ready mixed concrete and also concrete blocks that Ronez produces. With the proposed cessation of extraction at Simon Sand and Gravel in December 2023, as envisaged in the extension to the Minerals Strategy's earlier deadline of 2018, both Ronez and Granite Products will need an alternative to current arrangements.

Ronez is understood to be advanced in designing processing plant to produce a range of 'sands' (granite 'dust') from granite in the quarry. Although different in its specification and performance to naturally occurring sand such as Simon Sand and Gravel's products, satisfactory performance in ready mix concrete and concrete products can be achieved by using chemical additives to the natural minerals.

On balance, Ronez is of the opinion that with these proposed alternatives, it would be able to replace its current reliance on Simon Sand and Gravel products in the

event that the 2023 closure of the Simon Sand and Gravel works is enforced. It is noted also that recycling of construction and demolition wastes is also able to produce acceptable sands for some applications. Ronez has also experimented with one of the recycling companies in recycling glass into sand.

Given this understanding, Ronez does not envisage that it will become necessary for it to look seriously into the option of importing sand or gravel in bulk. If necessary, however, smaller amounts of imported material could be handled by using the existing roll-on roll-off facilities at the port.

2.5 Simon Sand and Gravel

2.5.1 Overview

Simon Sand and Gravel has been producing sand and shale-based gravel products to the construction industry since 1909. It is located in a windblown sand dune landscape along the coast of St Ouen's Bay and in the Jersey Coastal National Park. Growing demand from the 1960s onwards led to the introduction of mechanised excavation. At this time, the sand works were well inland. In the early 1970s, excavation moved westwards on the site towards the sea, where sand was deeper and, in 1977, permission was granted to excavate below the water table, using dredgers, with pumping and washing facilities. This method resulted in the creation of a progressively larger and larger lagoon.

In 2004/05 the present owner reverted to excavation but continuing working below the water level. This requires a long-reach excavator that is able to excavate to depths of 3-4 metres and stockpile material along the water's edge where it is allowed to dry for several days before being moved by dumper to the sand processing plant where product fractions are separated.

The present-day works extend over some 22.5 hectares, including 11 hectares of lagoon areas. Of this, Simon Sand and Gravel have restored around five hectares of the site which includes about 0.6 hectares of habitat ponds.

The Simon Sand and Gravel works produce a range of products to the building, landscaping and retail gardening sectors of the Jersey economy including:

- windblown sand for concrete and block making;
- beach sand for plastering, rendering and painting;
- darker sand for backfill of trenches and concrete foundations; and
- shale stone of various sizes for pipe-bedding, hard core and for decorative uses in driveways and garden landscaping.

Total annual product sales are currently at around 60,000 tonnes, although this can vary depending on market demand. The peak annual output was almost 90,000 tonnes (in 2001). Simon Sand and Gravel indicates that approximately 50% of total output is accounted for by (mainly bulk) sales direct to Ronez Quarry and Granite Products for their concrete making and concrete products works. The other 50% goes to myriad smaller contractors, suppliers and retail purchasers.

Simon Sand and Gravel's estimate of remaining saleable product is 600,000 tonnes on land in its own ownership and up to one million tonnes including 2.6 hectares of contiguous land parcels in other ownerships. This gives a potential production life of between ten and fifteen years at current levels of extraction.

While not all of the 600,000t in Simon's ownership lies within permitted parcels of land, the permitted parcels can be managed to yield sufficient product, at current levels of output, to the end of the permission. The current permission requires cessation of production by December 2023. If the works do close in December 2023, then, at current production levels, between six and eleven years of sand and gravel supply would remain thereafter, allowing for the resources both in Simon's and in the adjacent ownerships.

It is one of the aims of this Study to advise on the appropriateness of continued excavation after 2023.

2.5.2 Aspirations of the Current Owner of Simon Sand and Gravel

Simon Sand and Gravel is seeking policy clarity in order to be able to make whatever commercial decisions may be needed to secure the future of the business.

Simon Sand and Gravel's preference is to continue excavation until all economically winnable reserves within existing site boundaries[10] are exhausted; this within the context of an agreed after use / restoration plan. Simon Sand and Gravel notes also that its ability to supply sand and fill shales to the construction industry at much lower financial cost and, given the high CO_2 impact of long distance transport, at lower environmental cost too, suggests that their preference is consistent with the current planning policy.

2.5.3 Implications of Ceasing Operations at Simon Sand and Gravel

Simon Sand and Gravel is for practical purposes the only local source of naturally occurring construction and building sand. Any determination to secure the closure of the works needs to take note of impacts, including consideration of whether, and if so how, local users of the Simon Sand and Gravel products could adapt to the removal of current output from the industry.

This question was put to the two main users of Simon Sand and Gravel sand namely, Granite Products and Ronez Quarry (their responses are recorded in the relevant sub-sections of this section). Through engagement with Simon Sand and Gravel, the following considerations emerged:

- Simon Sand and Gravel understands that natural sand is used by both Ronez and Granite Products in combination with these company's own

[10] But see Figure 1 above which notes that potential further reserves of sand exist in land adjacent to the permitted works, and not within SSG's ownership.

crushed rock and quarry fines to optimise the mix designs in their readymixed concrete and manufactured concrete products.

- Simon Sand and Gravel acknowledged that while both quarries could probably produce technically acceptable granite-based sand fractions by further processing of the fines / wastes from their own quarries, this would come at a cost to them, as a result of having to use alternative technical approaches to achieving products of the same quality as is currently achieved using the locally available sand.
- This might lead to them testing options for importing more sand than the small amounts that are currently imported for specialist applications. This, in turn, could have further cost implications; (including CO_2 footprint).
- Simon Sand and Gravel raised their concern about the impact that cessation of local sand and shale production would have on its large number of smaller customers, who account for the remaining 50% of sales. They would have to either find alternative solutions to their various requirements or press suppliers such as B&Q to increase materials that they import for retailing.

2.5.4 Alternative Options

Simon Sand and Gravel is currently considering a commercial offer from a partnership of local businesses to purchase the business and seek permission to transform the site into an integrated restoration / inert waste accommodation / secondary aggregates production project. The proposal document, entitled 'Dune Restoration 2020 Limited'[11] (DRL) states that its restoration plan could meet the current restoration requirement (Condition 14 of Simon Sand and Gravel's permission) only if an extension of a further ten years beyond the December 2025 deadline for restoration were granted.

DRL state that they do not wish to seek an extension beyond December 2023 for the extraction of sand for sale, although they would wish to be able to use locally recovered sand to blend with incoming materials to assist with restoration of the dune landscape[12]. The proposal includes the suggestion that the restored land would eventually be returned to some form of public ownership.

The parties to the DRL proposal recognise that the new mineral planning guidance, for the period 2020-2030, will need to be changed from the current guidance if the project is to gain approval. Current guidance, which initially provided for Simon Sand and Gravel operations to close at the end of 2018 was extended to December 2023 with restoration to be complete by the end of 2025.

In light of this review, there are considered to be a range of options for the future of Simon Sand (only the first of which fits *current* planning policy):

[11] *Dune Restoration 2020 Limited – Outline Restoration Plan of Simon Sand and Gravel Quarry* (available on request)
[12] DRL document, p15

- Enforcement of the current policy, entailing cessation of production by December 2023 and completion of restoration by December 2025.
- A new permission within the bounds of the existing site allowing continued operations until all economically accessible product is won, followed by an agreed restoration process.
- Permitting a more integrated waste management, secondary aggregates production and restoration solution, linked to a tightly timetabled restoration; in other words, allowing a project such as that of DRL.
- Compulsory purchase of the site by Government, linked to a public sector-led project to accelerate restoration (i.e. the Government choosing to restore the site faster than what is required by the current permission).

A factor that may affect some restoration and re-use options is that the water springs adjacent to the Simon Sand and Gravel lagoons and the lagoons themselves have been found to contain higher levels of both perfluorooctanoic acid (PFOS) and perfluorooctylsulphonate anion (PFOA) than is present in groundwater and water sources elsewhere in the island. Although no formal determination has been made of the origin of the contamination, a 2019 Government of Jersey report[13] notes a possible link with fire-fighting chemicals use at the training area at the west end of the airport runway, from where it could be carried by water over the escarpment and down to the coastal dune / lagoon areas. The degree of contamination could be an issue if leisure-based uses of the lagoons were to be considered in future. It may also be an issue in terms of the lagoons being a groundwater source for future public water supply.

2.6 Recycled / Secondary Aggregates

2.6.1 Overview of the Current Situation

Over the past 20 years the production of saleable aggregate products from mineral and construction wastes in the Island of Jersey has mushroomed. From being a somewhat unnoticed by-product of the inert waste stream, secondary aggregate production has grown to be a major supplier to the construction industry, accounting for over 40% of the Island's approximately annual 500,000 tonnes (485,000 tonnes – see Figure 2) of the total of primary and recycled, or secondary aggregate sales. This is much higher than almost anywhere in the UK and a success story for the island's construction materials industry. Industry estimates put the share of recycled construction and demolition wastes at 26% for Great Britain (England, Scotland and Wales) in 2017[14].

Secondary aggregates production is a by-product of the need to dispose of the various materials arising from construction and demolition. These include the excavated soil and overburden produced when 'greenfield' sites are developed,

[13] Available at: https://www.gov.je/News/2019/Pages/PFOSInterimReportPublished.aspx
[14] See: This report records a higher figure of 29% but this includes industrial wastes as well. https://mineralproducts.org/documents/Contribution_of_Recycled_and_Secondary_Materials_to_Total_Aggs_Supply_in_GB.pdf

together with masonry and concrete from demolition of buildings and breaking of concrete bases, old compacted fill materials, and also the asphalt, sub-base and road base materials recovered during road maintenance, repair and reconstruction.

Altogether, some 500,000 tons per year of such materials are generated each year in Jersey. Its uses subsequent to their arising include:

- Re-spreading on site for levelling purposes.
- Rough processing and then on-site use for temporary access / haul roads, piling mats and construction related storage areas requiring ground with some additional load bearing capacity.
- Removal from site to licensed inert disposal locations or to licensed inert fill sites.
- Separation and recycling into usable materials from these locations with varying degrees of processing of into saleable soil, sand, fill and aggregate products and unsaleable fractions going to inert fill.

For the past 10-20 years, the La Collette reclamation project has been the primary final destination for inert as well as unrecyclable and hazardous wastes.

Three licensed sites for the recycling of inert wastes have developed:

- AAL Recycling who have a licenced waste reception and recycling site on the La Collette reclamation itself (this site receives 'clean' inert waste, i.e. with a substantial degree of separation of non-inerts required in advance). This site receives around 80,000 tons of inert waste per year, producing – on average for the past three years – roughly 90,000 tons of saleable products.
- WP Recycling who have a licenced waste reception and recycling site in the parish of St Peter. This site accepts mixed wastes and therefore offers a waste separation service. The mixed nature of inert wastes lends itself to the creation of some second grade products such as a simple '4" down' aggregate for preliminary road make up or hardcore backfill of a lower un-engineered standard. WP is also able to produce products that meet the WRAP protocol and Highways Agency standards where this is called for by clients. The site receives about 100,000 tons of mixed waste and sells 70,000 tons of products.
- Barette Plant Hire which runs a small aggregate reprocessing site in St Peter. The facility is only able to accept clean concrete and blockwork with no contamination and low fines content. Incoming waste is processed into five categories of secondary materials. No data is available.

Another 180,000 tons is received direct to the La Collette land reclamation site. Industry estimates also speak of a further +/-90,000 tons of arisings that are used on site, sold in smaller quantities and/or disposed of to a variety of other purposes. An estimated 25,000 tons of usable product arises from this 90,000 tons of arisings. This estimate is based on construction industry practice of using inert

arisings to create access tracks for plant and load-bearing construction working areas.

AAL's sales are higher than received arisings because material stockpiled on-site from earlier years, and not recycled, is also being 'mined' for saleable product.

Figure 2: Arisings and sales of recycled aggregates, 2019

Site / company	Arisings (t)	Recycled products (t)	% recycled	Notes
AAL Recycling Limited	80,000	90,000	100%	Includes more products designed to engineered specs
WP Recycling Limited	100,000	70,000	70%	Includes more products designed to lower, un-engineered standards
La Collette Land Reclamation Site	180,000	5,000	3%	Almost all to infill
Others (including Barette + unrecorded on-site uses etc.)	90,000	25,000	28%	Rough estimates based on industry practices
Total	**460,000**	**190,000**	**41%**	

(Sources: AAL, WP Recycling, La Collette weighbridge data)

2.6.2 Aspirations and Concerns of Recycled / Secondary Aggregates Producers

WP Recycling, Barette Plant Hire and AAL Recycling are all keen to continue in their business operations. Granite Products primary aggregates producer also believes that there is commercial potential in the industry, having secured planning permission for inert waste management and recycled aggregates production on their La Gigoulande site.

While it is true that both the 2002 and 2011 Island Plans contain policies aimed at encouraging the recycling of inert wastes, the recycling contractors expressed concerns that minerals planning policy does not, as yet, seem to make explicit provision for the sustainability of the industry, for example by supporting longer term suitable operational sites. They wish to see this situation remedied in the revised policies, noting that the viability of inert waste recycling requires the same degree of planning intent as does that of primary aggregate extraction.

Moreover, the aggregate recycling industry is best understood within the context of the inert waste management sector and, as such, its commercial viability is linked to that sector.

More specifically still, recycling of aggregates involves a symbiotic relationship between the processing of parts of the waste stream on the one hand and having access to licenced waste disposal facilities, on the other.

AAL has been engaging with Granite Products about the possibility of linking the two firm's strategies. Similarly, WP has been engaging with Simon Sand and Gravel regarding the possibility of combining a primary and secondary aggregates business with a commercially underpinned restoration programme for the sand duned landscape of St Ouen's Bay.

The impending closure of the La Collette reclamation scheme therefore has implications not only for the future of inert waste storage capacity, but the future of the recycled aggregates industry.

Unlike previous rounds of minerals planning leading to the 2002 and 2011 Island Plans, the mineral resource section of the Bridging Island Plan will need to consider primary aggregates extraction, waste management, secondary aggregates production and the environmental imperatives of site restoration as both conceptually and commercially interlinked issues.

As already indicated in Section 2.2 on the issues facing the revised policy exercise, and also in Section 2.3 on Granite Products' La Gigoulande Quarry, and Section 2.5 on Simon Sand and Gravel, trade-offs may be required between aspirations for restored natural landscapes and the commercial means of achieving those objectives; with waste management and recycling potentially being a key to achieving those objectives.

2.7 Requirements for Imports / Port Capacity

2.7.1 Outline of the Issues for Minerals Planning

The 2002 minerals planning guidance makes a firm commitment to the need to make provision for the importation of bulk aggregates into Jersey. At that time, it was not only the possibility of the loss of the 60,000 – 80,000 tonnes of Simon Sand and Gravel production, but also the option of substituting some local crushed rock production by imports that was being considered.

Studies subsequently conducted for the Government discovered that while it would be quite technically feasible to develop a dry bulk, aggregate importing (and possibly inert waste exporting) facility at St. Helier, for the likely volumes involved the cost would be prohibitive resulting in prices far above current quarry gate prices for locally produced aggregates.

Notwithstanding this the 2011 minerals guidance (revised in 2014) retained a commitment to consider import options but also notes that there would be a number of additional factors suggesting that more careful thought was required before committing. For, in addition to the likely high cost involved, the much greater distance that the materials would have to be transported would entail significant energy expenditure and associated high CO_2 footprint per tonne of product.

In this Study, more detailed thought has been given to the imports issue, given the now deadline of December 2023 for the closure of the Simon Sand and Gravel works. This has involved engagement with each of the main suppliers, including Simon Sand and Gravel itself, to determine how they think that the construction sector might respond to this event.

As noted in Sections 2.3 and 2.4, neither Granite Products nor Ronez think that the current lack of a facility at St. Helier to accommodate bulk imports would be a major constraint on their business, in the event of Simon Sand and Gravel's production ceasing. Both the crushed rock suppliers believe that they will be able to adapt satisfactorily by a combination of manufactured and recycled sands, together with some non-bulk imports using the conventional handling systems operated in the Port at present.

They note that small scale bulk handling is by its nature very expensive, and would entail a high cost per tonne of shipping the relatively small volumes likely to be involved. Moreover, St. Helier Port tariffs and other handling charges add a further £10+/ton. Taken together, these considerations would mean that users of construction materials would first consider alternative technical solutions to the absence of naturally produced sands, before looking to imports.

Simon Sand and Gravel, while accepting the perspective of Granite Products and Ronez, has raised concerns on behalf of their many retail and small contractor customers. This sector of Simon Sand and Gravel's clientele is responsible for 50% of sales, some 30,000 tonnes. While accepting also that some of this volume could be substituted by recycled aggregates, Simon Sand and Gravel suggest a much more realistic annual importation figure would be between 25,000 and 30,000 tonnes depending on demand levels, and subject to subsequent market growth.

Section 5 of this Study provides an assessment of the likely import requirement taking these varying perspectives into account. The remainder of this sub-section following analyses the ability of port facilities to handle imports as well as the cost implications of imports.

2.7.2 Capacity for Increased Aggregates Imports / Inert Waste Exports at St. Helier Port

Engagement with Ports of Jersey established the following:

- A masterplan for St. Helier Port is under preparation which provides for increasing the port's capacity from the present 450,000 t.p.a. to an initial 840,000 t.p.a and, potentially, to 1.1 million t.p.a.
- Imports of sand or other construction materials (currently amounting to less than 10,000 t.p.a) are handled satisfactorily with equipment already in place in the port, using bagged, roll on-roll off or bulk container modes.
- The Port has studied the case for a separate dry bulk terminal to handle imports of aggregates and/or exports of inert wastes (or any other dry bulk materials) and concluded that the minimum throughput to make such an investment worthwhile would be 0.5 million t.p.a., and probably higher.

- Moreover, the Port would prefer not to have such a terminal because of the dust pollution and other logistical impacts on the rest of the Port.
- The Port confirmed the Consultant's preliminary finding that the levels of sand or aggregates imports and/or inert wastes export, based on the Study's estimates (25,000-30,000 t.p.a.) will quite readily be able to be handled within currently available or planned port capacity.

Noting especially the above point about the non-feasibility of a dedicated dry bulk facility, Ports of Jersey are content that there would need to be evidence for very much higher levels of sand or other aggregate imports (as well as any inert waste exports) than the Study's estimates before there would be any concern about the ability of conventional shipping and port handling modes to cope.

2.7.3 Economics of Importing Sand / Aggregates

Ports of Jersey has expressed the view that imports of sand or other aggregates could be achieved competitively with locally produced products. However, this perspective does not seem to be consistent with available information about shipping and port costs. Moreover, the current minerals planning guidance in the 2011 Island Plan (2014 amendment) notes that imported sand would likely be more costly than locally-produced sand.

To test this matter, Figure 3 sets out a generic comparison of the delivered price of a ton of aggregate produced locally with products imported from the UK.

Figure 3: Comparison of aggregates supply costs: local supplier versus import via St. Helier

Cost item	UK via Portsmouth (Cost / ton)	Existing Jersey supplier (Cost / ton)
Typical 'quarry gate price' (averaged across two primary aggregate sources)	£22.00	£27.00
Local road transport cost: quarry to site in Jersey: (allow 5mls @£0.30/t/mile)	£0.00	£1.50
Road transport cost: supplier to port UK (allow 20mls @ £0.25/t/mile)	£5.00	£0.00
Export port charges (guesstimated)	£4.00	£0.00
UK 'fob' cost versus Jersey delivered cost	*£31.00*	*£28.50*
Shipping cost - UK port to St. Helier ro-ro trailer / bulk container (disaggregated from shipping agent's all-in cost)	£12.00	£0.00
St. Helier Port - composite of vessel + cargo handling charges + harbour tariff on bulks	£12.00	£0.00
Road transport cost port to a notional, central Jersey site (allow 5 mls @ £0.30/t/mile)	£1.50	£0.00
Additional costs for imported aggregates	*£24.00*	*£0.00*

Delivered cost - imports versus local supply	**£55.00**	**£28.50**
Imported versus local supply cost differential	**1.93**	**-**

Sources:

1. Current Ports of Jersey commercial port tariff schedule
2. Ronez estimate drawing on market knowledge and experience of importing to Guernsey
3. Shipping agents' (ProFreight) quote for a weekly 24t trailer load to St. Helier ex Portsmouth

The comparison shows that for an annual volume of 1,250 tons (24 tons x 52 weeks), representative of a small/medium contractor's requirement, the imported aggregate would be almost twice the cost of locally sourced material.

The above is only a generic estimate and larger volume, longer-term contracts might yield lower shipping costs. Alternatively, supply routes from France may also yield lower costs. Ports of Jersey would presumably also have discretion in the application of harbour tariffs (which account for almost 75% of the 'composite' St. Helier Port cost in the generic estimate). Nevertheless, it provides an indicator of one of the likely consequences of minerals supply scenarios that may involve increased importation.

At the same time, the comparison lends support to the view of some local producers that the market's initial response to loss of a local source of sand and gravel production would be to look for substitute products and/or substitute local solutions.

2.8 Key Findings

There are a number of issues that need clarification before clear minerals planning recommendations can be made about the future of La Gigoulande Quarry. These include: whether La Gigoulande's primary aggregates supply role is required to sustain the island's construction industry; whether La Gigoulande should become a joint recycled and primary aggregates production site; and whether Jersey Water's proposal to use the quarry for water storage will be more beneficial than continuing primary aggregates supply. These are assessed through the longlist assessment (Section 6) and scenarios assessment (Section 7).

There are a number of possible responses regarding the future of Simon Sand and Gravel – some of which would require updates to current planning policy. These include:

- upholding the December 2023 cessation of production date and 2025 restoration set in current policy;
- granting new permission to allow operations at the existing site until all economically accessible product is won, together with an agreed restoration timeline;
- allowing a more integrated waste management, secondary aggregates production and restoration solution.

The primary and secondary/recycled aggregates industries in Jersey are beginning to function as an integrated whole: of a total aggregates market of approximately

500,000 tonnes, recycled products account for nearly 40%. The future security of aggregates supply to the Jersey construction industry is therefore dependent on the viability of both primary production at the island's quarries and secondary production at recycling facilities. Recycling, in turn, is dynamically linked to the management of inert waste streams.

Preliminary assessment suggests that current port arrangements at St. Helier would be able to cope with significantly higher volumes of sand and other construction materials being imported in bagged, palleted and other 'neo-bulk' formats, and using current roll-on roll-off ferry facilities.

The overall objective of Part 2 of this Study is to arrive at minerals planning guidance based on the evidence collated through the Study. In contrast to the previous two minerals planning guidance periods, the new advice will need to recognise the dynamic integration between especially the minerals and inert waste components of the exercise. The level of integration between the two parts of the aggregates industry is probably greater than most parts of the UK and, as such, requires more careful policy consideration.

The future security of aggregates supply to the Jersey construction industry therefore depends on the viability of both primary production at the island's quarries *and* secondary production at the various recycling facilities. Recycling, in turn, is dynamically linked to the management of inert waste streams.

Future options for minerals extraction are assessed in Part 2 of this report.

3 Inert Waste Baseline

3.1 Evidence Base

The sources of evidence that inform the inert waste baseline are:

- Solid Waste Strategy (States of Jersey, 2005)
- Revised 2011 Island Plan (Sates of Jersey, 2014)
- Waste Management (Jersey) Law 2005 (States of Jersey, 2005)
- Waste Management (Exemptions from Licensing) (Jersey) Order 2006 (States of Jersey, 2006)
- Supplementary Planning Guidance: Advice note - Site waste management plans (States of Jersey, 2013)
- States of Jersey Environment Scrutiny Panel - Review of Ash Disposal Policy and Methods (Ricardo-AEA, 2012)
- States of Jersey Inert Waste Arisings and Landfill Capacity (Hydraconsult Ltd, 2008)
- Sustaining the Business of Inert Construction Waste Management at La Collette (States of Jersey Growth, Housing and Environment, 2019)
- La Collette Reclamation Site earthworks dataset: 2015-2019 (States of Jersey Growth, Housing and Environment, 2020)
- Inert Waste Management Strategy (AAL Recycling Limited, 2020)
- AAL incoming and outgoing dataset: 2017-2020 (AAL Recycling Limited, 2020)
- Outline Restoration Plan of Simon Sand and Gravel Quarry (Dune Restoration (2020) Limited, 2020)
- Waste Management Licence WML001 (States of Jersey, 2013)
- Waste Management Licence WML008 (States of Jersey, 2015)
- Waste Management Licence WML011 (States of Jersey, 2013)
- Waste Management Licence WML039 (States of Jersey, 2020)
- Consultation with Government of Jersey
- Consultation with AAL Recycling Limited
- Consultation with WP Recycling Ltd
- Consultation with Denis Waste Management
- Consultation with Barette Plant Hire Ltd

3.2 Inert Waste Definition

Inert waste is generally considered to comprise of material which is neither chemically nor biologically reactive and will not decompose. There is no clear definition of inert waste within Jersey law; the clearest definition is provided within Article 2 of the EU Council Directive on the Landfill of Waste:

"'Inert waste' means waste that does not undergo any significant physical, chemical or biological transformations. Inert waste will not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm human health. The total leachability and pollutant content of the waste and the ecotoxicity of the leachate must be insignificant, and in particular not endanger the quality of surface water and/or groundwater."

3.3 Regulation, Policy and Strategy

3.3.1 Regulation

The primary legal measure for the control and management of waste activities in Jersey is the Waste Management (Jersey) Law 2005. The general objectives of the Law are to:

- minimise the generation of waste within Jersey;
- ensure that wastes are managed in an environmentally sound way; and
- ensure compliance with international obligations to transboundary movements of waste.

Article 2 sets out the types of 'controlled waste' regulated under the Law, including hazardous waste, health care waste, and municipal waste. Inert waste is not identified specifically in the scope of the Law; however, it is the view of the regulator that inert waste arising from construction, demolition and excavation (CD&E) activities is included within the category of municipal waste.

Except for activities specifically exempt from the requirement for a licence, all facilities undertaking activities with respect to controlled wastes are required to hold a valid waste management licence for their operations.

The Waste Management (Exemptions from Licensing) (Jersey) Order 2006, sets out the waste activities exempt from the licensing requirements of the Waste Management (Jersey) Law 2005. Of specific relevance to inert waste are Articles 5 and 10:

Article 5 - The use of a controlled waste in a way that is beneficial to the environment, if it is put to use without further treatment, and the use does not amount to disposal.

Article 10 - Any crushing, grinding or other size reduction process, when applied to controlled waste that consists of bricks, tiles, concrete, stone or similar materials.

3.3.2 Planning

Jersey has a 'plan-led' planning system, that identifies that all development should be in accordance with the (Revised 2011) Island Plan, unless there is sufficient justification for granting planning permission that is inconsistent with the Plan.

Until such time as it is replaced, the Revised 2011 Island Plan acts as the primary guide to the planning of inert waste management, and the development of new inert waste management capacity in Jersey.

The current Plan sets the followings objectives with respect to inert waste:

- An annual decrease in the amount of inert construction and demolition waste material for disposal by landfill at La Collette and any other registered waste disposal sites;
- A continuing annual increase in the proportion of inert solid waste material re-used or recycled;
- To make sufficient provision for future inert solid waste disposal, for when the reclamation site at La Collette II reaches the end of its life; and
- To support and permit proposals for permanent or temporary facilities for the recycling of inert wastes into alternative aggregates/and other recycled materials where it can be demonstrated that there is an identified need for the facility.

The Plan identifies that the preferred site option for future inert waste management when the La Collette reclamation site has been filled is La Gigoulande Quarry in St. Peter's Valley. The plan proposes using the site both for landfill of inert waste and for recycled aggregate production, and restoring the quarry for a suitable end-use

Whilst the plan identifies La Gigoulande Quarry as the preferred option for future inert waste landfill in the island, it also acknowledges the potential for further land reclamation, or the development of alternative landfill sites, including proposals from other quarry operators. The plan suggests that controlled landfill at the Simon Sand and Gravel site should also be considered as an option.

3.3.3 Strategy

The Solid Waste Strategy (2005) describes, at a high level, how the Government of Jersey intends to fulfil its obligations in the management of solid waste that is likely to be produced. It also seeks to align solid waste management in the island with standards of international best practice.

The Strategy states that it sets the agenda for Jersey for the next 25 years (2030). There are, therefore, ten years left to run for the strategy, and the objectives and targets set should be a material consideration for inert waste planning in the island. The Strategy sets the following recommended actions:

- Continue to use the planning process to require developers to utilise recycled inert materials in projects.

- Achieve proper control of inert waste through waste regulation, to minimise contamination and ensure that recycled materials meet construction industry requirements.
- Recycle 90% of available glass through processing for recycled aggregate.
- Establish a new inert landfill site in the longer term, when required.

The Strategy acknowledges the positive efforts to divert inert waste from La Collette Reclamation site through recycling of material into secondary aggregates. However, it identifies the minimisation of inert waste generation as the optimal approach to extending the lifespan of the reclamation site.

The Strategy identifies the requirement for larger developments to produce site waste management plans (SWMPs) as an integral component of efforts to reuse and recover increasing quantities of inert waste.

3.4 Inert Waste Generation

Whilst there is no clear definition of inert waste within Jersey law, it is generally accepted by producers, the waste industry, and the regulator in Jersey that the following materials are considered to comprise of inert waste:

- Concrete, blocks, bricks, tiles, ceramics and aggregates, or a mixture thereof arising from CD&E activities;
- Excavated clays and soil, sands and gravels, and stones and rock, excluding those from contaminated sites;
- Asphalt road planings; and
- Glass.

No other materials have been identified in significant quantities as being managed as an inert waste in Jersey, and only the above materials have been included within the scope of this study.

The Energy Recovery Facility at La Collette generates significant quantities of incinerator bottom ash (IBA), primarily composed of inert, non-combustible materials that are left over after the combustion process (sand, stones, and ashes from burnt material). Heavy metals concentrations in IBA typically prevent the material from being considered as inert waste, and the material is currently exported to the UK for reprocessing as a non-hazardous waste. Previous investigations into the potential recovery of this material in Jersey, and use as a secondary aggregate, have identified unacceptable environmental risks in the Jersey context. This material is outside of the scope of the inert-waste component of this study; however, it is recommended that the decision to export the material is periodically reviewed.

3.5 Inert Waste Management

3.5.1 Management at Licensed Facilities

Overview

With the exception of exempt activities, sites undertaking treatment, recovery or disposal of controlled wastes in Jersey are required to hold a valid waste management license. The facilities identified in Figure 4 comprise the sites holding valid licences in the island for the management of significant quantities of inert waste.

Figure 4: Licenced inert waste management sites

Site	Waste management licence	Operator
La Collette Land Reclamation Site	WML001	GHE Operations
Aggregates Recycling, La Collette	WML008	AAL Recycling Ltd
Broadlands Recycling Centre	WML011	WP Recycling Ltd
BPH Depot	WML039	Barette Plant Hire Ltd

The Aggregates Recycling facility at La Collette is operated by AAL Recycling Ltd, on behalf of Government of Jersey, as a contracted recycling partner. The facility is co-located with La Collette Land Reclamation Site operated by IHE, and is considered by the operator to comprise a single site.

3.5.1.1 La Collette Infill Site

Overview

The only licensed site for disposing of inert waste to land in Jersey is the La Collette infill site. The site is a public facility operated by GoJ Infrastructure, Housing and Environment (IHE) and comprises an inert waste landfill in the marine void space behind a rock wall created in 1995. The site commenced operations for the receipt of inert waste in 1996.

The site primarily accepts inert waste from the private sector that is deemed to be non-recyclable, and inert waste from Government departments.

Until recently, all construction, demolition and excavation (CD&E) waste arriving at the site was deposited at the tip-head and pushed into the infill-site. Approximately 6-8 months ago, the site operators began separating tipped loads which are visually identified as having potential value for aggregate production; this material is then collected for reprocessing by AAL Recycling Ltd.

CD&E waste accepted

As reprocessing of inert waste into secondary aggregates by operators in Jersey has gained traction, the type and quantity of inert waste taken to the La Collette infill site has changed. This trend has continued to develop as the remaining void space at the site has declined. With limited time left before the site is filled and

can no longer accept waste, there is a growing sense of urgency amongst operators to explore opportunities to divert more material away from the site.

The predominant material deposited at the site comprises loose, fine soils excavated during the construction of development projects - sometimes with larger rock and stones content. Prevailing sources of material include:

- Piling and foundation excavations;
- Excavation of basements and parking structures; and
- Reprofiling of coastal sites to develop tiered development platforms.

Figure 5: La Collette infill site – stockpiled material awaiting deposit at the tip head

Glass

Further to the inert waste from CD&E activities, the site also takes the balance of recycled glass from AAL Recycling Ltd, originating from door-to-door household waste collections, and glass bring-sites located around the Island. Until recently, all recycled glass generated in Jersey had been used to line the rock walls at the La Collette infill site, so as to protect the permeable lining membrane from damage. As concern regarding the impact of microplastics in the marine environment has grown, this material is no longer used for lining and has been stockpiled on-site until a suitable use has been identified. AAL Recycling Ltd are currently trialling the use of a mobile impact crusher and screens to remove contamination from the glass (typical contaminants are plastic, paper, metals, etc) and prepare it for use in aggregates and concrete production (see Figure 6).

Figure 6: Trial of glass sorting and crushing by AAL at La Collette

Inert waste input data

La Collette infill site has a weighbridge, which tracks the weight of waste deposited by all trucks arriving at the site. Waste input data for waste received between 2015 and 2019 is presented in Figure 7.

Figure 7: La Collette infill site waste data 2015 to 2019

Material	2015 (tonnes)	2016 (tonnes)	2017 (tonnes)	2018 (tonnes)	2019 (tonnes)	Average (tonnes)
Private sector inert waste	119,022	174,631	135,594	127,670	174,219	146,227
Internal GoJ inert waste	3,328	19,435	130,611	700	1,736	31,162
Glass	5,603	5,936	5,938	5,911	5,591	5,796
Total	**127,953**	**200,002**	**272,142**	**134,281**	**181,546**	**183,185**
% recycled	*4.4%*	*3.0%*	*2.2%*	*4.4%*	*3.1%*	*3.4%*

It is clear from the data in Figure 7 that waste quantities received by IHE at La Collette vary considerably between years. Jersey is a relatively small island and the quantity of material received at the site can be affected significantly by large developments. The operator may get prenotification of larger developments through the Island's planning process, or through direct contact from developers or contractors, which goes some way towards planning the operations at the site and estimating the lifespan of the remaining void space.

Charges

Charges for depositing inert waste have increased at La Collette since the site began receiving inert waste. The charges have typically been increased to balance increased operating costs, and more recently, to disincentivise use of this facility and encourage waste producers to take the material for reprocessing, where possible. The current charge is set at £20.45/tonne, with a significant rise in 2020 pending approval.

Whilst there has been a gradual decline in the quantity of waste taken to the infill site, the charges do not always have the desired effect in discouraging use of the site. A proportion of the vehicles arriving at the site are general contractors that pass the gate fee cost onto their clients. It is common practice for a % uplift to be applied to the disposal charges, meaning some operators benefit from the higher charges. There is concern therefore that increasing the gate fee charge further may not have the required deterrent effect.

3.5.1.2 AAL Recycling Ltd at La Collette

Overview

AAL Recycling Ltd (AAL) operate an aggregate recycling facility at La Collette under contract to the Government of Jersey, co-located with the La Collette infill site, and located on land previously reclaimed through deposit of inert waste.

AAL began operations at the site in 2006 after a competitive tender process, with their contract to occupy the site being periodically renewed. Commercial waste meeting the criteria of 'Recyclable aggregates' are received at the facility under a licence arrangement between GHE and the operator AAL.

CD&E waste accepted

AAL accepts a broad range or materials, with a combination of modern equipment (screeners, crushers, etc) used to sort and reprocess the material into secondary aggregates for resale into the market.

The equipment used by AAL is in line with good-practice, but they are currently unable to sort heavily contaminated material, or produce saleable products from very fine, loose material. This material is either rejected at the gate, or tipped and a reloading fee charged. This is likely to change once a planned aggregate washing facility is commissioned; it is expected that this will be complete in Q1 2021.

Inert waste input data

The AAL site at La Collette has a weighbridge, which tracks the weight of waste deposited by all trucks arriving at the site. Waste input data for waste received between 2015 and 2019 is presented in Figure 8.

Figure 8: AAL La Collette aggregate recycling facility waste data 2017 to 2019

Material	2017	2018	2019	Average
Incoming inert waste	74,125	76,214	85,063	78,467
Rejected and sent to infill site	0	0	370	123
Total	**74,125**	**76,214**	**85,433**	**78,591**
% Recycled	*100.0%*	*100.0%*	*99.6%*	*99.9%*

With the exception small quantities of waste received in 2019, all waste received at the AAL site is reprocessed and sold on the secondary aggregates market. AAL produces a range of products to meet market requirements, including aggregates that meet the UK Highway Agency's Specification for Highway Works standards, and the WRAP Quality Protocol for Aggregates from inert waste.

Charges

The gate fee charged to incoming waste is dependent on the value of the material, ranging from £1.50/tonne for clean recyclable aggregates to £21/tonne for material with lower recyclable content.

3.5.1.3 WP Recycling at St Peter

Overview

WP Recycling Ltd operate a waste recycling centre on a site at Broadlands, St Peter. The working area of the site has reduced and shifted, with part of the site now developed for housing.

The remaining part of the site, on which waste activities are currently undertaken, is subject to a planning application to build additional houses. Approval of the pending application, and construction of the housing, would effectively close waste operations at the existing site. The operator is considering options to expand into adjacent fields, or relocate to sites elsewhere on the island.

The area of the site currently occupied, comprises primarily of unsurfaced ground, on which a variety of equipment is accommodated to enable the sorting and processing activities to be undertaken. Waste taken to the site undergoes manual and mechanical sorting; any separated materials suitable for reprocessing into marketable products undergo screening and crushing, prior to resale as secondary materials (see Figure 9). The facility produces a broad range of products, and whilst they are able to conform to the WRAP protocol and Highways Agency standards, their primary focus is on producing materials that meet the engineering needs of their customers.

Figure 9: WP Recycling Ltd – production of secondary aggregates

CD&E waste accepted

WP Recycling Ltd accept the broadest range of construction waste of any of the licensed facilities in Jersey. Their site accepts mixed construction wastes containing non-inert components which the other three sites would be unable accept due to the restrictions of their licenses, and the process used to sort or dispose of the waste.

WP Recycling primarily accepts mixed CD&E wastes, from a large range of commercial and domestic customers, ranging from clean concretes and natural stones, to mixed construction wastes containing insulation, green waste, plastics, wood and metal. The facility sorts the material manually and mechanically, to remove materials that cannot be reprocessed into saleable soils and aggregates. The residues primarily go to the La Collette infill site and/or the EFW facility, whilst the recycled components are produced into pipe bedding, sub-base aggregates, sands and soils, etc

Inert waste input data

The WP Recycling Ltd site in St Peter does not have a weighbridge; waste in and materials out are charged by volume. Therefore data on the tonnages processed at the site are estimates.

Detailed estimates of material quantities in and out of WP Recycling's site are still pending. Informal estimates show that the site accepts approximately 100,000 tonnes of waste per year, of which approximately 65-75,000 tonnes is returned to

the secondary materials market, and the remainder sent to the La Collette infill site.

3.5.1.4 Barette Plant Hire

Barette Plant Hire operate a small aggregate reprocessing site in St Peter. The facility is the newest and smallest licensed site accepting inert waste in Jersey. The constraints of the site, the equipment, and the license, mean that the facility is only able to accept clean concrete and blockwork with no contamination and low fines content. The site processes incoming waste into five categories of secondary materials.

The site does not operate with a weighbridge and no data has been provided regarding the quantities of material accepted at the site. It is estimated that the site manages less than 10,000 t.p.a.

3.5.2 Informal Recovery

It is the view of the Head of Waste Regulation that under the Waste Management (Exemptions from Licensing) (Jersey) Order 2006, where controlled waste is used to fulfil a legitimate construction or development purpose, for which there is a valid planning permit, and where the waste derived material is appropriate for use, then the activity would be exempt from the need for a waste management licence.

Consultation has identified the following activities as being undertaken under this type of exemption:

- Use of crushed demolition waste in temporary piling matts;
- Use of crushed demolition waste in permanent development platforms; and
- Use of crushed construction and demolition waste for restoration purposes.

It is understood that a considerable quantity of inert waste is managed in this way in Jersey. However, little data is available with which to estimate annual quantities, and little evidence is available on which to ascertain the proportion on non-inert waste used in this way. Estimates by those familiar with the industry identify that approximately 100,000 t.p.a. of material may be used outside of licensed waste sites in Jersey.

3.5.3 Exports of Inert Waste

Whilst it is technically and legally possible for inert waste generated in Jersey to be exported for recycling, recovery or disposal, the cost of exporting the material is understood to be uncompetitive when compared with domestic options. No exports of inert waste were identified when undertaking this study.

3.5.4 Summary

Based upon a mixture of data, ranging from several years of high-quality weighbridge based data, to ballpark estimates, it is forecast that approximately 440,000 tonnes of inert waste is generated in Jersey each year. Of this quantity:

- Approximately 183,000 tonnes of inert waste are disposed of at the La Collette infill site;
- Approximately 157,000 tonnes of inert waste are reprocessed into secondary materials for resale at three licenced sites; and
- Approximately 100,000 tonnes of inert waste are reused on the site of origin, or within neighbouring construction projects.

The relatively new Barette Plant Hire site is small and presently provides a limited contribution to the island's inert waste management industry. Each of the remaining three licensed sites is integral to the smooth functioning of the industry. In particular, La Collette infill site is the only facility able to dispose of low value inert waste which is not recyclable into marketable products. Similarly, the WP Recycling site is the only facility able to accept and sort mixed construction wastes. Without either of these sites, there would be significant quantities of wastes generated in Jersey with no sites able to accept them.

3.6 Inert Waste Management Capacity

3.6.1 Disposal Sites

3.6.1.1 La Collette Infill Site

Overview

La Collette infill site is a landfill site with a finite void space. The annual throughput capacity of the site is essentially unlimited; the capable road network, and generous terms of the waste management licence (500,00 t.p.a.), would permit significantly more waste than the site is ever likely to receive in a single year. The significant factor is the volume of the remaining void space and the length of time that it will take before it is filled.

Cohesive materials, such as clays, have little market value in Jersey and are currently only suitable for disposal. La Collette infill site is the only facility in Jersey able to accept inert waste with no value to reprocessors. On closing, waste producers with this type of material will have no suitable facility for the material to be taken to, unless an alternative site is developed, and a suitable waste management license granted.

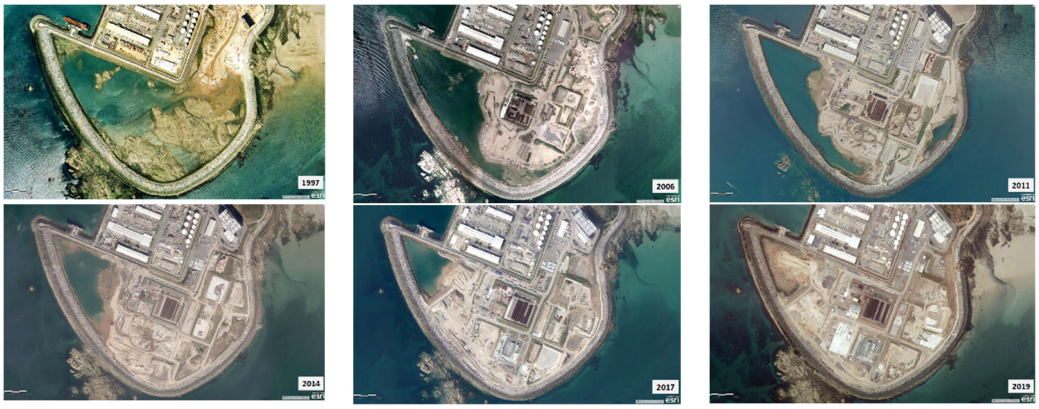
Current capacity

Since use of La Collette infill site began in 1997, the original area of the landfill site has been substantially filled, with much of the reclaimed land already having

been put to use. The original area of the site was 275,000m^2, with an average depth of 12.36 m, giving an estimated capacity of 3,400,000m^3.

It is clear from the aerial photos in Figure 10, that most of the original area behind the sea wall has been filled. Detailed drone surveys undertaken in December 2019, put the remaining unfilled volume of the infill site at 83,875m^3. Based on an estimated average material density of 1.75 tonnes/m^3, the remaining capacity of La Collette infill site is thought to have been approximately 146,800 tonnes in December 2019. At the current (2019) rate of deposit, it is estimated that the remaining void space is now approximately 117,500 tonnes, which is forecast to last approximately eight months before being filled. This is slightly lower than the operator estimate of approximately 14 months of remaining capacity.

Figure 10: Picture 4: Progress at La Collette infill site between 1997 and 2019



Extending the life

The operator believes that by inspecting incoming loads and separating those understood to have usable quantities of recyclable materials (for transfer to AAL's aggregate recycling facility), they are able to stretch the life of the site to approximately 18 months. The commissioning of an aggregate washing facility at the neghbouring AAL Recycling Ltd. site is likely to increase the proportion of material that may be diverted away from the infill site in the future. This could be further extended by super-filling the remaining area of the site (allowed under the existing consent).

Contingency measures to further increase the lifespan of the site include excavation of areas of the site known to contain high proportions of usable material. In 2017, significant quantities of shales, excavated as part of a Government of Jersey waste water project, were deposited at the site. The operator believes that much of this material could be removed and reprocessed into secondary aggregates, potentially freeing up previously used space. The quantity of material that could be removed from La Collette for reuse elsewhere is dependant on the required engineering properties for potential off-site applications. The quantity of material that could be extracted for use in applications such as land reclamation projects (See **Error! Reference source not found.**), may be significantly increased over that suited for processing into general engineering fill.

It is the operator's desire to increase the tipping charges at the La Collette infill site from £20.47/tonne to £42/tonne. It is intended that increasing the charge will reduce the volume of waste being tipped for disposal by encouraging greater quantities of material to be taken to one of the Island's inert waste reprocessing facilities. It is forecast by the operator that the greater diversion of waste from the site could prolong the lifespan to between three and four years.

3.6.2 Recycling and Recovery Facilities

Overview

Unlike the La Collette infill site, whose capacity comprises a finite void space, the capacity of the three licenced inert waste reprocessing facilities in Jersey are only constrained by annual throughputs. Provided the sites remain active, the annual capacity can be provided in perpetuity. The capacity of the inert waste reprocessing facilities in Jersey can be categorised in the following ways:

- the legal capacity, regulated by GHE according to the terms of the sites' waste management licence;
- the practical capacity of each site, limited by the transport constraints of the local road network, the logistical constraints of the site, and the throughput capacity of equipment used; and
- the size of the local secondary aggregates market and its ability to absorb the material produced at the inert waste reprocessing facilities.

3.6.2.1 AAL Recycling Ltd at La Collette

Current capacity

The AAL Recycling Ltd site at La Collette has a throughput limit of 200,000 t.p.a. according to the terms of the waste management licence. This permits the site to accept more than double their current annual throughput. It is believed that the site, the equipment currently used, and the local road network would all accommodate this throughput. The operator believes that the site could process approximately 250,000 t.p.a., were this quantity of waste available, and their licence extended to permit it.

Whilst the AAL Recycling Ltd facility has the capacity to accept considerably more waste than they currently do, the equipment used limits the *range* of materials that they are able to process into marketable products.

Future considerations

AAL Recycling Ltd are a successful business and are enthusiastic about continuing operations.Whilst they are operating the site under a time-limited contract, their tenure has recently been extended, and the retention of an aggregate recycling facility on the site is relatively secure.

AAL Recycling Ltd are currently in the process of commissioning an aggregate washing facility on the site, due to be completed in Q1 2021. This is anticipated to

increase production of secondary aggregates from inert waste by approximately 50%. Based on 2019 data, this would increase throughput by approximately 43,000 tonnes, and would have a direct equivalent impact on reducing inputs to the adjacent infill site. In practice, it is likely that for this increase in throughput to be achieved, a revised material reception process would be needed at La Collette, to ensure that no material suitable for processing at the AAL Recycling Ltd site is deposited at the infil site for disposal.

Were AAL Recycling Ltd's contract not to be renewed in the future, and no alternative site found for their operations, there is the possibility that their contribution to inert waste reprocessing and production of secondary aggregates in Jersey would be lost.

3.6.2.2 WP Recycling at St Peter

Current capacity

The WP Recycling Ltd site at St. Peter has a throughput limit of 200,000 t.p.a. according to the terms of their waste management licence. This permits the site to accept approximately double their current annual throughput. The equipment used on the site is thought by the operator to be capable of delivering output up to the licensed throughput limit; however it is likely that expansion of the land utilised for operations would be required to accommodate this increase.

Future considerations

The part of the site on which waste activities are currently undertaken is subject to a planning application to build additional houses. Approval of the pending application and construction of the housing could close waste operations at the site, although there is potential for relocation to neighbouring fields to retain operations in the area.

3.6.2.3 Barette Plant Hire Ltd

The Barette Plant Hire site at St Peter has a throughput limit of 60,000 t.p.a. according to the terms of their waste management licence. This permits the site to accept considerably more than their current throughput; however, the site area is small and road access to the site is constrained. It is unlikely that the operator could exceed their permitted capacity within the limitations of the site.

3.6.3 Summary

Disposal Capacity

Regardless of the proposed measures to extend the life of the La Collette infill site, the remaining life of the facility in its current form is very limited. With some operational changes, the life of the facility could be stretched to 18-24 months. With more radical measures, it may be possible to extend the lifespan up to four years.

Reprocessing capacity

If each of the three licenced inert waste reprocessing facilities in Jersey were to operate at the limits of their waste management licences, they would be able to process 460,000 tonnes of inert waste. This capacity exceeds the estimated total annual demand for inert waste management in Jersey. The current investment in aggregate washing equipment at the AAL Recycling Ltd site, is likely to increase the proportion of the waste currently sent for disposal, which is reprocessed into secondary materials.

It is understood from consulting with inert waste reprocessors that there is considerable demand for the secondary aggregates that they are producing. With the exception of a few lower value materials (road planning and glass primarily), there is no evidence that aggregates produced at the reprocessing facilities are being stockpiled in significant quantities whilst awaiting sale. Generally, operators stated that, for most materials, they are selling the products as fast as they can produce them, and often have to turn customers away due to lack of stock.

In most cases, the facilities have the practical and legal capacity to increase the quantity of inert waste that they accept considerably, were additional waste material to be available. The market demand for secondary aggregates is high and could sustain greater quantities, could more suitable inert waste be diverted from disposal to the recovery facilities.

Mixed wastes

The WP Recycling Ltd site at St. Peter is the only facility in Jersey able to accept waste loads comprised of mixed inert and non-inert waste. Were the site to close, and not be replaced with a site operating similarly, there would be no facility in Jersey able to accept mixed construction wastes. This may encourage CD&E waste producers to effectively segregate such wastes on-site, but it likely that there will continue to be cases of such waste being produced. With no facility able to accept such waste, incidences of fly-tipping or disposal at unregulated sites are likely to increase.

3.7 Planned and Possible Inert Waste Management Capacity

3.7.1 Recycling and Recovery Facilities

Between the Government of Jersey aggregate recycling site operated by AAL Recycling Ltd at La Collette, and the WP Recycling Ltd site at St Peter, the two facilities comprise approximately 95% of Jersey's inert waste reprocessing capacity. The future of the WP Recycling Ltd site is uncertain, and could feasibly be lost to residential land-use development in the next few years.

Only La Gigoulande Quarry has been allocated in the Revised 2011 Island Plan for future inert waste reprocessing uses. Whilst it currently remains in-use as an active quarry, it does have planning permission for reprocessing and inert waste disposal, and could operate as a dual use site.

3.7.2 La Gigoulande Quarry

As established in the 1999 Jersey Mineral Study, and reflected in successive Island Plans, La Gigoulande Quarry is designated in the Revised 2011 Island Plan as the preferred site to replace inert waste reprocessing when the landfill at La Collette is completed.

The site appears suitable for the proposed use and, with the correct preparations, it is estimated that at current disposal rates the 1m m^3 void space would provide a disposal route for non-recyclable inert waste for approximately ten years. This could be extended considerably if a greater proportion of Jersey's inert waste was diverted from disposal.

The site already has planning permission to begin inert waste disposal and reprocessing operations, and only requires a Waste Management Licence before such operations can commence.

The site remains in private ownership and use of the site is at the discretion of the current occupiers. Continued use of the site for minerals extraction remains viable and there are no guarantees that the occupier will make the site available for inert waste operations in sufficient time to replace the La Collette sites when they close – however, the owners have stated their intention to progress with waste disposal when La Collette is full as a dual use facility. Furthermore, there is interest in the site for use as a water reservoir, which would prevent use of the site for inert waste management.

3.7.3 Simon Sand and Gravel Quarry

The Simon Sand and Gravel quarry is primarily a sand extraction site, operating under permissions which allow extraction to continue to 2023. The site is in a sensitive location being within the 'Coastal National Park' of coastal dune landscape. Despite the projected six to eleven years of sand and gravel supply expected to remain at the site beyond 2023, there is a commitment in the Revised 2011 Island Plan, to wind down sand extraction at the Simon Sand and Gravel site and progressively restore the site.

It is evident that the restoration of the site will require the importation of material; however, the sensitivity of the location may mean that the introduction of a waste processing facility would involve considerable challenges and that the waste acceptance criteria may be more restrictive than those at La Collette infill site (i.e. the site may be unable to accept the range of materials currently disposed of at La Collette). It is therefore considered that whilst the site has the potential to accept some of the inert waste currently sent to the La Collette infill site, there may be a remaining quantity of inert waste which the site cannot accept.

The void space of the quarry is not known with certainty and would be subject to detailed surveys. The quantity of inert waste that could be used within the restoration of the site would be dependent on the void space of the quarry, and the details of the approved restoration plans. Estimates indicate that the void space is likely to be between of 2.25m and 4m tonnes; this would provide a lifespan of 12 to 22 years, based on current rates of deposition at La Collette.

The conditions of the site's planning consent require that restoration of the site is to be completed by 2025, or agreed otherwise with IHE (Regulation). The volume of inert waste generated in Jersey would make this timeframe unfeasible without importing additional material. It should be considered that such a condensed restoration schedule does not serve the interests of Jersey in stimulating the production of secondary materials from waste and providing long-term solutions to the disposal of non-recyclable material.

3.7.4 Land Reclamation

Whilst further land reclamation projects are not unanimously popular in Jersey, there are a significant proportion in favour of another land reclamation project to replace La Collette when the site closes. The Shoreline Management Plan, adopted in early 2020, identifies 'advance the line' policy options in the short-term and medium-term for those areas of the island's shoreline most at risk from coastal flooding, which would also require inert waste for its creation.

3.7.5 Recovery Opportunities

There is scope within the island's waste regulations for suitable inert waste to be used in recovery applications to replace use of non-waste materials. Such applications may include flood alleviation schemes, climate change adaptations, and recreational landscaping projects, such as golf courses. Opportunities may be identified though consultation with relevant Government departments and private developers.

3.8 Export of Inert Waste

3.8.1 Regulation Governing Export Within the EU

3.8.1.1 Overview

Exporting waste for disposal or recovery within the EU is possible, depending on country controls, waste type and destination. A summary of the key constraints are presented in the following section.

With effect from June 2007 the Waste Shipments Regulations were implemented in EU legislation and the EU implementation of the Basel Convention was brought up to date. The new Waste Shipments Regulation introduced two lists, a Green List and an Amber List.

Unlike amber listed waste, green listed waste may be imported/exported for recovery without the need for prior written notification and consent of the Environmental Protection Agency. Procedural and control requirements are thus less stringent with regard to green listed waste destined for recovery. The requirement is limited to the need for an accompanying Annex VII document; cf. Article 18, which details information that is relevant for tracking the waste.

Inert waste would generally be classified under the Amber list.

Figure 11: Summary of waste import restrictions in nearby countries

Country	Allow import from Jersey			Conditions
	Disposal	Recovery	Non-wastes	
UK	No- strictly banned	Yes- DMR[15] needed	Yes- if meets Quality Protocol	Complying with the criteria set out the Quality Protocol would allow the import of inert material, no longer regarded as waste, into the UK for use.
France	Yes- requires authorisation	Yes- requires authorisation	Yes	France does not restrict imports of waste beyond the requirements of the EU waste shipment regulations. Inert waste falls within the Orange list, so would require prior authorisation for import, but this is not as restrictive as the UK.
Netherlands	Yes- requires authorisation	Yes- requires authorisation	Yes	For the import and export of waste, a notification, permission or permit is required depending on the type of waste under the Environmental Protection Act, which has implemented EU Shipments of Waste Regulation
Belgium	Yes- Some regions	Yes- Some regions	Yes- Some regions	Brussels does not have the capacity to treat inert waste. Agreement from consenting authorities needed in Flemish region. Waste import ban in Walloon region.

3.8.1.2 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal

The overarching objective of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, also known as the Basel Convention, is to protect human health and the environment against the adverse effects of hazardous wastes. The principal aims of the Convention are:

- To reduce the transboundary movement of wastes subject to the Convention to a minimum consistent with the environmentally-sound and efficient management of such wastes;
- To minimize the amount and toxicity of hazardous wastes generated and to ensure their environmentally-sound management as close as possible to the source of generation;
- To establish a regulatory system that will apply in cases where transboundary movements are permissible.

Waste can only be imported into countries ratified to the Basel Convention (including the UK, France and all other EU nations) for recovery from other

[15] Duly Motivated Request

ratified parties. Whilst Jersey is not identified formally as a signatory, in September 2007, the Government of the United Kingdom informed the Secretary-General that it intended the United Kingdom's ratification of the Convention to be extended to Jersey for whose international relations the United Kingdom is responsible, with immediate effect.

3.8.1.3 End-of-Waste Criteria

End-of-waste criteria specify when certain waste ceases to be waste and obtains a status of a product (or a secondary raw material).

In the UK, certain specified wastes cease to be waste according to Article 6 (1) and (2) of the Waste Framework Directive 2008/98/EC, when it has undergone a recovery (including recycling) operation and complies with specific criteria to be developed in line with certain legal conditions, in particular:

- the substance or object is commonly used for specific purposes;
- there is an existing market or demand for the substance or object; and
- the use will not lead to overall adverse environmental or human health impacts.

If inert waste reprocessors can satisfy the requirements of meeting end-of-waste criteria in Jersey, and the country to which waste is sent, the material can be exported as a non-waste, with taxes and regulations of goods applying, in place of waste.

3.8.1.4 Exporting Inert Waste to the UK

Imports of waste for disposal in the UK are prohibited, save for a few exceptions described in the UK plan for waste shipments. In these exceptions, notification controls will always apply. It should be assumed that exports of Jersey's inert waste to the UK, would only be approved for recycling or recovery, and not for disposal to landfill.

Transfrontier Shipment of Waste (Amendment) Regulations 2014

Generally, waste should not be imported into the UK for disposal. There are a number of exceptions to this ban. Waste can be imported into the UK from countries outside the UK where environmentally sound disposal is not available in the originating country, and can be provided in the UK. Governments of states wishing to dispose of waste in the UK must have an agreement with the relevant environmental regulator under a duly motivated request (DMR), the UK Correspondent (The Secretary of State), or the EU under a bilateral agreement. For example, the Isle of Man is permitted to export hazardous waste to the UK under a DMR for physico-chemical treatment, disposal to landfill and high temperature incineration at authorised facilities.

It is unlikely that a DMR would be approved for inert waste exports from the Jersey to the UK, as Jersey would need to justify why they cannot reasonably develop or acquire the necessary technology to dispose of the waste itself.

UK Plan for Shipments of Waste

In addition to the Waste Shipment Regulations and the Transfrontier Shipment of Waste Regulations 2007, this UK policy document, the UK Plan for Shipments of Waste implements the long-standing UK policy of self-sufficiency in the disposal of waste by strictly limiting when waste may be shipped to or from the UK for disposal. Relevant exclusions set out in the plan include:

- Shipments of waste into the UK from a Party to the Basel Convention outside the EU where a UK competent authority has acceded to a duly reasoned request;
- Shipments of waste into the UK from a non-Party to the Basel Convention with which the UK Government has concluded a bilateral agreement.

It should be noted that even where these exceptions apply, shipments of waste for disposal to and from the UK are subject to the procedure of prior written notification and consent as set out in the EU Regulation.

Quality Protocol (WRAP)

The Quality Protocol sets out the end of waste criteria for the production and use of aggregates from inert waste in England, Wales and Northern Ireland. The protocol was developed by the Environment Agency, the Northern Ireland Environment Agency and WRAP (Waste and Resources Action Programme). Producers and users are not obliged to comply with the Quality Protocol. If they do not, the aggregate will normally be considered to be waste and waste management controls will apply to its handling, transport and use.

Those intending to import Quality Protocol compliant material into England, Wales or Northern Ireland should be aware that, if the country of despatch regards the material as waste, the controls set out in the Waste Shipment Regulation will apply to the shipment. This is the case even though the material may be regarded as having ceased to be waste in England, Wales and Northern Ireland.

3.8.1.5 Exporting Inert Waste to France

France does not restrict imports of waste beyond the requirements of the EU waste shipment regulations. Inert waste falls within the Orange list, so would require prior authorisation for import, but this is not as restrictive as the UK.

3.8.1.6 Exporting Inert Waste to Belgium

Belgium is more complex than some other EU nations as it has three separate regimes for its regions of Brussels, Flanders and Wallonia.

There are no reprocessing or recycling facilities within the Brussels region; waste produced in the region is sorted and sent for treatment elsewhere. Therefore, it would not be feasible to export waste from Jersey to Brussels.

Businesses who want to import waste from another country into the Flemish region, have to comply with the requirements of Council Regulation (EC)

1013/2006 on shipments of waste. The Walloon region implemented a ban on the import of waste in 1992. There is much deliberation over the legality of this ban within EU law. Therefore, there is limited data or information on the importation of waste into this region.

3.8.1.7 Exporting waste to Netherlands

For the import and export of waste, a notification, permission or permit is required depending on the type of waste under the Environmental Protection Act, which has implemented EU Shipments of Waste Regulation (1013/2006).

3.8.2 Market Study

A high-level market study has been carried out to investigate the opportunities for exporting inert waste and secondary aggregate material to the UK and Europe for recovery or disposal and for use as a product on a for profit basis. Engagement with Ports of Jersey, waste management facilities and shipping companies provided a basis for an estimated cost for the export of material to the UK and France and sites within Jersey.

3.8.2.1 Export of Waste Material for Management

Shipments of waste to the UK for disposal (likely to comprise landfilling in this case) are, save for some exemptions, prohibited. In order to export inert waste to the UK for disposal, a DRR must be made and this would be subject to a fee. It is unlikely that a DRR would be granted for the treatment of Jersey's inert waste in the UK.

Exports of inert waste to the UK for recovery would be permitted, reliant on the exported material being suitable for recovery at a permitted or exempt waste facility in the UK.

Inert waste can be imported into France for disposal or recovery, assuming prior authorisation has been gained.

Figure 12: Total cost of exporting waste from Jersey to UK or France for treatment

Cost item	UK	France
Handing fee at Jersey Port	£12	£12
Shipping from Jersey port	£12	£12
Additional fees, tariffs or levy's in export destination	£7.25 (TFS)	£7.25 (TFS)
Gate fee	£12.30	£4.51
Total cost	**£43.55**	**£35.76**

There are a number of sites in Jersey accepting inert waste for recovery, and prices charged rarely exceed £20/tonne. Under the current conditions, it would not be cost effective for waste producers to export inert waste for recovery, which could be recovered within Jersey. However, once the pending price rise for

disposal of inert waste at La Collette is introduced (£42/tonne), the cost of disposing of inert waste in the island will be substantially higher.

If an inert waste producer could find a site able to process material for recovery in the UK, which would otherwise require disposal in Jersey, the costs per tonne are comparable. This situation may arise given, the relatively basic recovery processes currently employed in Jersey, and the greater range of facility types existing in the UK and Europe. However, once the AAL aggregate recycling facility commissions the pending aggregate washing plant, the recovery of a greater range of inert materials will be achievable in Jersey, and is recovery is likely to be possible at lower cost than export.

The costs comparison in France is likely to be more favourable still, and it is considered likely that for inert waste producers generating significant quantities of inert waste, there may be financial advantages to exporting their waste for disposal in France, when compared with the proposed increased cost for disposal at La Collette (£42/tonne).

Currently incinerator bottom ash (IBA) from the island's Energy from Waste facility, is exported for recovery in the UK, this is at a cost of £46 per tonne. An additional transfrontier shipment of waste admin charge costing between £7,000 to £14,000 per annum is applied, equating to approximately £0.56/tonne - £1.13/tonne, see Appendix A for full table of charges.

3.8.3 Export of Inert Material and Secondary Aggregates for Profit

Consultation with inert waste recovery site operators in Jersey has indicated that they have little difficulty selling secondary aggregates produced from inert waste. Small stockpiles of product were visible at the sites visited, which supports the view that there is strong demand for the materials produced. Therefore, if secondary aggregates, or the inert waste material currently used to produce them in Jersey, were to be exported, this would be detrimental to the island. Buyers would be forced to use more expensive virgin aggregates for applications suited to secondary materials, and the additional demand for virgin aggregates would expedite the exhaustion of local quarries.

Furthermore, a high-level market study shows that the cost of exporting secondary aggregate material to Europe and the UK would be sufficiently high as to make the material uneconomical compared to domestically produced aggregates, due to the fees associated with transporting material through the Port of St. Helier and the cost of shipping such material. Therefore, it is not considered to be commercially feasible to successfully export processed secondary aggregate.

3.9 Best Practice Inert Waste Management

3.9.1 Overview

The quantities of recycled aggregates produced and used in a wide range of construction applications within the UK and Europe has progressively increased

over the last 30 years. These uses include the manufacture of concrete, concrete products, use in pavement construction and in both private and public funded industrial and housing projects.

Recycled aggregates can be used in a variety of construction applications, such as:

- bituminous (asphalt) road construction
- ground improvements
- earthworks - cuttings and embankments
- utilities reinstatement
- shallow foundations
- shallow and deep foundations
- buildings - residential and industrial

Recycled and secondary aggregates (RSA) may also be used in a range of construction materials, such as:

- concrete - coarse and fine aggregates mixed with cement and water
- asphalt - coarse and fine aggregates mixed with bitumen
- hydraulically bound materials - coarse and fine aggregates which set and harden when a hydraulic binder is added
- unbound materials - materials ranging in size from fine grains to stony material

In order for successful reuse and recycling of aggregate and inert material, there must be a market for the use of the end product. There are several examples of how reuse and recycled aggregate has been used, representing best practice.

Aggregate recycling is undertaken successfully in Jersey, and increasing proportions of inert waste are being diverted from landfill. However, further opportunities exist, and best practice elsewhere could be applied in Jersey to improve recovery of inert waste. In particular:

- Soil washing – to reduce the proportion of material delivered to La Collette that requires disposal at the infill site.
- Recycled content specifications for public projects – to drive an increase in secondary aggregate use in concrete and asphalt for public projects.
- Fiscal measures to pemit more complex processing of inert waste to be undertaken, whilst enabling the sresulting secondary aggregates to still be competitive with virgin materials.

3.9.2 Case studies

3.9.2.1 Aggregates Levy, UK

The aggregates levy is an environmental tax that encourages business to operate in a more environmentally friendly way. This tax applies to sand, gravel and rock that's either been:

- dug from the ground
- dredged from the sea in UK waters
- imported

Businesses must register with HM Revenue and Customs (HMRC) they exploit aggregate in the UK, for example a quarry operator. Every quarter, they must report to HMRC how much aggregate they've produced or sold. The tax is currently £2 per tonne of sand, gravel or rock and is still paid if the material is imported, up from £1.60 per tonnes since its introduction. There are some examples where material may be eligible for relief, including if aggregates are used in industrial or agricultural processes. The levy was introduced to encourage the reduction in the use of primary aggregates in the construction sector, In the UK the intensity in use of primary aggregates has significantly reduced since the introduction of the levy; since the levy was announced in 2000, the use of primary aggregates per unit of construction output has reduced by around 40% to 2014.

3.9.2.2 Quality Protocol, UK

The progression in reuse of inert waste the UK has been assisted by the WRAP Quality Protocol (QP) to allow inert material destined for waste to meet UK aggregate standards. The aggregates Quality Protocol has been a success for business resource efficiency. Early and wide take-up across the construction and demolition sectors has created quality recycled products from waste, and reduced the use of primary materials by more than 200 million tonnes. The document is now an established reference tool. At least 62% of recycled aggregates in the UK are now produced to QP criteria.

3.9.2.3 Soil Washing

Advances in processing technology have changed the landscape of secondary treatment, and soil washing facilities are at the forefront of showcasing the circular economy in the inert waste sector. Soil washing is best suited for soils with a high granular content; typically below 30% fines is ideal. It can also be used as a process to treat hazardous waste, making it suitable for local landfill disposal.

Ideally, the soil washing process would lead to a volume reduction of about 90%, which would mean only 10% of the original volume would require further treatment or disposal. Wastes with a high percentage of fine silt and clay will

require a larger quantity of material to go on to subsequent, more expensive treatment. These soils may not be suitable for soil washing[16].

Figure 13: Characteristics impacting recovery of soil washing[17]

Character Impacting Process	Reason for impact
Complex mixture of waste types (metals and organics)	Formulation of suitable washing fluids difficult
Variation in waste composition	May require frequent reformation of washing fluid
High humic content	Inhibition of desorption
Fine particle size (silt and clay)	Fine particles difficult to remove from washing fluid
Difficult recovery of solvent	High cost if recovery is low

The facilities are widely used and accepted in the mineral extraction industry. However, the same process can apply to construction, demolition and excavation waste arisings (CDEW), which are typically unsorted concrete blocks and gravelly soils, with incidental metal and wood. The process can vary but the principal activities are screening and washing of the waste to clean and produce aggregate from 75 mm down to fine sand.

As a secondary process, there is the treatment of the wash water sludge through settlement, which produces the silt material. Water is re-used in a closed loop system with minimal topping up from primary water supply, making the process sustainable. The principal processing makes light work of CDEW arisings, producing high quality, well sorted aggregates, with very low risk of contamination. The silt is a by-product of the process but, if put through a filter press system, can create a high quality, general fill Class 2C material[18].

In the UK the recovery rate of these materials are low given the high potential for re-use of secondary sand, and other aggregate, to reduce the demand on primary resource. This is due to the fact that low aggregate content means the material does not fit under acceptable materials within the recognised Quality Protocol: aggregates from inert waste guidance as the protocol does not acknowledge low grain size soils and silts as recoverable. The silt remains a waste and does not have a defined protocol to achieve material status.

The material generally complies with Class 2 general cohesive fill material and can conform to human health and controlled water parameters for different land uses. The high silt and clay content can also give the material low permeability properties, ideal for lining ponds, as capping or in stable earth bunds. As there is

[16] https://clu-in.org/download/remed/soilwash.pdf
[17] https://books.google.co.uk/books?id=Q_1BAQAAIAAJ&pg=SA3-PA31&lpg=SA3-PA31&dq=screening+processing+waste+soil+recovery+rate+%25&source=bl&ots=oeV8o4Cmnn&sig=ACfU3U0e8PSRuuPLChkvJb75Ku07Z2YxYA&hl=en&sa=X&ved=2ahUKEwiXvauN3LjqAhWUbsAKHaUFBx8Q6AEwEHoECAgQAQ#v=onepage&q=screening%20processing%20waste%20soil%20recovery%20rate%20%25&f=false
[18] Circular (2020). Soil Washing Plants: the role of the Regulator and the re-use of silt. Available at: https://www.circularonline.co.uk/research-reports/soil-washing-plants-the-role-of-the-regulator-and-the-re-use-of-silt/. (Accessed 5 Jun 2020)

no defined mechanism to transfer the silt off site, the Operator is left with a waste and therefore must assess a way to report this as necessary.

However, in Jersey, where the regulations are less specific, the processed material could be used and applied elsewhere, for example as landfill cover, therefore, making the treatment process more worthwhile.

3.9.2.4 Lightly Contaminated Soil Washing

In Northern European States, soil washing has been extensive over the past fifteen years. Various detergents have been mixed with soils to facilitate the extraction of various soluble compounds into water which is pumped through the soil matrix. These techniques are effective when the contaminants present are both water soluble and do not adhere to the particles in soils such as certain clays. This is a source elimination technique which is effective on sites where soil movement is possible and where the treatment of the contaminated process water is cost-effective.

3.9.2.5 Cremerstraat High Recycled Asphalt Content Cycle Tracks, Netherlands

The Dutch City of Utrecht constructed the Cremerstraat cycle lane. This project used a total of 69% recycled asphalt in lieu of new materials. During procurement, the City challenged contractors to submit a circular economy solutions for the construction of the cycle lane. The selected contractor (KWS) submitted a bid that contained two innovative elements:

- Less asphalt: two instead of the three traditional layers of asphalt were used; and
- 100% recycled asphalt was used for the lower layers.

The city's standard approach is to utilise up to 50% of recycled asphalt in the lower pavement layers. However, due to the proposals put forward by the contractor the overall project required 69% less new asphalt over standard construction. Utrecht utilised the environmental cost indicator (ECI) approach to calculate the environmental impact of the project. The ECI value was determined by using a life cycle assessment (LCA) database. Regular asphalt has an ECI of €10.16 per ton and recycled asphalt has an ECI of €3.37 per ton. The overall ECI value of the project was 68% lower than a design with regular asphalt.

This case study is an example of how higher quantities of asphalt recycling may be achieved, and how the application of functional specifications instead of technical specifications in the procurement process may promote contractors to deliver new solutions. The ECI was used in the procurement process for assessing suitability of materials.

3.9.2.6 Recycled Concrete Aggregate

Using recycled concrete aggregates (RCA) or crushed concrete aggregate (CCA) is a possible option for partial coarse aggregate replacement. EN 206 gives

recommended maximum limits for replacement of coarse aggregate only depending on exposure condition and aggregate quality. These limits vary from 0% in chloride and freeze-thaw environments (with exceptions) to 50% for X0(unreinforced concrete or very dry conditions), with 30% for most other conditions. Nevertheless, using replacement levels above the generally accepted practical limit of 20% may have implications, and testing for strength, modulus, creep, shrinkage and durability should be considered as appropriate to the proposed application. Not surprisingly, above 20% RCA will probably require a higher cementitious material content which will increase the carbon footprint of the concrete. Generally, environmental benefit from CO^2 emissions reduction might not be present from incorporating RCA in the concrete (due to the additional processes involved with transforming construction demolition waste to usable aggregates for concrete) but contributes to waste management/utilisation.

Coarse recycled aggregate from general demolition waste is less likely to be suitable for use in structural concrete but could be considered on a case by case basis for lower grade applications, special attention needs to be paid to the alkali content and, if for reinforced concrete, the chloride content. Fine recycled aggregate is generally considered unsuitable for use in concrete except under carefully controlled conditions. High water demand is likely to result in increased total cementitious materials content. Little guidance is available within standards.

The Netherlands has achieved 100% recycling of End of Life concrete. The most common practice for concrete re-cycling in the Netherlands is simply crushing and subsequent use as a base in road construction, which is considered a low-grade or low value-added route. Currently, the most commonly applied method for high-grade recovery of concrete is the wet process, which produces clean aggregate for concrete by washing the coarse aggregate, leaving the fine fraction (sieved sands) for road base filling and generating sludge, which needs be treated. A downside of the wet process is that it requires a large washing plant, which is expensive. Therefore, more than 90% of the waste concrete in the Netherlands is still processed low-grade for use in road base materials.

The most common use for aggregate recycling in the Netherlands is in asphalt. Its reported that percentage reuse in road surfaces is currently at 30%.

3.10 Key findings

The remaining void space at La Collette infill site is small and, on the basis of current practice, its potential to continue to fulfil this role is very limited and short-term. It is necessary, therefore, for plans to be prepared immediately to ensure that the island's inert waste needs can be best met.

The increasing imminence of La Collette infill site closing has spurred the operators into segregating increasing quantities of incoming waste. This arrangement should be formalised to maximise diversion of recyclable material, by way of a secondary stage of inspection, allowing optimal extraction for reprocessing.

There is a considerable quantity of good quality inert waste reprocessing equipment used in Jersey, but the equipment currently in use is unable to process

very fine, or very wet materials. Suitable equipment exists to generate saleable secondary materials from these wastes, but the equipment is specialist and expensive. Short-term contracts, market uncertainty, and low gate-fees have produced unfavourable conditions for the type of investment necessary. Once the aggregate washing plant at the AAL aggregate recycling facility is commissioned, it will be possible for a greater proportion of inert waste delivered to La Collette to be recycled.

There is a strong market for secondary aggregates derived from inert waste in Jersey; however, a significant outlet has yet to be found for materials produced from recycled glass or from reprocessed road planings. Opportunities should be explored with potential users to test the engineering properties and market acceptability of products derived from these waste streams.

Whilst there are benefits to the rapid restoration of mineral sites (to get the land back into use) and completion of land reclamation projects (to commence development), such sites are finite resources in Jersey and in short supply. Any new opportunity for the disposal of inert waste to replace La Collette should be considered as a valuable commodity, reserved only for wastes which cannot be reasonable reprocessed into secondary materials. Any rush to complete such schemes may reverse the excellent inert waste recycling industry that Jersey has developed, and will bring-forward the next search for a disposal site, with the possibility that finding a solution is more difficult the next time.

WP recycling operate the only site able to take mixed construction waste containing inert and non-inert wastes. Were the site to close, there would be no facility on the island that accepts unsorted construction wastes. Options should be explored to ensure that interim measures could be put in place, should the WP Recycling facility close.

The cost of exporting secondary aggregate material to Europe and the UK would be sufficiently high as to make the material uneconomical, due to the fees associated with transporting material through the Port of St. Helier and the cost of shipping such material. Buyers would also be forced to use more expensive virgin aggregates for applications suited to secondary materials, and the additional demand for virgin aggregates would expedite the exhaustion of local quarries.

Future options for inert waste management are assessed in Part 2 of this report.

4 Potable Water Baseline

4.1 Evidence Base

The primary sources of evidence that inform the potable water baseline are:

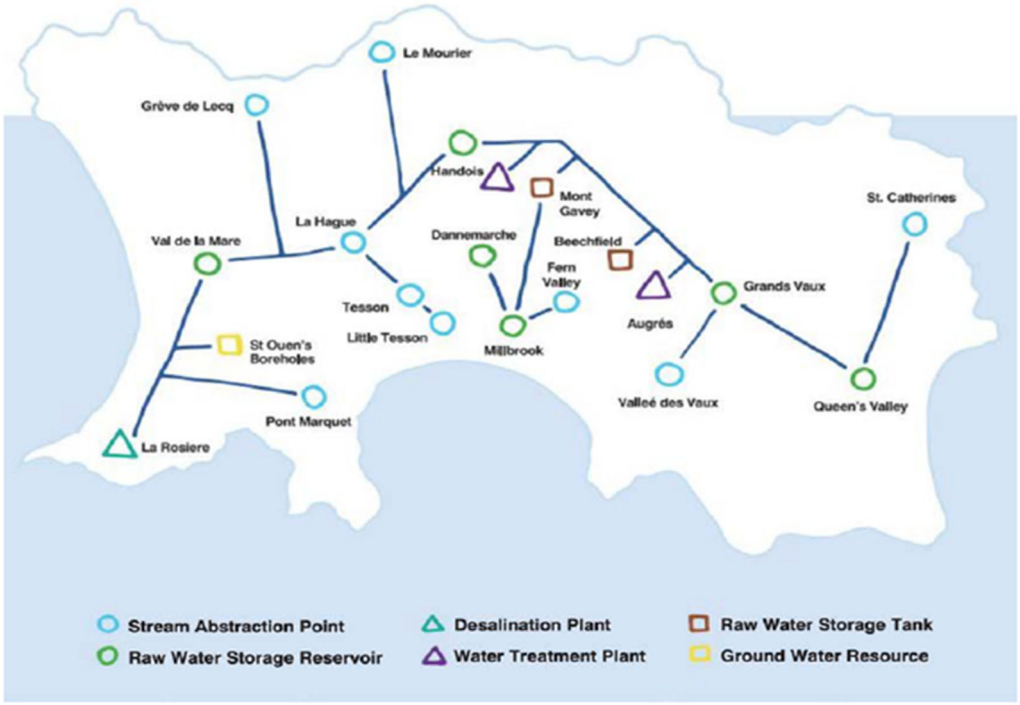
- Jersey Water Resource and Drought Management Plan (Jersey Water / Ricardo Energy & Environment and Sweco, 2019)
- Island Plan 2021-2030 Jersey Water representation (MS Planning, 2019)
- Water Resources and Drought Management Plan Stakeholder Briefing Note (Jersey Water, 2019)
- Water Resource Management Plan (2014)
- Jersey Island Plan (Revised), Chapter 9, Natural Resources and Utilities (Government of Jersey, 2014)
- Draft Jersey Raw Water network supply diagram (Arlosh/Jersey Water, 2020)
- JW Fact Sheet Water Treatment Works (Jersey Water, 2016)
- Jersey climate and state statistics, (available at www.gov.je, accessed 2020)
- Jersey Water Resource Management Plan (WRMP) (Jersey Water, 2009)
- UK Met Office climate trends (Met Office, 2018)
- Consultation with Jersey Water

4.2 Jersey Water Overview

Jersey Water is the sole supplier of treated mains water to the island. Jersey Water is not regulated by (the UK-based) OFWAT and, as such, is self-regulated bye laws and regulation that regulate the quality of water in line with European Union Directives. In 2017, the company supplied approximately 7.3 billion litres of mains water to approximately 40,500 homes and businesses. In recent years, total water consumption in Jersey has gradually decreased, despite a growing population. However, 2015-2017 consumption was elevated. This is attributed to issues associated with a rise in leakage recorded by an increase in customer metering.

The raw water supply system, shown in Figure 14, comprises a series of interlinked raw water storage and impounding reservoirs. It consists of six impounding reservoirs, two storage tanks and their direct catchments, seven pumped surface water catchments, six boreholes and La Rosière desalination plant. Water is predominantly supplied through the collection and storage of surface water in reservoirs.

Figure 14: Jersey Water supply schematic



Source: Island Plan 2021-2030 Jersey Water representation

The island's water supply can be supplemented by the desalination plant at La Rosière. The output water from the desalination plant supplements raw water reservoirs.

Jersey Water identified in their 2019 Water Resource and Drought Management Plan that action needed to be taken to address a current and increasing supply and demand deficit. As part of their submission to the Island Plan Review Strategic Issues and Options Paper (2019) Jersey Water emphasised the need to act on both the supply-side and the demand side.

4.3 Regulation and Policy

4.3.1 Regulation

The Water Resources (Jersey) Law 2007 came into force on 01 January 2010.

The law requires that all water abstractions that exceed fifteen cubic metres in any 24 hour period must be licensed. This includes:

- abstractions from surface sources (streams, reservoirs etc.); and
- abstractions from sub-surface (groundwater) sources such as wells and boreholes.

Commercial properties abstracting less than this amount must register their abstraction. All abstractions for private domestic purposes (individual properties which are not supplied by Jersey Water) are exempt from the law.

The Water Pollution (Jersey) Law 2000 came into force in November 2000 and brings the island in line with the rest of Europe with regard to the protection of the aquatic environment from all forms of pollution. The law seeks to:

- ensure activities do not cause pollution; and
- establish and issue discharge permits and ensure that no condition of a discharge permit is contravened.

4.3.2 Planning

Revised 2011 Island Plan

Jersey has a 'plan-led' planning system, that identifies that all development should be in accordance with the (Revised 2011) Island Plan, unless there is sufficient justification for granting planning permission that is inconsistent with the Plan. The Plan, sets the followings objectives with respect to water resources:

- to protect the island's water resources, including surface and groundwater quality and quantity, through prevention of inappropriate development and encouragement of water conservation measures; and
- to support the appropriate development and siting of new facilities and infrastructure by utility companies.

The Plan sets the followings policies with respect to water resources and water quality:

- Developments will not be permitted unless adequate water supply is made available at the time of the development.
- It is proposed that all major development proposals (i.e. greater than 1,000m^2, or ten dwellings) submit a 'Water Conservation Strategy' as part of the Design Statement or any statement of sustainability to demonstrate how this is to be achieved.

- Development that would have an unacceptable impact on the aquatic environment, including surface water and groundwater quality and quantity, will not be permitted.
- If a development proposal is within the Water Pollution Safeguard Area, Jersey Water will be consulted prior to determining the planning application, to ensure the public water supply is not put at risk from pollution.
- No development should be permitted, unless it can be shown that adequate water supplies are available. In most cases, it will be necessary to connect to the treated water supply in the mains and, where appropriate, advice will be sought from Jersey Water on whether or not the proposals will have an unacceptable impact on the capacity of mains water supplies.
- To support the appropriate development and siting of new facilities and infrastructure by utility companies
- To protect the island's water resources, including surface and groundwater quality and quantity, through prevention of inappropriate development and encouragement of water conservation measures

4.3.3 Strategy

The strategy for water resource management, as outlined in the Jersey Water Resource Management Plan (WRMP) (Jersey Water, 2009) and the draft 2019 WRMP, is the process of planning, developing, and managing water resources, in terms of both water quantity and quality. For water supply and demand, water resource management seeks to ensure sufficient water of adequate quality for drinking water and sanitation services, as well as sustaining healthy water-dependent ecosystems and water quality.

Water resource strategies focus on two main streams: water supply and water demand. Water supply involves the predicted yield from catchment, boreholes and other raw water abstraction. For Jersey Water, a high proportion of their supply is captured from surface water catchment areas, which feed raw water reservoirs. The draft 2019 WRMP assessment takes into account the impact of climate change on rainfall amounts and intensities, which replenish these catchments, as well as ground water sources.

The 2019 WRMP outlines how demand is managed and which actions can be undertaken to reduce demand. The strategy for water resources demand is carried out through customer engagement, customer metering, asset management, leakage detection and repair, and asset renewal.

In developing the overall proposed strategy a WRMP is a composite of the components as outlined in Figure 15.

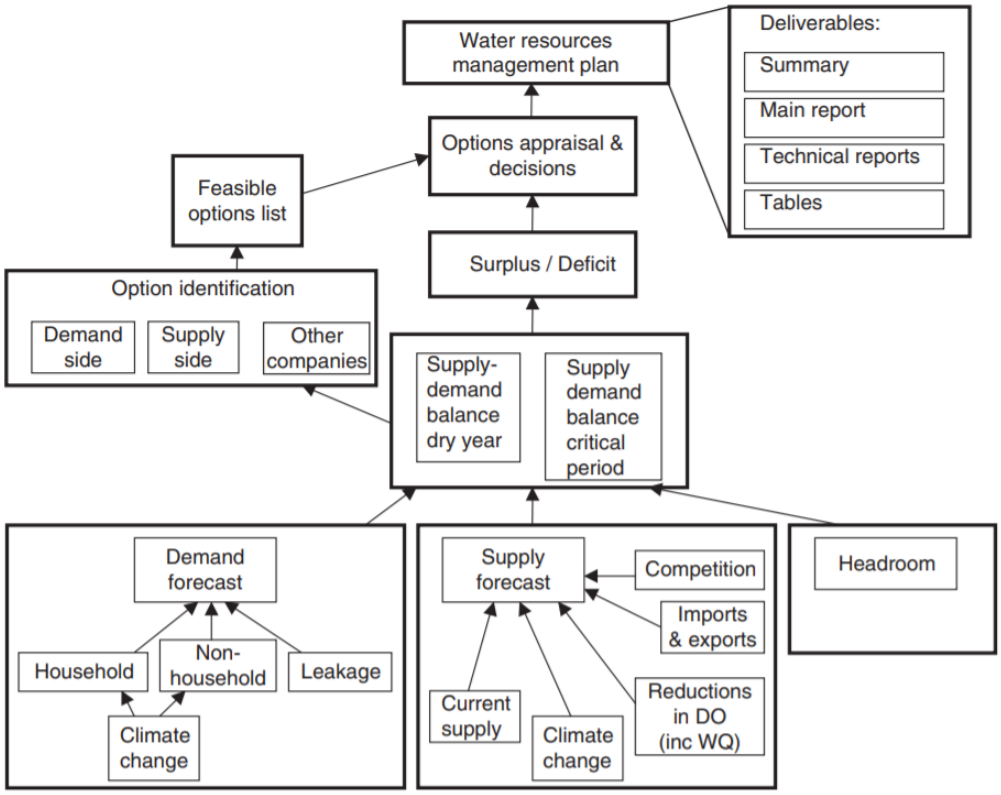


Figure 15.Components of a water resources management plan, from Environment Agency (2008).

4.4 Current Potable Water Supply and Demand

4.4.1 Overview

Deployable output (DO) can be defined as the output of a source or group of sources into supply or a bulk supply for a given level of service, as constrained by the following (this list is not exhaustive):

- Environment
- Abstraction licence
- Pump capacity
- Raw/transfer/treated water mains capacity
- Water treatment facility output
- Borehole/ aquifer water quality

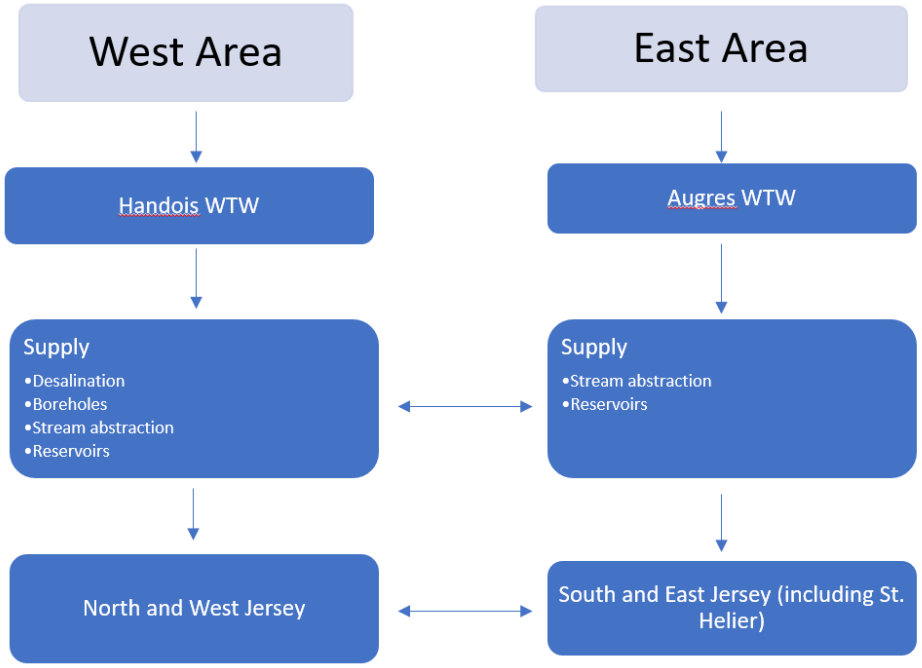
Jersey water has a complex supply system, approximately 95% supplied by surface water catchments. Water is stored in six main storage reservoirs and is supplemented by a small number of groundwater sources. Individual catchments and sources are operated to manage storage levels over the year in response to weather and demand patterns (see the overview schematic in Figure 14). The capacity of these sources is 2,705 million litres or approximately 120 days of useable supply.

4.4.2 Supply

4.4.2.1 Water Treatment Works

There are two water treatment works on the island at Handois and Augrès. The water treatment works broadly split the supply to the island into West and East. Although, water from both treatment works is blended in some areas and the island operates as a single water supply zone as per Figure 16.

Figure 16: Simplified water supply schematic



Source: Jersey Water Draft WRMP

The treatment works consist of three stage treatment, comprising chemically assisted sedimentation, rapid gravity filtration and UV treatment followed by disinfection using chlorine and ammonia. The maximum daily capacity of both treatment works is defined in Figure 17. Most often, the water is then transferred to service reservoirs before entering the potable water network.

Figure 17: Jersey Water treatment works summary

Name	Year constructed	Location	Maximum daily capacity (Megalitres per day)	Water feeds into
Augrès	1964	Trinity	18	Treated water service reservoirs
Handois	1931	St Lawrence	28	Treated water service reservoirs

Source: JW Fact Sheet Water Treatment Works

4.4.2.2 Desalination Plant

Jersey Water owns and operates the La Rosière desalination plant located in the south west of the island. Following an upgrade in 2016, it has the capacity to provide two streams, each of 5.4Ml/d. At full capacity, the plant can supply approximately 50% of daily demand.

4.4.2.3 Storage Reservoirs and Tanks

As stated previously, there are six raw water storage reservoirs and two storage tanks in the island, as well as two service reservoirs.

Figure 18 provides a summary of the overall catchment area, maximum capacity and water levels at each reservoir. Each reservoir is supplied by a combination of water abstraction assets utilizing boreholes, stream abstraction or desalination. Jersey Water have developed a network of raw water transfer mains, allowing for water transfer between raw water reservoirs.

Figure 18: Raw water reservoir information

Reservoir	Catchment area (Ha)	Max capacity (Megalitres)	Top Water level (mAOD)
Dannemarche	200.00	93.00	45.26
Grands Vaux St Saviour	909.00	229.60	36.59
Handois St Lawrence	271.00	187.50	88.70
Millbrook St Lawrence	127.00	36.40	19.83
Queen's Valley Grouville	516.00	1193.00	36.00
Val de la Mare St Peter/St Ouen's	350.00	938.70	46.02
Total	**2373.00**	**2678.20**	

Source: Jersey Water website

4.4.2.4 Boreholes

The St Ouen's borehole site consists of five operational boreholes. In discussion with a Jersey Water representative, it was highlighted that current abstraction from the boreholes is reduced due to PFOS contamination within a portion of the aquifer. Two boreholes are currently non-operational due to the proximity of the contaminants. The current output from St. Ouen's is 0.3 Ml/d.

Another borehole site is located at Tesson in the south of the island. The Tesson site consists of one borehole, with an output of 0.24 Ml/d.

4.4.2.5 Climate Change

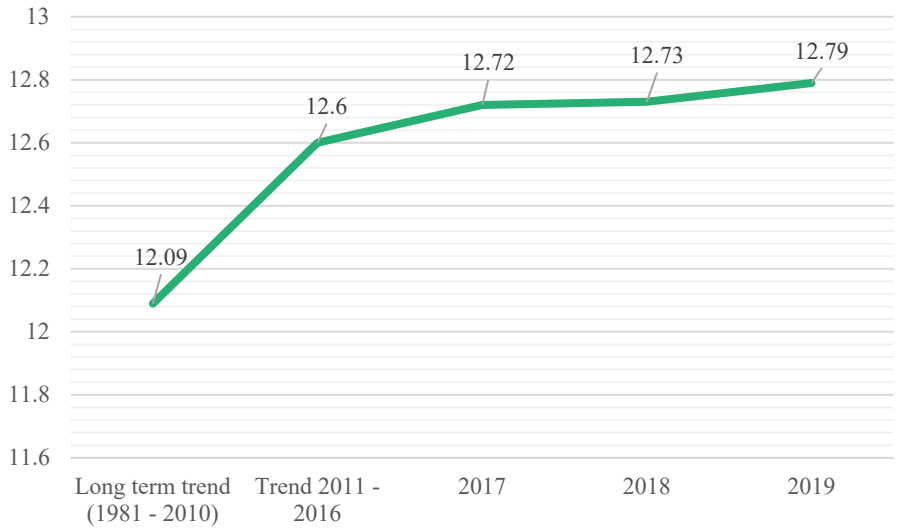
Jersey Meteorological Office holds daily rainfall, as well as maximum and minimum temperature data from the Maison St. Louis Observatory from 01 January 1894. There is a four-year break in daily records from 1921 to 1924 but data have been derived for this period from other sites.

The Government of Jersey website provides data on long-term annual weather averages for the period 1981-2010. Averages were as follows:

1. Mean daily air temperature of 12.09°C
2. Hours of sunshine per year were 1986.1 hrs
3. Rainfall per year was 874.7mm

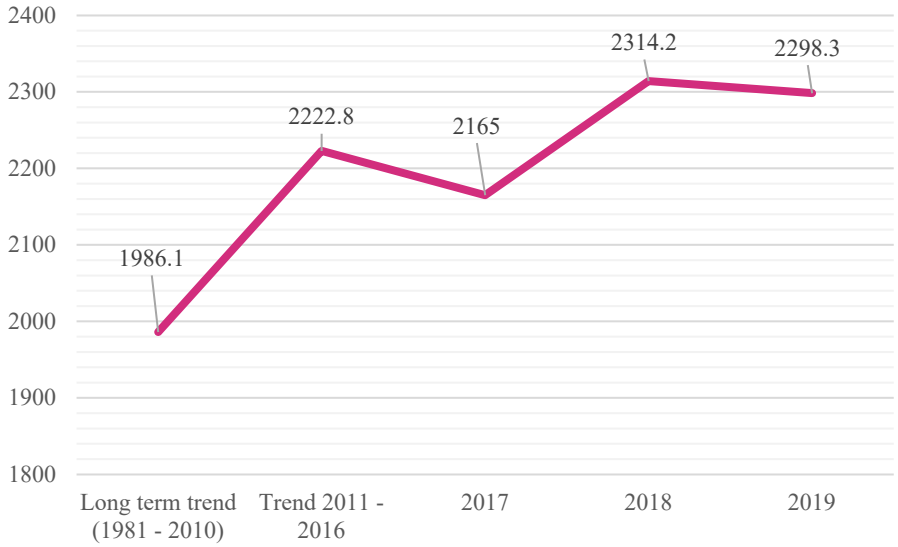
Using data available from the GoJ website (some unverified, as yet), the trends since 2011 have been plotted and are shown in Figure 19, Figure 20, and Figure 21. These figures highlight that there has been an upward trend in both mean daily temperature, hours of sunshine and rainfall since 1981. Climate change trends have an impact on the demand for water and the long term reliability of Water Available for Use (WAfU) forecast. In a drought period, such as the low-level rainfall and higher temperature experienced in 2018, Jersey Water can be required to operate the La Rosière desalination to increase available water.

Figure 19: Mean daily air temperature (°C)



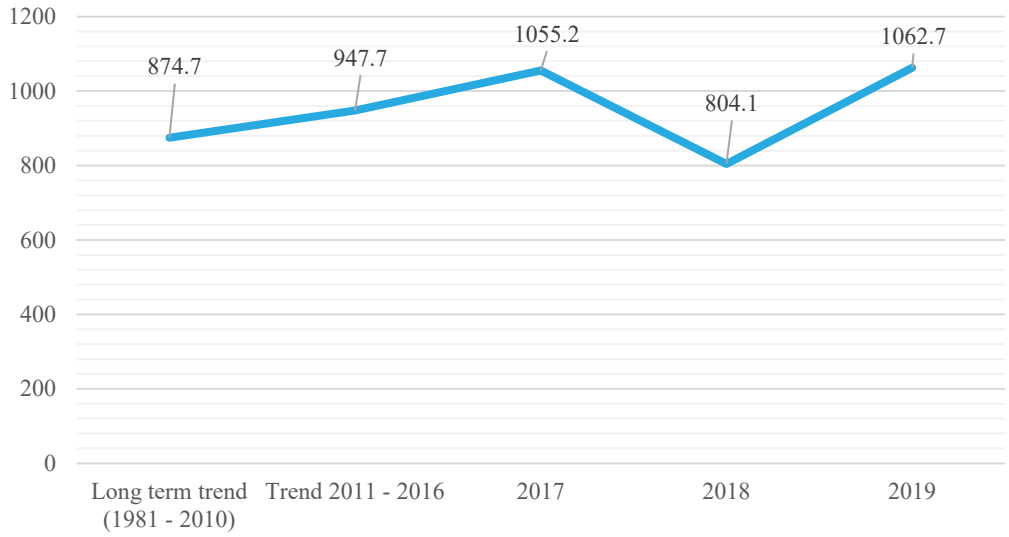
Source: GoJ website

Figure 20: Total hours of sunshine per year



Source: GoJ website

Figure 21: Annual rainfall (mm)



Source: GoJ website

4.5 Demand

In 2017, Jersey Water supplied 20,100 cubic metres per day (m^3/d) on average to 37,000 homes and 3,600 commercial properties across the island. It is estimated that approximately 92% of households in the island are supplied by Jersey Water. The latest domestic consumption (as of 2017) for Jersey Water has been calculated as 300l/prop/d.

Island demand can be broken down into a number of categories, listed below:

Residential

- Measured domestic consumption – metered water use at residential properties.
- Unmeasured domestic consumption – non-metered residential properties.

Commercial

- Measured commercial consumption – metered water use at commercial properties.
- Unmeasured commercial consumption – non-metered commercial properties.

Commercial supplies can be further subdivided into:

- Agriculture
- Industry
- Miscellaneous
- Offices and retail
- Public services
- Tourism and leisure

Minor Water Use

- Operational water use associated with Jersey water site operations and fire hydrants.

Total Leakage

- Losses incurred from water mains and customer supplies during the distribution of water.

Unaccounted For Water

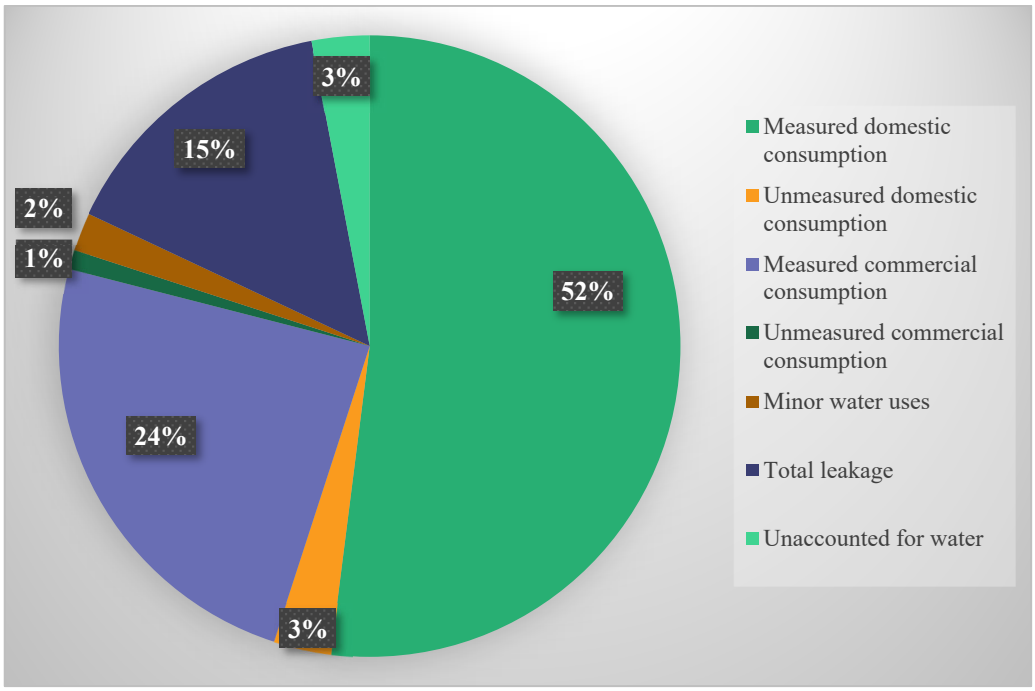
- A small volume of water that cannot be accounted for.

The water balance is reflective of the conditions experienced in that year. It may have been wet, dry, hot, cold or somewhere in the middle. From a planning perspective, the water balance should reflect a demand that would be expected to be up to the point that the system becomes stressed.

Figure 22 provides a breakdown of the reported water usage, as per Jersey Water's Draft Water Resources and Drought Management Plan. The three highest categories reported in 2017 were:

1. Measured Domestic consumption
2. Measured Commercial consumption
3. Leakage

Figure 22: Jersey Water water balance, 2017



Source: Jersey Water Draft Water Resources and Drought Management Plan

There are an additional 3,390 properties in the island which are served by private boreholes and wells. According to the Department of the Environment, in 2013 an

estimated 2,162 Ml (2,162,597 m3) was abstracted from groundwater in Jersey, mostly for private and business use.

The most recent data available suggest that an estimated 515,700 cubic metres of water is abstracted for domestic household requirements from private abstraction sources. Around 8% of properties on the island source their water from private sources (boreholes, wells and springs).

4.6 Future Supply and Demand

4.6.1 Supply

The Jersey Water raw water storage reservoir assets have a raw water storage capacity of 2,705 million litres (Ml).

Jersey Water yield sources (borehole and stream abstractions) are predominately supplied by surface water catchments. The Jersey Water operated desalination plant provides an additional yield from salination water treatment.

The raw water supply requires treatment to achieve a potable water standard. The Distribution input to the potable water network can be limited by the water treatment capacity. Jersey Water operate two water treatment facilities Handois and Augrès Treatment works and has sufficient treatment capacity available to meet future needs. Handois treatment works has a capacity of 28 Ml/d and Augrès has a capacity of 20Ml/d. Each treatment works is individually capable of supplying at least the average daily demand and both are capable of supplying all areas within the treated water network.

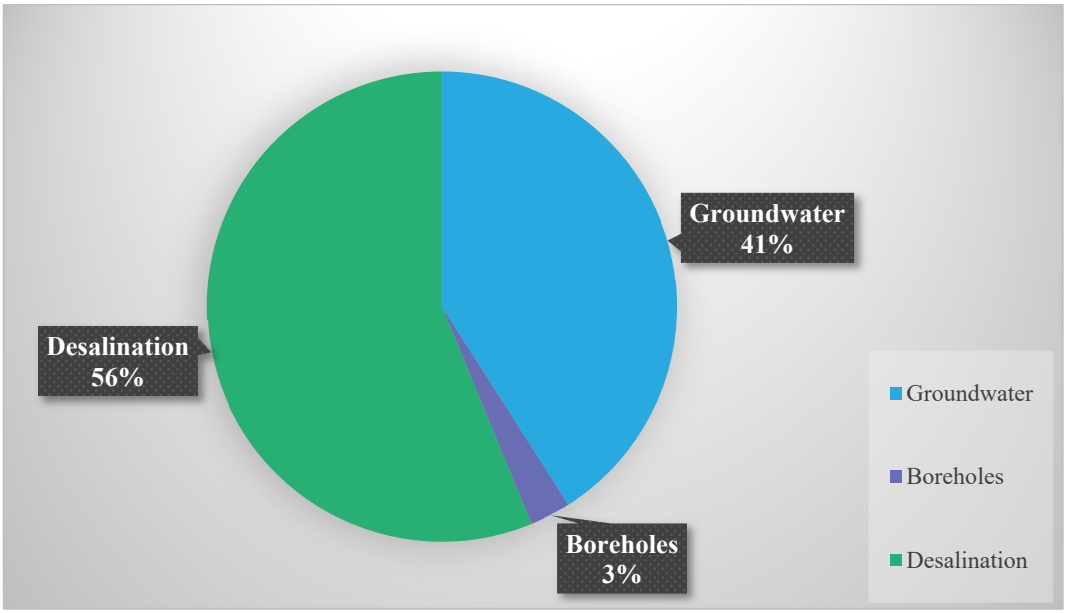
The potable water network consists of a network of transmission mains, service reservoirs and a distribution mains. Once treated, water enters the treated water distribution network and is either sent directly into supply or to one of five treated water storage reservoirs located in St. Helier, Trinity and St Lawrence. The treated water reservoirs assist with daily peak demand supply and are refilled overnight.

In average rainfall year, the Water Available For Use (WAFU) is achieved from the use of the surface water catchments yield, with >95% of yield achieved

Based on information provided by Jersey Water (based on UK DEFRA approved best practice methodologies), the WAFU to Jersey Water in 2018 was 19.21 Ml/d.

In severe drought events, such as the baseline year of 1992, the desalination plant would be fully operational to provide the required WAFU. Based on available output from the La Rosière desalination plant of 10.8 Ml/d and abstraction of 0.54Ml/d from island boreholes, a minimum of 41% of the overall supply is from surface water catchment areas, as per Figure 23.

Figure 23: Percentage of overall water yield



Source: Jersey Water Draft Water Resources and Drought Management Plan

4.6.1.1 Climate Change

Climate change is expected to impact on catchments and associated stream flow rates. Jersey Water extracts raw water from streams in the island, which feed into the raw reservoirs prior to treatment and distribution. Climate change projections have been created for the UK and the latest versions are published in UKCP18 projections. Jersey Water have undertaken their projected climate change impact assessment based on UKCP09, which was the latest available information at the time. (UKCP18 projections have now been made available and are used in Section 5 of this Study.)

Potential evapotranspiration (PET) is the potential evaporation from soils plus transpiration by plants. PET has been used also for the losses of water to evaporation from open areas, such as catchments and reservoirs. This data has not been provided in the latest or previous UKCP projection data set. PET data can be calculated using available climate data. Jersey Water have utilised available temperature data to derive the percentage change and have applied this to the UKCP09 data for predicted future impacts.

The derived figures have been used for seasonal rainfall data. This allows for further analysis of the proposed deficit/surplus.

The forecast for impacts of climate change assessed by Jersey Water have been summarised in Figure 24 below. The impact on source yield is likely to be governed by the projected rainfall and PET changes in spring and summer, which are likely to reduce flows in surface water stream sources. The potential effects of climate change and the associated uncertainties are reflected in the target headroom values. They are also considered as part of the wider resilience and sensitivity testing in the WRMP.

Figure 24: Potential climate change impact on water source yield

Emission Scenario	Baseline Yield[19] (Ml/d)	Projected Yield Impact (Ml/d)
Baseline	20.46	
Low	18.86	-1.60
Medium	18.79	-1.67
High	19.01	-1.45

Source: Jersey Water

4.6.2 Demand

Jersey Water have undertaken a demand forecast as part of their WRMP. The year 2017 was selected as the baseline year from which the forecast changes will be analysed. The demand forecast takes into account changes (increase/decrease) in economy and population to predict impacts on future water supply. A range of population growth forecasts have been calculated and the central forecast has been chosen to be net + 700 migration per year until 2045, based on Government of Jersey population projections. This anticipates that the population of Jersey will be 130,300 by 2045, which represents an increase of approximately 30% since 2017.

Consideration is given to technological advances, planning requirements, and social and behavioural changes which should aid in the reduction of water usage. It is predicted that a Per Property Consumption (PCC) for domestic water consumption in a Normal Year Annual Average (NYAA) will reduce by 10% by 2045. However, it is predicated that an overall demand increase of 21% in the NYAA will occur by 2045: this increase in demand is due to new residential development, population growth and mains extension programme to connect current private users. Similarly, changes in industrial activities and associated increase in office and retail, as well as miscellaneous industry, are predicted to increase demand by 6% by 2045.

A targeted metering and leakage reduction programme has been carried out by Jersey Water, with a reduction of 900m^3/day in leakage achieved by 2018. It is noted that for the baseline year of 2017, the leakage level was 3,055m^3/day.

Jersey Water normal annual average demand is projected to increase from 20,100 m3/d in the baseline year 2017 to 22,800 m3/d in 2045. In dry weather conditions the demand is expected to be approximately 23,900 m3/d by 2045 as shown in Figure 25 below. There is uncertainty in the demand estimates variables. A method of very low to very high demand forecast based on the variables has been considered in the WRMP. The impact to the forecast for the dry weather annual average demand in 2045 from the alternative scenarios range between 17,000 and 32,000 m3/d.

[19] Baseline yield is assumed to include all sources including groundwater and the La Rosière desalination plant at 10.8Ml/d.

Figure 25: Baseline demand forecasts by demand component and planning scenario (m^3/d)

	2017	2018	2025	2035	2045
Measured domestic consumption	10,476	10,564	11,357	12,518	13,590
Unmeasured domestic consumption	573	560	471	401	385
Measured commercial consumption	4,755	4,817	5,013	5,059	5,064
Unmeasured commercial consumption	219	219	219	219	219
Minor water uses	400	400	400	400	400
Total Leakage	3,055	2,558	2,558	2,558	2,558
Unaccounted For Water	596	596	596	596	596
Distribution input (normal year) (m^3/d)	**20,073**	**19,713**	**20,613**	**21,751**	**22,812**
Distribution input (dry year) (m^3/d)	**20,782**	**20,456**	**21,432**	**22,690**	**23,877**
Distribution input (normal year peak week) (m3/d)	**26,296**	**25,824**	**27,003**	**28,494**	**29,884**
Distribution (dry year peak week) (m^3/d)	**27,225**	**26,798**	**28,075**	**29,724**	**31,279**

Note: Dry year forecasts include dry weather effect and climate change impacts

4.7 Options Appraisal

Jersey Water have undertaken an options appraisal for the assessment of unrestrained options to meet the future predicted deficit. In WRMPs the options appraisal process has been outlined by Figure 26, which outlines the method to arriving at a preferred optimal programme of works to meet the supply demand deficit in the future.

The Options Identification and Options Appraisal chapters of the WRMP were provided during the Stage 2 process. The following were outlined as supply and demand management options for further optimal appraisal:

- Acquiring and transforming La Gigoulande Quarry into a new reservoir.
- Increasing the volume of water extracted from boreholes in the St Ouen's Bay area through onsite water treatment.
- Investigating sites for new boreholes/ catchments.
- Aquifer Storage Recovery;
- Increasing the storage capacity of the Val de la Mare Reservoir from 900 to 2,100 million litres.
- Further increasing capacity at the existing desalination plant at La Rosière.
- Introducing a new desalination plant on the east of the island.
- Recycling process water back into the reservoir system.

Concurrent with the supply options, demand initiatives are to be progressed to aid with the overall water balance. There are extensive demand initiative programmes that have been undertaken by water companies across the UK and Jersey Water have a similar programme in place. These can be broken into two main categories as below.

Demand side management

- Mains extension programme to include additional private water customers, this will increase demand.
- Asset management programme including maintaining and upgrading existing assets.
- Leakage reduction programme, this includes replacing up to 2.5km of old mains annually to minimise leakage and burst risks.
- Residential and non-residential water efficiency and water audits.
- Customer side leakage improvements.
- Social media, marketing and educational information on water use and reduction.

New assets

Additional Jersey Water assets could be utilised to increase water available for use. For the WRMP, Jersey Water is considering all possible options. A summary of the main options has been provided below:

Water storage

Jersey Water could increase raw water capacity through expansion their use of raw water storage reservoirs, The island currently has six raw water storage reservoirs. Capacity at each reservoir is limited by the existing infrastructure. To increase capacity would require additional engineering solutions, which could include increasing dam height of a new downstream dam.

Jersey Water has identified that there is potential for a new additional raw water storage reservoir to be built at La Gigoulande Quarry site in St Peter's Valley. Granite Products, the owners of La Gigoulande Quarry, has separately commissioned work on the potential for use of the site for water storage – focussing on available storage volumes and any technical challenges and practicalities associated with water storage in the western void only. The conclusion of this work is that this option might provide a smaller storage volume than the Jersey Water assessment suggestsand that water resource, environmental or viability issues remain to be considered.

Water abstraction

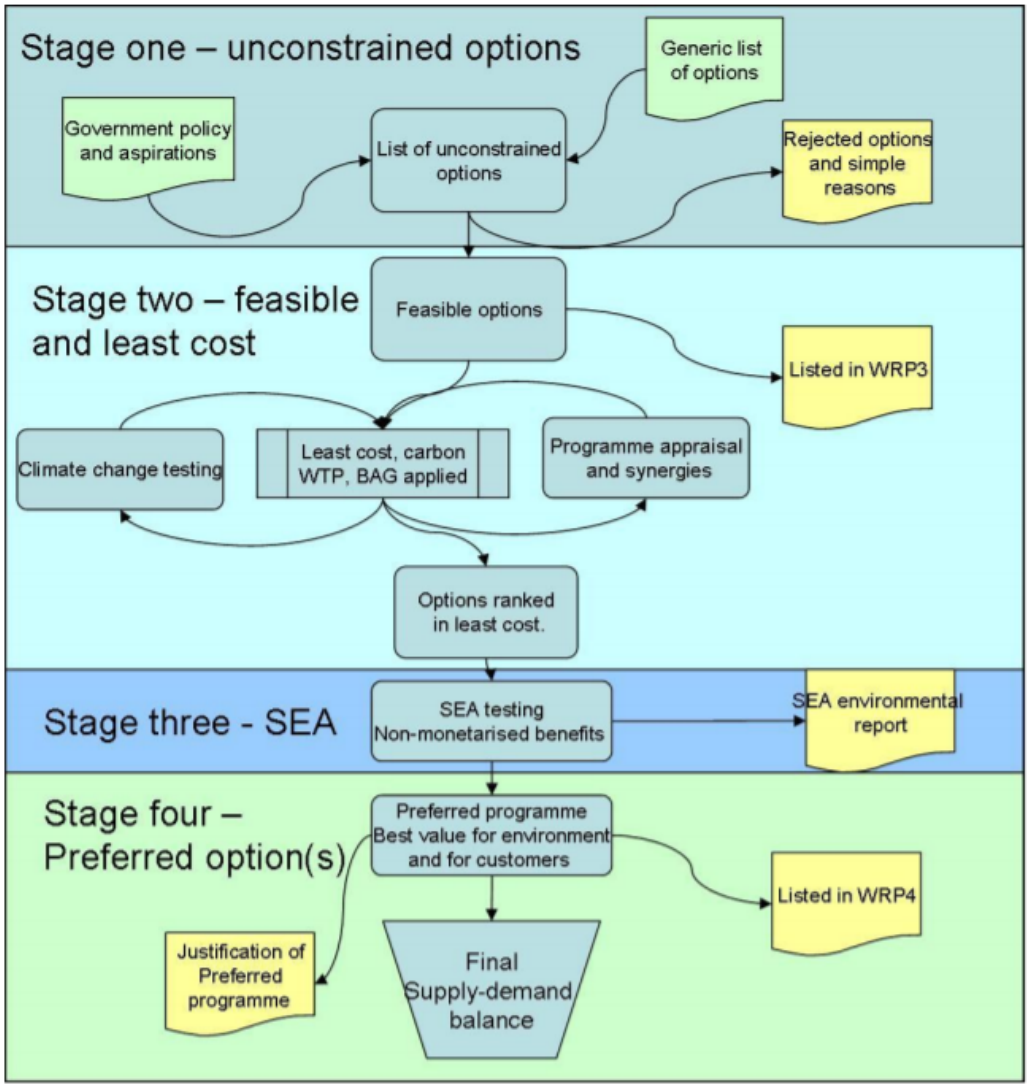
To meet any additional raw water storage reservoir capacity, additional water abstraction may be required. A number of options are available for the island to increase its raw water supply.

- At source water treatment could increase the output from the St Ouen's borehole site, which is currently reduced due to contamination.

- An additional desalination stream at the current facility La Rosière desalination plant; or a new desalination plant
- Water reuse from the Bellozane wastewater treatment works (WWTW).

It is important to note that, for all of these changes, network capacity would need to be considered, with potential network transfer and output capacity likely needing to be increased. This can be achieved through installation of a new main, network reinforcement and/or increasing pump capacity.

Figure 26: The stages of an option appraisal process. EA 2012



October 2012

4.9 Key Findings

Jersey Water's draft WRMP has evaluated the supply and demand required for the island based on the most recent available data and future scenarios. Future scenarios incorporate allowances for supply-side changes (primarily due to climate change), as well as demand impacts of population growth, economic growth, and water use efficiency initiatives. There is a calculated predicted deficit of 8,155 m3/day by 2045.

Table 1. Jersey Water supply-demand balance based on a worst historic drought similar 1992

Supply-Demand Balance Component (m^3/day)	2018	2025	2035	2045
Water available for use (including climate change effects)	19,209	18,784	18,176	17,569
Dry weather demand (net migration)	20,456	21,432	22,690	23,877
Uncertainty planning allowance	1,026	1,255	1,563	1,847
Supply-demand balance	**-2,273 (deficit)**	**-3,903 (deficit)**	**-6,077 (deficit)**	**-8,155 (deficit)**

There are a range of options for meeting future supply of and management of demand for potable water in Jersey. These include: purchasing and transforming La Gigoulande Quarry into a reservoir; increasing extraction from boreholes in St Ouen's Bay; increasing the storage capacity of the Val de la Mare Reservoir; increasing capacity at La Rosière desalinisation plant; and recycling grey water back into the reservoir system.

Future options for potable water are assessed in Part 2 of this report.

PART 2

5 Demand Forecasting

5.1 Overview

This section considered the demand for minerals, inert waste management and potable water over the next twenty years. Three population scenarios have been assessed:

- **Low**: net increase of +800 population per annum[20].
- **Medium**: net increase of +1,000 population per annum.
- **High**: new increase of +1,500 population per annum.

The following population baseline has been used:

- An end-2018 population baseline of 106,800 (Statistics Jersey's latest figure).
- An assumed population growth in 2019 and 2020 of +1,200 each year (based on 2018 trends) to give an end-2020 figure of 109,200.

It should be noted that for a number of reasons, the forecasts across minerals, inert waste and potable water do not always use the same base date or end date. The reasons for this divergence is explained in each relevant sub-section.

The demand informs the assessment of options in Section 6 and Section 7.

5.2 Minerals Demand Forecasting

5.2.1 Methodology

This forecast of demand for minerals relates to the various aggregate materials required by the island's construction industry and currently supplied almost entirely from sources in the island: the two granite quarries, Ronez and La Gigoulande; Simon Sand and Gravel, together with suppliers of recycled or secondary aggregates. The current supply situation is as reviewed in the Minerals Baseline in Chapter 2.

The forecasting method includes the following steps:

- Agreeing a baseline volume of material demanded drawing on the analysis in Chapter 2.
- Identifying the parameters against which the industry demand will be projected to grow (these include, but are not restricted to, the population growth rates set out in Section 5.1).
- Applying these to the baseline volume to realise forecasts up to 2040.

Using this approach, the forecasting is reported in Section 5.2.3 below.

[20] For potable water, Jersey Water forecasts are based on +700 rather than +800 per year. Refer to Section 5.4.2 for more information.

5.2.2 Assumptions Affecting Demand Forecasting

Although the forecasting process is, in one sense, simply an arithmetic exercise, it needs to take account of a number of assumptions and limitations inherent in the institutional context in which it takes place. Whether or not these considerations are explicitly referred to in the actual forecasting process, it is important to appreciate that they will be factors that determine how the future demand for construction materials in Jersey will manifest itself in practice.

Minerals planning policy: Although the demand forecasts are developed independently of policy, the Island Plan's 2011 minerals planning policy (as revised in 2014) embodies the Government of Jersey's commitments to the means of ensuring that demand is met. This includes timely processing of the necessary site applications for permission to quarry; or planning for port facilities, to enable the minerals industry to produce, and bring to market, the forecast tonnages of the various aggregate products.

While all of these issues are considered further in later chapters, it should be noted here that they form part of the context within which the forecasts are produced.

The balance between economic and environmental policy objectives: While minerals forecasts are essentially an expression of the economic growth expected by the island's construction industry, the island's commitment both to high standards in the physical environment generally, and to CO_2 neutrality specifically, mean that lower economic growth – and hence lower construction industry demand – is not necessarily viewed negatively.

Moreover, the unique structure of the Jersey economy, in which financial services account for nearly 40% of gross value added (GVA)[21], means that changes in the measured national GVA may not translate as readily to construction industry output as they might in the more balanced UK economy. This factor is taken into account in the selection of parameters used for forecasting.

Trade-offs in the inert waste sector among demands for reclamation fills and the burgeoning recycled/secondary aggregate sector: By its nature, the recycled aggregates sector produces materials that can also be produced by the primary aggregates sector. As discussed in Chapter 2 the production of secondary, or recycled, aggregates is affected by many factors other than market demand, including: availability of sites for recycling; competing land-use demands for such sites; demand for inert material for land reclamation projects; and demand for inert material for restoration of mineral workings.

All of this means that the share of demand that will actually be met from recycled aggregates is likely to be subject to significant variation during the forecast period. This in turn will mean that primary aggregate producers may have to vary production not only in response to market trends but also to compensate for non-market issues affecting the recycling sector (this is reflected in the forecasts made

[21] See: https://www.gov.je/Government/JerseyInFigures/BusinessEconomy/Pages/NationalAccounts.aspx (accessed July 2020)

for the three different scenarios tested in Section 7 – further information is provided in Section 5.2.3.3 and Appendix B).

5.2.3 Future Demand for Aggregate Minerals in Jersey

5.2.3.1 Base Year and Base Year Demand

The base year for forecasting will be the first year of the new minerals planning period which is 2021. The estimated demand for this forecasting base is derived from the three primary aggregates producers indications of their average sales for the past three-five years, plus current sales of the recycled aggregates producers.

Figure 1 in Section 2.2.2 summarises this as 485,000 tonnes, comprising 295,000 tonnes of primary quarried material, and 190,000t of generally lower specification, secondary production.

This current 2020 consumption baseline estimate may be compared to the estimates of future demand in previous Island Plans' minerals sections:

- The 2002 Island Plan estimated 450,000 tonnes per annum.
- The 2011 (revised) Island Plan, noting the impact of the 2009 economic downturn combined with the island's strategic economic growth policies as expressed especially in ambitious plans for the development of the St. Helier Waterfront, proposed a range from 400,000 to 500,000 tonnes.

Notwithstanding the immediate economic impact of the Covid-19 pandemic on all economies, including that of Jersey, it is considered that it would be prudent to round the recent average demand of 485,000 upwards, thus setting the 2021 baseline for forecasting purposes at 500,000 tonnes, inclusive of material from on-island primary and recycled sources, as well as imports if required.

5.2.3.2 Forecasting Parameters

Aggregates demand is function of construction industry demand. Over the medium to long term, construction industry demand is a product of economic growth. In large economies, a forecast of a country's long-term economic growth is generally the most reliable parameter to use for projections of underlying demand growth for a particular industry. This is especially true for the construction sector because its demand derives from all other economic sectors.

Jersey, however, is not only a small island economy; it has an economy that is dominated by one sector, the international financial services sector, (Figure 27). In past years, prior to the 2008-10 global financial crisis, the sector has represented up to 60% of Gross Value Added (GVA), and is currently almost 40%. As a result, both past trends and future predictions of Jersey's GVA are not reliable indicators of the state of construction demand on the island. Instead, the more stable and more predictable parameter of population growth is used, as noted in Section 5.1.

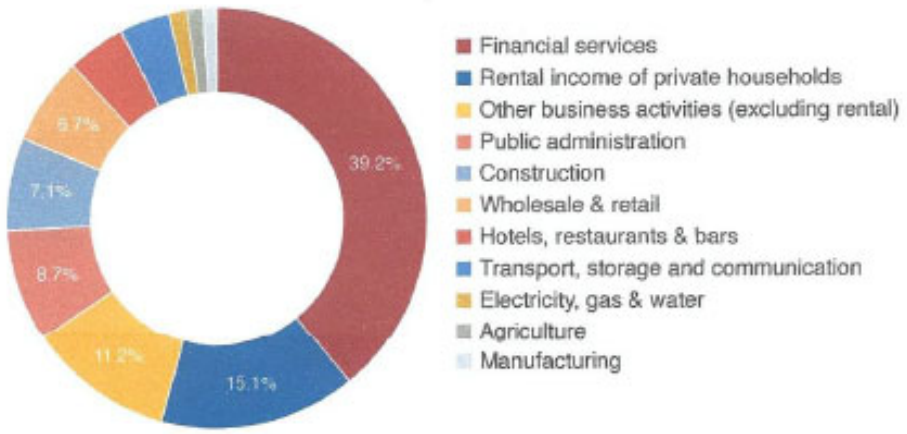
In Figure 28 below, the annual percentage growth rates have been derived from the assumed Low, Medium and High annual population increments. Although the

rates seem fairly low at 0.8% / 1.0% / 1.4%, this is consistent with the views of the two main minerals suppliers in the island, Ronez and Granite Products:

- **Granite Products:** Major growth is not anticipated; nor is any significant decline.
- **Ronez:** Stable demand or at best slow growth.

Although the use of a simple, annual growth rate approach to demand forecasting leads to a theoretically straight line demand growth envelope, suppliers advise that in reality the volume of aggregates used in any one year may fluctuate greatly in response to major project expenditure. As a result individual suppliers need to have the capacity to rapidly increase (and be willing to decrease) their output above (or below) the trendline indicated by the formal demand forecast.

Figure 27: Structure of Jersey's economy Gross Value Added by sector, 2018



Source: Statistics Jersey: Jersey in Figures

5.2.3.3 Future Demand

Figure 28 gives the projection of the 2021 Baseline demand of 500,000 tonnes, through to 2031 and 2041 using the growth rates calculated from the annual population increments for the Low, Medium and High scenarios.

Figure 28: Minerals demand forecast – summary

Year	Low (+800 pop. p.a.) = 0.8% p.a.	Medium (+1,000 pop. p.a.) = 1% p.a.	High (+1,500 pop. p.a.) = 1.4% p.a.
Baseline (2021)	500,000	500,000	500,000
Total annual minerals demand in 2031	540,000	552,000	575,000
Total annual minerals demand in 2041	586,000	610,000	660,000

In practice, the demand for minerals is met from the various different suppliers, currently almost all local, on-island sources. The respective share of demand met by each supplier is likely to change over time in response to physical availability, minerals planning and policy decisions, and construction market factors.

Figure 29 disaggregates the 2031 forecast into different material types or sources, using the current (2020) shares of the total. This assumes the share of sources is the same as in 2020. Figure 29 allows for a very small percentage of imports which is not included in Chapter 1 because of its insignificance. The only reason for including it here is for comparison with the other scenarios (see below).

The shares of the respective sources are therefore:

- Local crushed rock 48%
- Local sand and gravel 12%
- Recycled aggregates 39%
- Imports (notional only) 1%

Figure 29: Minerals demand forecast for 2031 disaggregated by material type

Material type – or source	Low	Medium	High
Local crushed rock (48%) [Ronez and La Gigoulande quarries]	260,000	265,000	276,000
Local sand and gravel (12%) [Simon Sand and Gravel]	65,000	66,000	69,000
Local recycled aggregate products (39%) [Various local producers]	211,000	215,000	224,000
Imports [Included for completeness; estimated as +/-1% in 2020]	4,000	6,000	7,000
Total	**540,000**	**552,000**	**575,000**

Forecasts for the scenarios assessed as part of the scenarios assessment undertaken as part of Section 7 have also been produced – these are presented in Appendix B.

For minerals planning policy purposes the demand projections and expected supply scenario will set the framework for establishing the total volume of material expected to be supplied from the different sources over the first (2011-2031) and subsequent (2031-2041) minerals planning periods. These numbers, in turn, will enable policy makers to understand the need for, and the urgency of, the necessary planning permissions and (in the case of recycled sources) waste management permits to facilitate the reliable delivery of construction materials to market throughout the planning periods.

5.3 Inert Waste Demand Forecasting

5.3.1 Methodology

Inert waste generation in Jersey is primarily generated by excavation, demolition, and construction activities undertaken in association with development projects.

The relatively small number of projects in progress at any one time in Jersey, means that the impact of large projects on the amount of inert waste generated in a given year is amplified. Consequently, there are significant swings in inert waste generation between adjacent years. Nevertheless, the general trend, visible by comparing recent inert waste data with that reported in the Jersey Inert Waste Arisings and Landfill Capacity Report 2008, is that inert waste generation is increasing steadily.

Between 2005 and 2019 inert waste generation increased at an interpolated rate of 1.12% per year; this compares with an average population growth over the same period of 1.21% per year. It is considered a reasonable assumption that, when considered over the course of a longer period, that there would continue to be a close relationship between inert waste generation, and population size.

Inert waste generation forecast, have been projected forward from a baseline year (2019), using the historic growth rate, scaled up or down based on the population scenarios.

5.3.2 Assumptions and Limitations

It has been assumed that private sector generated inert waste, currently disposed of and recovered at licensed waste sites, will continue to grow at the prevailing historic rate between 2005 and 2019, scaled up or down relative to the position of the populations growth scenarios against population changes over the same historic period.

- Low scenario inert waste growth – 0.70% per annum
- Medium scenario inert waste growth – 0.87% per annum
- High scenario inert waste growth – 1.31% per annum

It has been assumed that private sector generated inert waste, currently recovered informally under licensing exemption, would continue to be managed outside of licensed waste sites, and would continue to be play a secondary role in waste infrastructure capacity or planning concerns.

Government of Jersey-generated inert waste has a weak correlation with population, and it has been assumed that it would be generated in the future at the average rate recorded between 2015 and 2019, at 31,162 t.p.a.

Whilst the inert waste forecast methodology leads to a steady linear increase in inert waste generation each year it is expected that, in reality, there would be significant variation between years, depending upon the progress of significant development projects (see Section 5.3.4). There is insufficient information regarding any of the projects identified, to attribute specific tonnages of waste to particular years.

5.3.3 Inert Waste Demand Forecast

Jersey's inert waste generation has been forecast between 2020 and 2040 using the previously described population scenarios. The quantities presented exclude

private sector generated inert waste which is currently recovered informally under licensing exemption.

Figure 30: Inert waste generation forecast (t.p.a.)

Inert waste generation (t.p.a.)	Low (+800 pop. p.a.)	Mid (+1,000 pop. p.a.)	High (+1,500 pop. p.a.)
2020	378,639	379,290	380,918
2021	381,263	382,576	385,870
2022	383,907	385,893	390,892
2023	386,571	389,242	395,986
2024	389,254	392,622	401,151
2025	391,958	396,034	406,389
2026	394,683	399,478	411,702
2027	397,428	402,954	417,090
2028	400,194	406,464	422,554
2029	402,980	410,006	428,096
2030	405,788	413,582	433,716
2031	408,617	417,192	439,415
2032	411,467	420,835	445,196
2033	414,339	424,514	451,058
2034	417,232	428,226	457,003
2035	420,148	431,974	463,032
2036	423,085	435,758	469,147
2037	426,045	439,577	475,348
2038	429,026	443,432	481,637
2039	432,031	447,323	488,015
2040	435,058	451,251	494,484

5.3.4 Significant Development Projects

The waste arisings forecasts presented in Section 5.3.3 represent a reasonable future baseline, based on historic waste generation trends. A significant proportion of the quantities of waste forecast will be generated by a small number of significant scale projects that will create above average quantities of waste in the years in which they are undertaken.

The following projects do not have planning consent or committed project programmes, and so the impact of their construction cannot be incorporated into the inert waste forecasts; nevertheless, the potential quantities of waste arising from these projects are significant, and their undertaking will have a considerable impact in Jersey's inert waste management infrastructure, in the years in which they are under construction.

- International Finance Centre district – waterfront extension

- Our Hospital project
- St. Helier Port expansion / redevelopment
- Development of (and at) Jersey Airport
- Major housing developments, including Ann St Brewery site and Clare St Brewery site
- Shoreline Management Plan projects

5.4 Potable Water Demand Forecasting

5.4.1 Methodology

Demand forecasting is the method by which water companies estimate future demand for water. Water companies use mathematical models that use information such as population and property projections, water use data and trends, and a range of other information to forecast how the components of demand for water are likely to vary over the next 25 years and beyond.

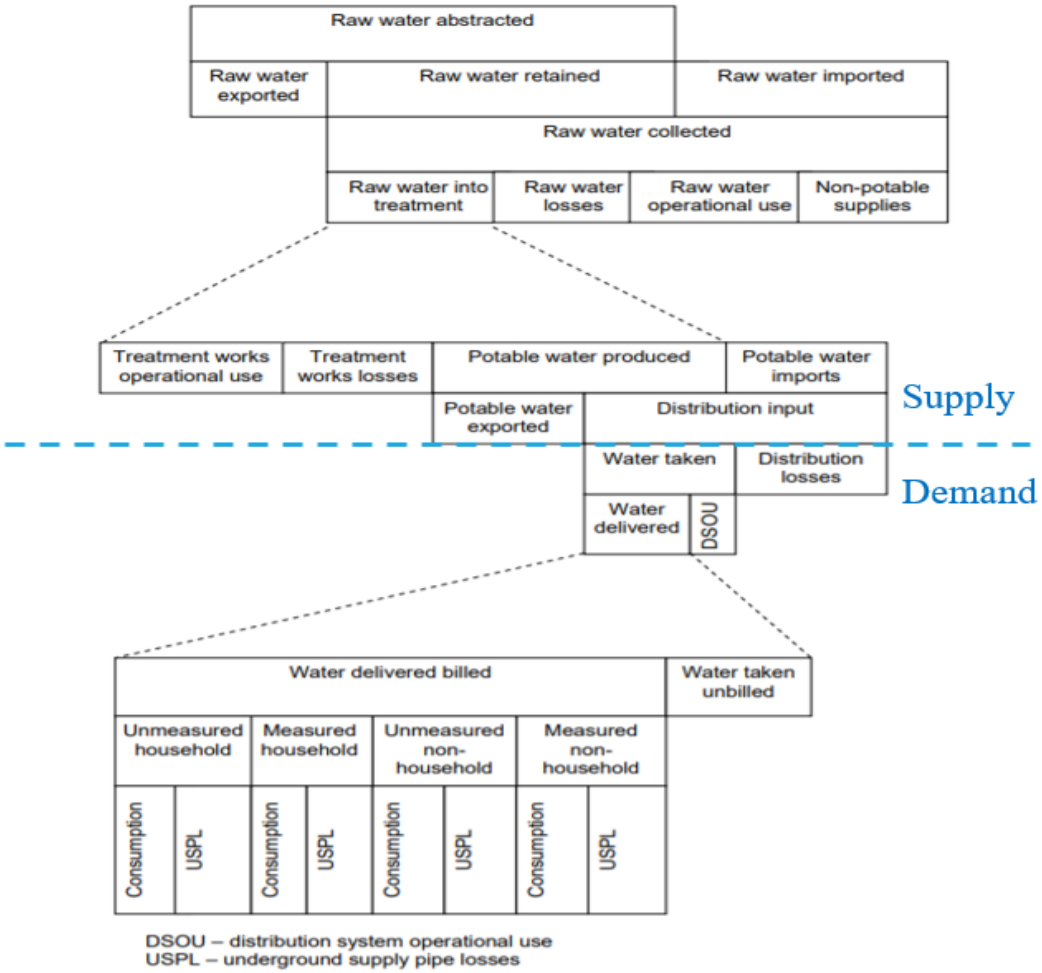
Water demand forecasting for water resources planning has been undertaken in the UK for many years. As a result, the UK has developed an extensive set of good practice methods for carrying out the calculations: in particular the methods developed by UK Water Industry Research Limited (UKWIR) and the national guidance for water resources planning prepared by the Environment Agency (in England) (2017).

To ensure that future demand for customer supply water is achieved the demand forecast considers dry years, as it is during these that the pressure on resources is at its greatest. Therefore, the supply demand analysis on which this section is based on will use forecasts of demand under a dry year scenario.

The forecasting method used by Jersey Water is in line with normal practice and guidelines. It includes the following steps as outlined in Figure 31 below:

- Household Use - water used in the home and garden
- Non-household Use - water used by businesses
- Operational Use - water used maintaining the network
- Water Taken Unbilled - water used without charge either legally (e.g. fire hydrant use), or illegally
- Leakage - water lost from the distribution system

Figure 31: Diagram illustrating components of supply and demand.



Source: Environment Agency (England) Water Resources Planning Guide 2008

Arup has reviewed the forecasts produced by Jersey Water, and has not sought to recreate the forecasts.

5.4.2 Assumptions and Limitations

The demand forecasting has been based on appropriate data sources from Jersey Water and Government of Jersey, and assumptions. The main assumptions considered in the Jersey Water demand forecast are:

- The review has used population growth data provided by Jersey Water as follows
  - Net migration +700[22]
  - Net migration +1,000
  - Net migration +1,500

[22] The lower population growth scenario is less than the Low scenario of +800 used in the minerals and inert waste forecasts. It should be noted that the impact is mainly to residential population figures and would create a small increase in the final demand figure quoted.

- The whole of Jersey Water's water supply system can be treated as a single water resource zone,
- Jersey Water WRMP has used a dataset of 2017. This year provided the latest complete date set of actual company information
- Jersey Water's customer billing system provides a reliable source of information on volumes of water consumed for 2017 and previous years. Jersey water current metering is at 92% of total residential customers.
- All new properties in Jersey will be served by Jersey Water and will be metered
- Climate change allowance has been included for domestic consumption and commercial industry consumption (agriculture and tourism).
- Unmeasured properties demand both residential and commercial will remain unchanged for the forecast.

5.4.3 Future Demand

As discussed in Section 5.4.1 the future demand for Jersey is a combination of number of demand component which Jersey Water supply. In doing so, this section sets out the forecasts for how demand is expected to change due to changes in demographics and how to account factors such as the impact of climate change.

5.4.3.1 Population Growth

Population growth will impact future water demand. Taking a baseline year of 2017, Jersey Water have interpolated a projected population growth to 2045 and beyond for each scenario. The anticipated levels are shown in Figure 32. The increase in population will impact the consumption of potable water on the island of Jersey, Figure 33 below show the comparison of potable water consumption in a Dry Year Annual Average (DYAA) demand scenario for each population criteria.

Figure 32: Jersey Water projected population growth numbers

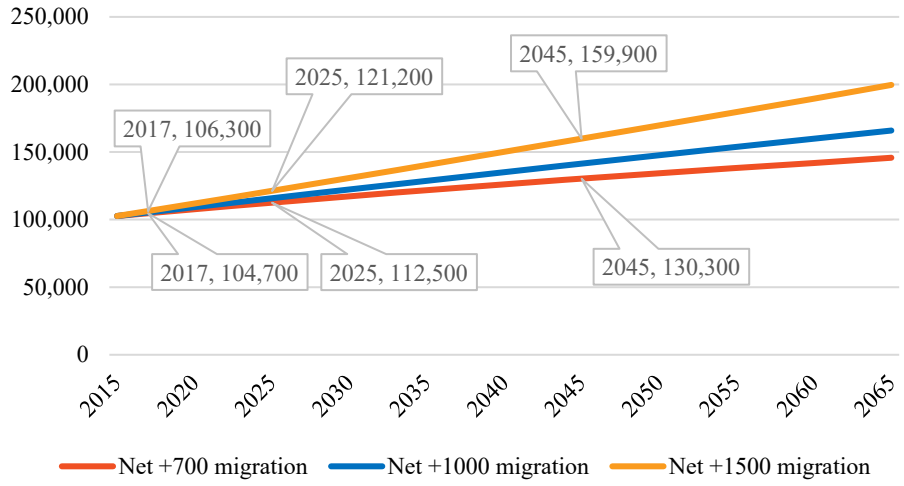
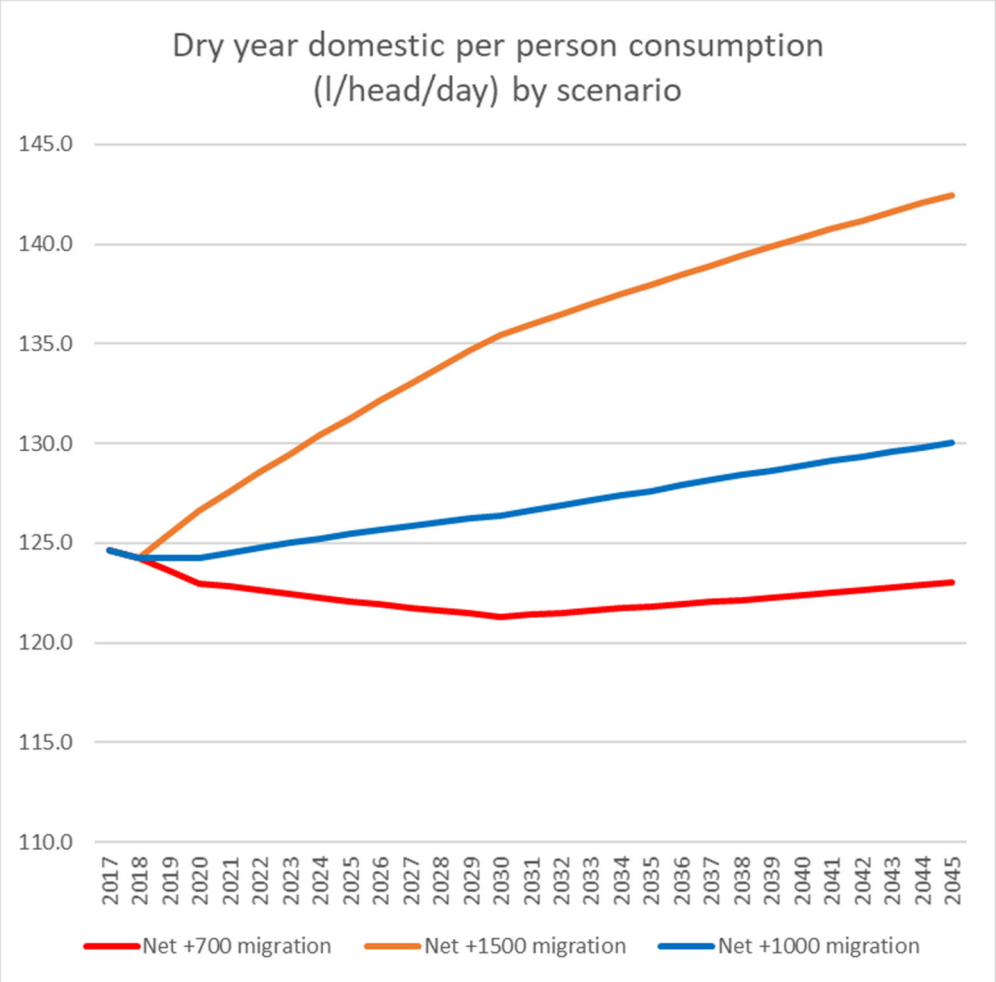


Figure 33: Dry year domestic per person consumption rates by scenario (l/head/day)



5.4.3.2 Commercial Growth

Jersey Water's non-household water use is forecast to remain broadly flat for the following industries over the planning period: agriculture, industry, tourism, public services and unmeasured commercial.

It is predicated that increase will be seen in miscellaneous and office and retails over the planning period, with an overall demand increase of 0.31Ml/d.

There is inevitable uncertainty in estimates of future commercial consumption. Economic and employment profiles are inherently uncertain.

5.4.3.3 Unmeasured Domestic and Commercial

For the purpose of the demand forecast, it is assumed that the number of commercial properties served by Jersey Water will remain at 2017 levels: estimated as 3,256 measured and 304 unmeasured. This assumption has negligible effect on the overall demand forecast as the volume supplied to measured commercial properties is calculated based on modelled volume trends which do not depend on the numbers of properties.

5.4.3.4 Leakage

UK best practice is to maintain a total leakage at, or below, the "sustainable economic level of leakage" (SELL) calculated in accordance with national guidance (Ofwat, 2007, 2012). As the leakage rate decreases it becomes, using current technology, less feasible to undertake extensive leakage detection.

Jersey Water has maintained a low leakage rate in comparison to most UK water supply companies. The total leakage for 2017 was recorded at 3,055 m3/d. This is approximately 15% of total distribution input. It is noted in the WRMP that an updated figure for 2018 of 2,558m3/d (12.6%) has been used for future demand forecasting. The updated figure was as a result of a scheme to repair faulty misreading meters. The UK average for leakage in 2017/18 and 2018/19 was 9.2 m3/km/day. In comparison the Jersey Water had an estimated 4.9 m3/km/day for 2018.

5.4.3.5 Minor Water Use and Unaccounted for Water

Minor water loss and unaccounted for water in the baseline year account for a small overall percentage of the total distribution input, approximately 3%. No increase in the amount have been allowed for in the forecast and they are there expected to remain stable in the future.

5.4.3.6 Climate Change

Climate change is expected to result in warmer, drier summers in the future, and three climate variables were assessed in the statistical analysis; temperature, rainfall and sunshine hours as part of the WRMP. The assessment highlights an increased water use by domestic customers. Jersey Water have anticipated the effect of climate change based on UKCIP09 date. The impact of climate change

on domestic water use is estimated to increase annual average consumption by 1.2%; and peak week consumption by 3.1% by 2045.

Climate change impacts are not assessed for commercial demand in most UK water company WRMPs as there is inadequate evidence from UK studies (e.g. UKWIR) to precisely quantify the effects of weather or climate change on water use by commercial sectors.

However, due to the nature of Jersey Water commercial supply (agriculture and tourism) it is likely that water consumption will increase if the summer weather is hotter/drier than usual. In the absent of specific commercial data, a climate change allowance uplift of 1.2% of annual average consumption and 3.1% peak week consumption by 2045 has been applied as per the residential consumption.

5.4.3.7 Water Use and Reduction

An objective of Jersey Water is reducing future demand. A focus on education, media advertising and the availability of household water efficient fittings are amongst the methods being undertaken by Jersey Water. It is also anticipated that a reduction in water demand will be accounted for in efficient/low water use domestic appliances in the future.

Currently, the water consumption performance of new properties in the UK is subject to the Building Regulations Part G. These include a whole building target in line with the joint Defra and Communities and Local Government (2007) statement of 125 l/h/d.

The current demand in Jersey Water has been calculated as 300l/prop/d. Based on an occupancy of 2.54 persons per property, this equates to approximately 118 l/h/d for each domestic property.

5.4.3.8 Summary of Future Demand

A summary of future demand is provided in Figure 34.

Figure 34: Potable water forecast

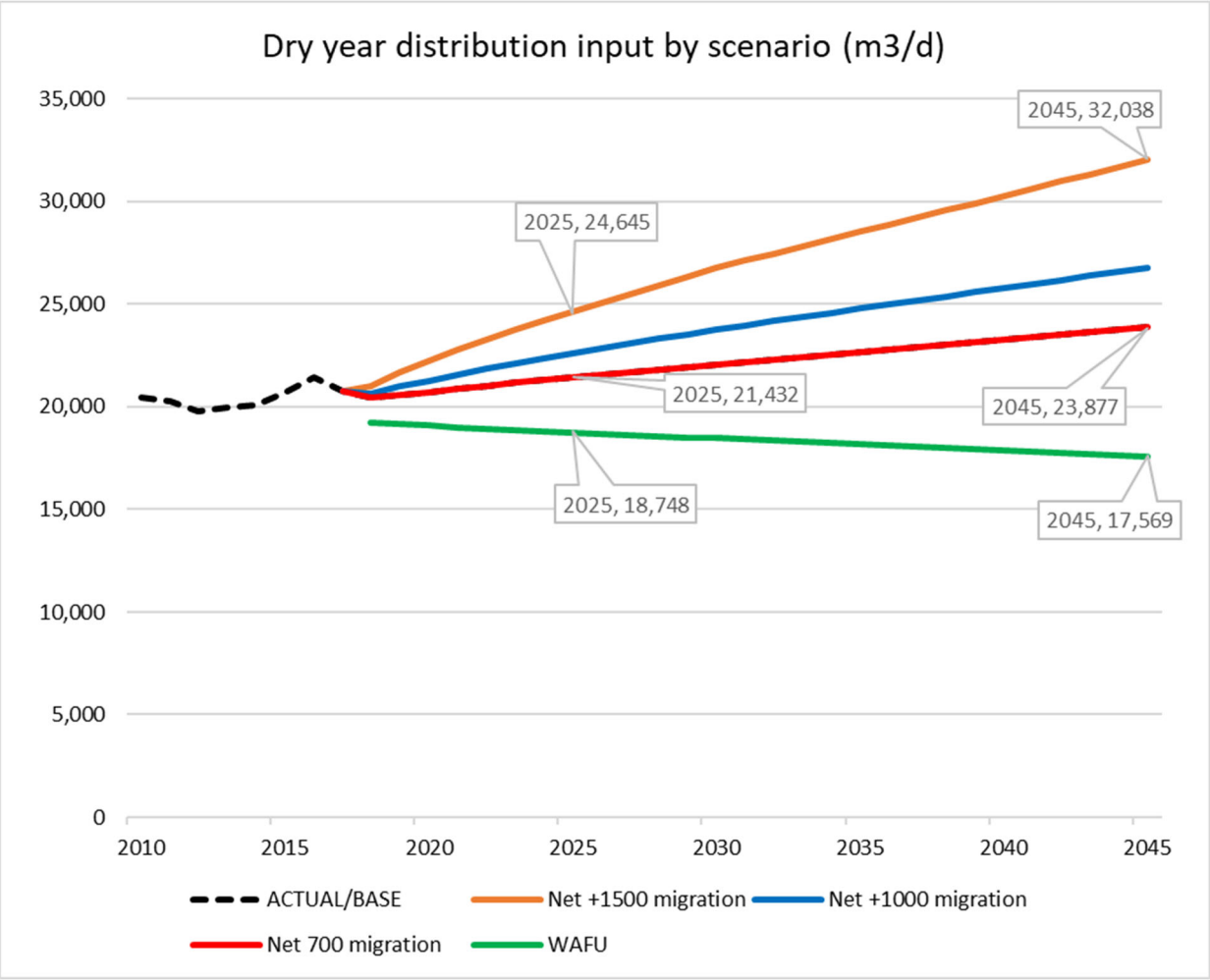
	Low (+700 pop. p.a.[23])	Mid (+1,000 pop. p.a.)	High (+1,500 pop. p.a.)
Jersey Water Baseline 2017	20,782	20,782	20,782
2025	21,432	22,605	24,645
2035	22,690	24,784	28,521
2045	23,877	26,773	32,038

[23] As mentioned previously, Jersey Water demand forecast used +700 population growth as Low scenario.

5.4.4 Supply Demand Balance Forecast

When forecasting for potable water demand, a forecast for the Water Available For Use (WAFU) needs to be undertaken to account for impact of climate change. Jersey Water have taken account of UKCP09 to account for the impact of climate change on raw water sources and in turn WAFU an assessment of the impact of UKCP18 has been accounted for in the target headroom allowance within the WRMP. In Figure 35, a comparison has been provided for the DYAA and WAFU, as shown it is predicated for the supply demand balance to have an increasing deficit in the scenario (figures quote do not include an uncertainty allowance, this has been captured in the forecast in Section 5.4.3.8.)

Figure 35: DYAA distribution input (m^3/d) compared to WAFU



Note: DYAA demands and WAFU include climate change impacts

In a dry year annual average scenario as shown in Figure 35, based on a drought in the order of the 1992 drought, there is a substantial impact to the WAFU and the demand. As shown in Figure 35 a deficit in the supply demand balance will be incurred for all population increases

Based on population growth and climate change impact allowance the current Jersey Water network would have an overall deficit of:

- 2,684 m^3/d for a +700 net migration in 2025; and
- 5,897 m^3/d for the +1500 net migration.

This deficit is further increased in the years to 2045, as the WAFU will decrease due to climate change and the demand increase due mainly to population growth customer use in drought scenarios. An overall deficit of:

- 6,308 m^3/d for a +700 net migration in 2045; and
- 14,469 m^3/d for the +1500 net migration.

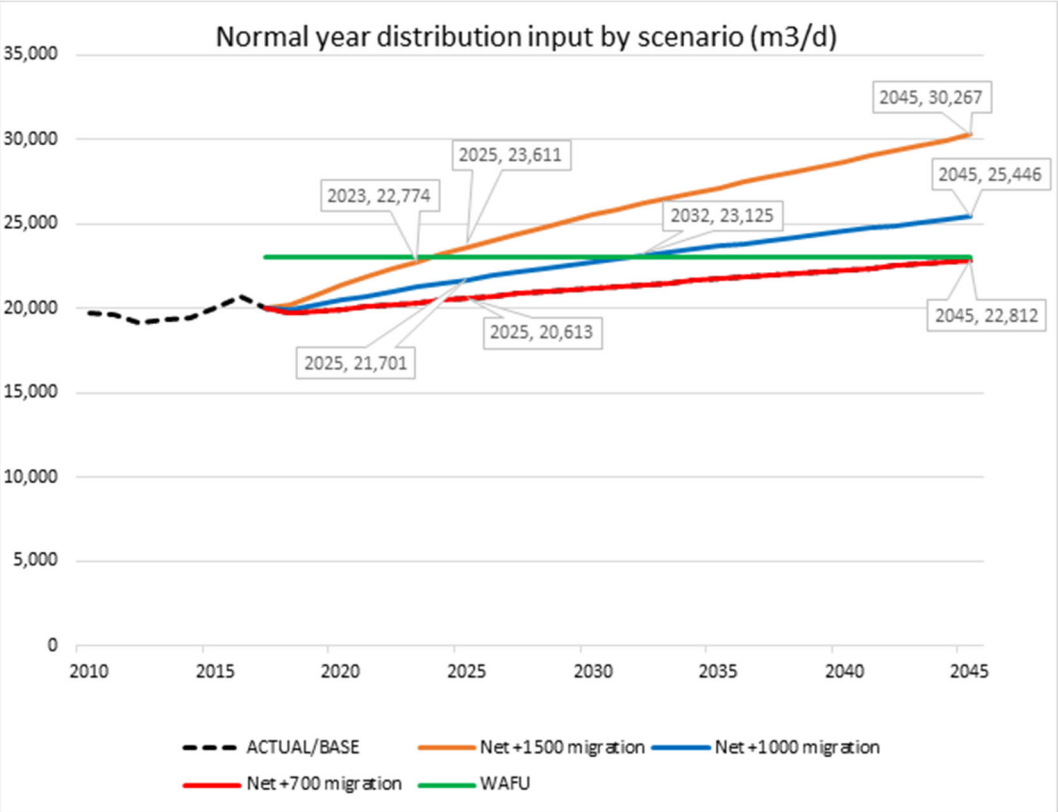
In normal year distribution scenario, it is anticipated that no deficit will be incurred for a population increase of net migration +700 upto 2045 with an expected supply of 22,812 m3/d. However, there are deficits predicted to occur from: as outlined in Figure 36: Normal year distribution input by scenario comparison with WAFU (m3/d).

- 2024 for the net migration + 1,500 criteria; and
- 2032 for the net migration + 1,000 criteria

These figures do not account for changes in climate change and the deficits shown are anticipated mainly by demand increases associated with by population growth. For the +1500 net migration it is anticipated to have a deficit of approximately 7m267 m^3/d in 2045 under normal year criteria.

Jersey Water have confirmed that water treatment is not a restriction to meet demand as the two water treatment works have a maximum water treatment capacity of 39,000 m^3/d.

Figure 36: Normal year distribution input by scenario comparison with WAFU (m^3/d)

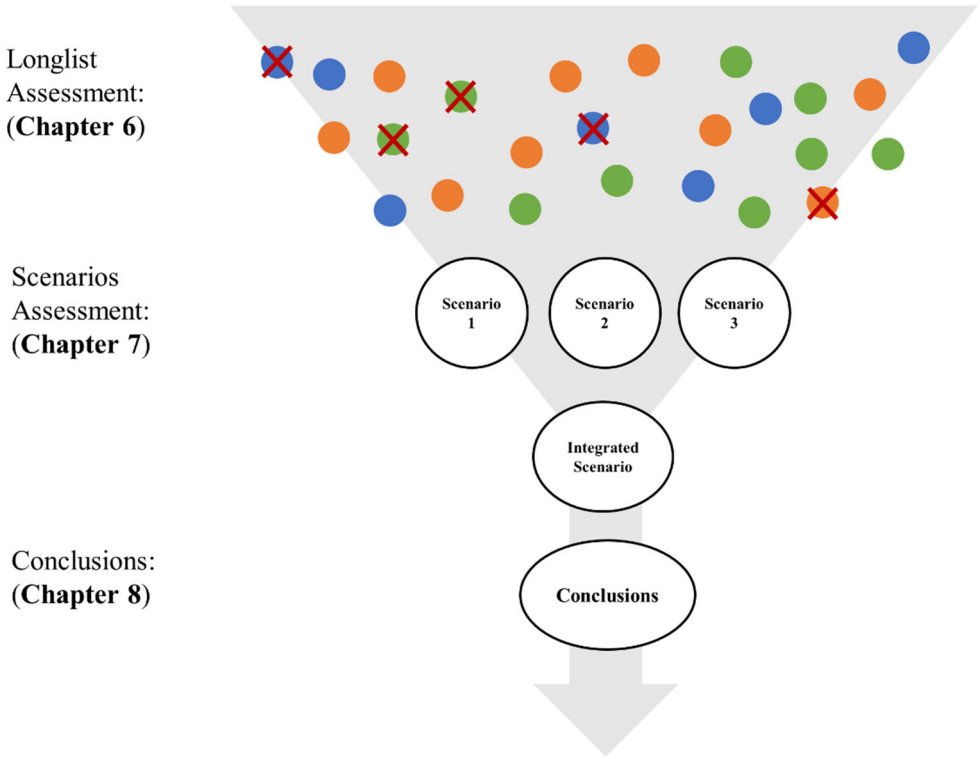


6 Longlist Assessment

6.1 Overview

The longlist assessment is the first stage of assessment in understanding the impact of various options for meeting demand for minerals, waste and water. It informs the development of the three scenarios assessed in Section 7. The overall approach to the longlist assessment and scenarios assessment is shown in Figure 37.

Figure 37: Longlist assessment and scenarios assessment methodology



6.2 Longlist Identification and Assessment Methodology

A longlist of options has been developed. The longlist is a list of all potential solutions for meeting demand, informed by the baseline (Sections 2-4). Crucially, it is not an integrated list – rather, it is a set of components to inform the shortlisted options. For this reason, some longlisted options may be mutually exclusive, for example they may use the same sites being used for multiple or competing purposes.

The longlist assessment takes the form of a short qualitative assessment in the form of a table which has considered:

- Whether the option is likely to be feasible (excluding options which are unlikely to be and so should not be considered as part of shortlisting).

- The likely scale of contribution towards meeting the forecast demand (excluding options which are of a scale that will not make a material contribution).
- Links to, and comparisons with, other longlisted options – including noting where options are either complementary to each other or mutually exclusive (and excluded if included as a subset of another option taken forward to scenarios assessment).
- Any other reasons why the longlist option should not be taken forward.

6.3 Longlist Assessment

The longlist assessment is provided in Figure 38.

Figure 38: Longlist assessment summary

Ref	Topic	Longlist option	Include or exclude from scenarios assessment?
001	Minerals	Continue and expand operations at Ronez Quarry	Include
001A	Minerals	Discontinue primary aggregates extraction at La Gigoulande Quarry (Ronez becomes the sole supplier)	Include
001B	Minerals	Continue operations at Ronez Quarry but do not permit additional operations	**EXCLUDE** Ronez is the longest standing aggregates producer on the island and is considered to be central to the objective of ensuring a sustainable supply of locally produced materials for the construction industry. It is currently in the position of potentially failing in this role, unless further reserves are permitted in the very near future.A planning application relating to expansion is currently being determined.
002	Minerals	Continue primary aggregates extraction only at La Gigoulande Quarry	Include
003	Minerals	Continue operations at Simon Sand and Gravel until the resource is exhausted, then progressive restoration	Include
003A	Minerals	Continue operations at Simon Sand and Gravel until the resource is exhausted	Include

Ref	Topic	Longlist option	Include or exclude from scenarios assessment?
004	Minerals	Cease operations at Simon Sand and Gravel by December 2023 and undertake landscape restoration by 2025	Include
005	Minerals	Develop an integrated extraction, waste management and restoration operation at Simon Sand and Gravel	Include
006	Minerals	Cease operations at Simon Sand and Gravel immediately and restore the landscape	**EXCLUDE** Impact would be to prematurely impose additional costs on other quarries (and hence on the market) as a result of them having to accelerate their plans for producing substitute products, and would result in a more rapid rise in cost as a result of import arrangements having to be made hastily. It would also entail compensation to the owner given that the extant permission runs to December 2023.
007	Minerals	Develop new operating sites (locations not currently identified)	**EXCLUDE** New operating sites could be feasible but given lack of definition have not been taken forward into scenarios assessment.
008	Minerals	Import minerals	Include
009	Waste	Extending life of IHE Operations at La Collette by super filling	**EXCLUDE** May form part of short term solution whilst more permanent solution is brought forward, but is not a solution in its own right.
010	Waste	Use La Gigoulande Quarry for inert waste re-processing and landfill only	**EXCLUDE** Taken forward into the scenarios assessment as part of 045 (dual use).
011	Waste	Further St Helier land reclamation	Include
012	Waste	Land reclamation to replace La Collette in other locations (not currently identified)	**EXCLUDE**

Ref	Topic	Longlist option	Include or exclude from scenarios assessment?
			Additional land reclamation projects could be feasible but given lack of definition have not been taken forward into scenarios assessment.
013	Waste	Long-term land reclamation project(s) developed slowly over years or decades using low-value inert waste (rather than being used to deliver short term developable land or a particular scheme)	Include
014	Waste	Use inert waste to develop sea defences (Shoreline Management Plan)	Include
015	Waste	Explore further opportunities to use inert waste to replace use of non-waste (e.g. flood alleviation, climate change adaptations, recreational projects etc - projects not currently identified)	Include
016	Waste	Develop facilities for inert waste reprocessing (locations not currently identified)	Include
017	Waste	Restore Simon Sand and Gravel without backfilling the void to enable inert waste to be used more valuably as secondary aggregates in construction and landscaping	**EXCLUDE** Different treatment of site taken forward into the scenarios assessment as part of 005.
018	Waste	Export inert waste	**EXCLUDE** Anticipated to be too costly a solution.
019	Waste	Introduce a charging scheme for waste disposal at La Collette	**EXCLUDE** May be part of solution for extending the life of La Collette but scale of impact on inert waste requirements generally is expected to be low – instead included as part of a package of measures assessed in 020.
020	Waste	Demand management of inert waste processing requirements through using the planning process as well as regulatory and fiscal measures (e.g. higher gate fees or an operator's landfill tax) to require developers to utilise recycled inert materials in projects and better control of inert waste through waste regulation	Include
021	Water	Maintain existing supply and assets (business as usual)	**EXCLUDE** Will not meet future demand.

Ref	Topic	Longlist option	Include or exclude from scenarios assessment?
022	Water	Use La Gigoulande Quarry as an additional reservoir	Include
023	Water	Increase borehole extraction St Ouen's Bay	Include
024	Water	Develop new borehole sites (locations not currently identified) with abstraction licence trading	**EXCLUDE** Additional boreholes could be feasible but given lack of definition have not been taken forward into scenarios assessment.
025	Water	Increase capacity at Val de La Mare Reservoir	Include
0025A	Waste	Increase capacity at another existing reservoir such as such as La Hague and Le Mourier	Include
026	Water	Increase capacity at La Rosière de-salination plant	Include
027	Water	New de-salination plant (location not currently identified)	Include
028	Water	Recycle wastewater back into the reservoir system and/or wastewater treatment process, or aquifer recharge	Include
029	Water	New facilities at other sites (locations and schemes not currently identified)	**EXCLUDE** Additional land acquisition projects could be feasible but given lack of definition have not been taken forward into scenarios assessment.
030	Water	Increase efficiency of water treatment works	**EXCLUDE** Water treatment facilities have a combined output of 46 m³/day. This is greater than the anticipated peak demand required in extreme events in 2045.
031	Water	Import water supply (e.g. connection to France)	**EXCLUDE** Costly and potentially unreliable resource.
032	Water	Leakage reduction – improved distribution monitoring and modelling	Include
032A	Water	Water efficiency-related planning policies and building bye-laws (similar to UK BREEAM)	Include
033	Water	Water demand management through fixing network leaks – enhanced leak detection and repair	Include
034	Water	Intensive media campaigns	Include
035	Water	Potable water network improvements	**EXCLUDE**

Ref	Topic	Longlist option	Include or exclude from scenarios assessment?
			Deployable output is considered to be hydrologically or water quality constrained rather than network constrained
036	Water	Water demand through non-household water efficiency	Include
037	Mixed - Minerals, Waste	Extract the area of high-value materials (materials suitable for reprocessing and resale as secondary aggregates) from La Collette, freeing up space for material which has no value as a secondary material	Include
038	Mixed - Minerals, Waste	Continue operation of AAL Recycling at La Collette	**EXCLUDE** Important resource in meeting aspiration for greater use of secondary aggregates (see 039).
039	Mixed - Minerals, Waste	Extend operations of AAL Recycling at La Collette	Include
040	Mixed - Minerals, Waste	Cease operations of AAL Recycling at La Collette by 2021	**EXCLUDE** Important resource in meeting aspiration for greater use of secondary aggregates (see 039).
041	Mixed - Minerals, Waste	Continued operation of WP Recycling at St. Peter	Include
042	Mixed - Minerals, Waste	Release the site of WP Recycling site at St. Peter for redevelopment	**EXCLUDE** Not in Government of Jersey's control, so not assessed in scenarios assessment. The impact of the loss of the site should be fully considered if plans to use this site for an additional use come forward.
043	Mixed - Minerals, Waste	Continued operation of Barette Plant Hire at St Peter	Include
044	Mixed - Minerals, Waste	Use inert waste in the long term restoration of Simon Sand and Gravel (with processed materials used directly at the sand quarry)	Include
045	Mixed - Minerals, Waste	Dual use of La Gigoulande Quarry as a minerals extraction site and inert waste facility (landfill or reprocessing)	Include

Ref	Topic	Longlist option	Include or exclude from scenarios assessment?
046	Mixed - Minerals, Water	Dual use of La Gigoulande Quarry as a minerals extraction site and water storage (reservoir)	**EXCLUDE** Could be feasible but have not been taken forward into scenarios assessment. Likely to be an incompatible use in the quarry's current form.
047	Mixed - Waste, Water	Dual use of La Gigoulande Quarry as an inert waste facility (landfill or reprocessing) and water storage (reservoir)	**EXCLUDE** Could be feasible but have not been taken forward into scenarios assessment.
048	Mixed - Minerals, Waste, Water	Mixed use of La Gigoulande Quarry as a minerals extraction site, inert waste facility (landfill or reprocessing) and water storage (reservoir)	**EXCLUDE** Could be feasible but have not been taken forward into scenarios assessment. Likely to be an incompatible use in the quarry's current form.

7 Scenarios Assessment

7.1 Overview

In order to understand how the demand for minerals, inert waste and potable water might be met in an integrated manner, three different scenarios have been developed for assessment. It should be noted that the scenarios are not three concrete 'options', from which one must be picked and adopted in its entirety. Rather, they have been developed to understand the interrelationships between the three topics. Following the assessment, a fourth 'integrated scenario' has also been developed and assessed (see Section 7.6).

7.2 Scenarios Development

Using the findings from the longlist assessment, three scenarios have been developed which reflect how the need for minerals, inert waste management and potable water might be met across the island. The scenarios are formed of a package of measures from the longlist options (see Figure 39 – note, excluded options are not included).

Figure 39: Relationship between longlist assessment and scenarios

Ref	Topic	Longlist option	All	Scenario		
				1	2	3
001	Minerals	Continue and expand operations at Ronez Quarry	✓			
001A	Minerals	Discontinue primary aggregates extraction at La Gigoulande Quarry (Ronez becomes the sole supplier)			✓	
002	Minerals	Continue primary aggregates extraction only at La Gigoulande Quarry		✓		
003	Minerals	Continue operations at Simon Sand and Gravel until the resource is exhausted, then progressive restoration				✓
003A	Minerals	Continue operations at Simon Sand and Gravel until the resource is exhausted		✓		
004	Minerals	Cease operations at Simon Sand and Gravel by December 2023 and undertake landscape restoration by 2025			✓	
005	Minerals	Develop an integrated extraction, waste management and restoration operation at Simon Sand and Gravel		✓		
008	Minerals	Import minerals			✓	✓
011	Waste	Land reclamation alongside (and eventually to replace) La Collette at International Finance Centre		✓		

Ref	Topic	Longlist option	All	Scenario		
				1	2	3
013	Waste	Long-term land reclamation project(s) developed slowly over years or decades using low-value inert waste (rather than being used to deliver short term developable land or a particular scheme)		✓		
014	Waste	Use inert waste to develop sea defences (Shoreline Management Plan)		✓		
015	Waste	Explore further opportunities to use inert waste to replace use of non-waste (e.g. flood alleviation, climate change adaptations, recreational projects etc - projects not currently identified)		✓		
016	Waste	Develop facilities for inert waste reprocessing (locations not currently identified)			✓	
020	Waste	Demand management of inert waste processing requirements through using the planning process as well as regulatory and fiscal measures (e.g. higher gate fees or an operator's landfill tax) to require developers to utilise recycled inert materials in projects and better control of inert waste through waste regulation	✓			
022	Water	Use La Gigoulande Quarry as an additional reservoir			✓	
023	Water	Increase borehole extraction St Ouen's Bay		✓		
025	Water	Increase capacity at Val de La Mare Reservoir		✓		✓
0025A	Waste	Increase capacity at another existing reservoir such as such as La Hague and Le Mourier		✓		✓
026	Water	Increase capacity at La Rosière de-salination plant				✓
027	Water	New de-salination plant (location not currently identified)				✓
028	Water	Recycle wastewater back into the reservoir system and/or wastewater treatment process, or aquifer recharge		✓		
032	Water	Leakage reduction – improved distribution monitoring and modelling	✓			
032A	Water	Water efficiency-related planning policies and building bye-laws (similar to UK BREEAM)	✓			
033	Water	Water demand management through fixing network leaks – enhanced leak detection and repair	✓			
034	Water	Intensive media campaigns		✓		
036	Water	Water demand through non-household water efficiency		✓		
037	Mixed - Minerals, Waste	Extract the area of high-value materials (materials suitable for reprocessing and resale as secondary aggregates) from La Collette, freeing up space for				✓

Ref	Topic	Longlist option	All	Scenario		
				1	2	3
		material which has no value as a secondary material				
039	Mixed - Minerals, Waste	Extend operations of AAL Recycling at La Collette	✓			
041	Mixed - Minerals, Waste	Continued operation of WP Recycling at St. John	✓			
043	Mixed - Minerals, Waste	Continued operation of Barette Plant Hire at St Peter	✓			
044	Mixed - Minerals, Waste	Use inert waste in the long term restoration of Simon Sand and Gravel (with materials used directly at the sand quarry or to another site for processing prior to being used)				✓
045	Mixed - Minerals, Waste	Dual use of La Gigoulande Quarry Gigoulande Quarry as a minerals extraction site and inert waste facility (landfill or reprocessing)				✓

7.2.1 Longlist Options Across All Scenarios

In developing the three scenarios, a number of the longlist options were identified which were considered to be important in meeting the future demand for minerals, waste and water over the assessment period regardless of the scenarios. These are set out in Figure 40 below.

Figure 40: Longlist options across all scenarios

Minerals		Inert Waste		Potable Water	
039	Extend operations of **AAL Recycling at La Collette**			**032**	Leakage reduction – improved distribution monitoring and modelling
041	Continued operation of **WP Recycling at St. Peter** *(with the exception of Scenario 3)*			**032A**	Water efficiency-related planning policies and building bye laws (similar to UK BREEAM)
043	Continued operation of **Barette Plant Hire at St Peter**			**033**	Water demand management through fixing network leaks – enhanced leak detection and repair
008	Import some materials *(whenever* **Simon Sand and Gravel** *stops producing - note Scenario 2 is import-centred so is also included separately)*	**020**	Demand management of inert waste processing requirements through using the planning process as well as regulatory and fiscal measures (e.g.		

Minerals		Inert Waste		Potable Water	
			higher gate fees or an operator's landfill tax) to require developers to utilise recycled inert materials in projects and better control of inert waste through waste regulation		
001	Continue and expand operations at **Ronez Quarry**				

With reference to Ronez in particular, it has been taken forward within all scenarios because there are no alternate, or dual, use options in the way that there are with La Gigoulande. This is nothing to do with the relative merits of the quarries themselves, either in terms of the quality of their rock or their respective environmental impacts. If Ronez were to close, it would further increase the requirement to import aggregates, and so its impact can be understood as an extension of Scenario 2.

The proposed expansion of Ronez entails take-up of land to the west of the current quarry, resulting in encroachment onto parts of the land currently used for BMX racing. It is understood that the land, which is in public ownership, will accommodate a revised layout that gives a track of approximately the same length as the current one.

7.3 Description of Scenarios

7.3.1 Scenario 1: Internalise, Reclaim, Reinforce

Figure 41: Scenario 1

Minerals		Inert Waste		Potable Water	
Overall Strategy: *'Internalise'* - optimise local primary aggregates supply sources.		**Overall Strategy**: *'Reclaim'* - manage inert waste through land reclamation.		**Overall Strategy**: *'Reinforce'* - strengthen use of existing assets in water management.	
002	Continue primary aggregates extraction only at **La Gigoulande Quarry** *(with Field 966 extension)*	**011**	Land reclamation alongside (and eventually to replace) La Collette at **International Finance Centre**	**025 / 025A**	Increase capacity at **Val de La Mare Reservoir** OR Increase capacity at another existing reservoir such as La Hague and Le Mourier

Minerals		Inert Waste		Potable Water	
003A	Continue operations at **Simon Sand and Gravel** until the resource is exhausted	**013**	Long-term land reclamation project(s) developed slowly over years or decades using low-value inert waste (rather than being used to deliver short term developable land or a particular scheme)	**028**	Recycle wastewater back into the reservoir system and/or wastewater treatment process, or aquifer recharge
005	Develop an integrated extraction, waste management and restoration operation at **Simon Sand and Gravel**			**036**	Water demand through non-household water efficiency
		014	Use inert waste to develop sea defences (Shoreline Management Plan)	**034**	Intensive media campaigns
		015	Explore further opportunities to use inert waste to replace use of non-waste (e.g. flood alleviation, climate change adaptations, recreational projects etc - projects not currently identified)		

7.3.2 Scenario 2: Externalise, Re-invent, Expand

Figure 42: Scenario 2

Minerals		Inert Waste		Potable Water	
Overall Strategy: *'Externalise'* - look to external sources of minerals.		**Overall Strategy**: *'Re-invent'* - use of Simon Sand and Gravel for waste management.		**Overall Strategy**: *'Expand'* - meet water demand through an additional reservoir.	
004	Cease operations at **Simon Sand and Gravel** by December 2023 and undertake landscape restoration by 2025	**044**	Use inert waste in the long term restoration of **Simon Sand and Gravel** (with materials used directly at the sand quarry or to another site for processing prior to being used)	**022**	Use **La Gigoulande Quarry** as an additional reservoir
001A	Discontinue primary aggregates extraction at **La Gigoulande Quarry**				
008	Import minerals				

7.3.3 Scenario 3: Integrate, Balance

Figure 43: Scenario 3

Minerals		Inert Waste		Potable Water	
Overall Strategy: *'Integrate'* - integrated minerals and waste management.		**Overall Strategy:** *'Integrate'* - integrated minerals and waste management.		**Overall Strategy**: *'Balance'* - balanced water demand strategy.	
045	Dual use of **La Gigoulande Quarry** as a minerals extraction site and inert waste facility (landfill or reprocessing) - with Field 966 extension			**023**	Increase borehole extraction **St Ouen's Bay** with abstraction licence trading
037	Extract the area of high-value materials (materials suitable for reprocessing and resale as secondary aggregates) from **La Collette**, freeing up space for material which has no value as a secondary material			**026 / 027**	Increase capacity at **La Rosière de-salination plant** OR New de-salination plant (location not currently identified)
003	Continue operations at **Simon Sand and Gravel** until the resource is exhausted, then progressive restoration	**016**	Develop facilities for inert waste reprocessing (locations not currently identified)	**025 / 025A**	Increase capacity at **Val de La Mare Reservoir** OR Increase capacity at another existing reservoir such as La Hague and Le Mourier

7.4 Assessment Methodology

The assessment takes the form of a Red-Amber-Green (RAG) scoring against each criteria as well as a qualitative statement which explains the scoring in detail.

- **Green**: likely to meet criteria
- **Amber**: likely to meet criteria with mitigation or additional technical assessment (qualitative statement will explain the likely mitigation / assessment required)
- **Red**: unlikely to meet criteria

The assessment is made against the criteria set out in Figure 44.

Figure 44: Assessment criteria

Category	Potential criteria
Environmental	• No or acceptable impact on watercourses, water table and potable water • No or acceptable impact on air quality • No or acceptable impact on ecology • No or acceptable impact on built environment and heritage • No or acceptable impact on landscape

Category	Potential criteria
	• No or acceptable impact on marine environment • No or acceptable impact on highways and traffic • Makes a contribution towards a net zero future • Makes a contribution towards the circular economy
Social	• No or acceptable impact on local amenity (including noise) • No or acceptable impact on open space and recreation • No or acceptable impact on transport • Supports meeting of housing needs over the study period • Likely level of public support (based on responses to Issues and Options consultation)
Economic	• Supports private sector investment • Supports public sector investment and returns • Supports wider economic growth • Likely to be affordable to the island
Topic-specific	• Meets total minerals requirements over the study period • Able to secure supply of aggregates for the Bridging Island Plan period with reserve, landbank provision for the period beyond • Continues of a good proportion of supply being met by secondary / recycled aggregates • Allows for achievement of restoration objectives within an acceptable timescale and with a specified mechanism for realising such objectives • Meets total inert waste requirements over the study period • Meets total water requirements over the study period • No or acceptable impact on customer cost for potable water
Other	• Provides additional benefits to the island (e.g. additional reclaimed land, flood protection etc.)

7.5 Scenarios Assessment

The scenarios assessment is included in Appendix C. A summary of the RAG assessment is provided in Figure 45, and a summary of the findings is presented below.

Figure 45: Summary of scenarios assessment (circles denote mixed rating)

Criteria	Scenario 1: Internalise, Reclaim, Reinforce			Scenario 2: Externalise, Re-invent, Expand			Scenario 3: Integrate, Balance		
	Minerals	Inert Waste	Potable Water	Minerals	Inert Waste	Potable Water	Minerals	Inert Waste	Potable Water
Environmental									
No or acceptable impact on watercourses, water table and potable water									
No or acceptable impact on air quality									
No or acceptable impact on ecology									
No or acceptable impact on built environment and heritage									
No or acceptable impact on landscape									
No or acceptable impact on marine environment									
No or acceptable impact on highways / traffic									
Makes a contribution towards a net zero future									
Makes a contribution towards the circular economy									
Social									
No or acceptable impact on local amenity (including noise)									
No or acceptable impact on open space and recreation									
Supports meeting of housing needs over the study period									
Likely level of public support (based on responses to Issues and Options consultation)									
Economic									
Supports private sector investment									
Supports public sector investment and returns									
Supports wider economic growth									
Likely to be affordable to the island									
Topic-specific									
Meets total minerals requirements over the study period (if not, total years' supply)									

Criteria	Scenario 1: Internalise, Reclaim, Reinforce			Scenario 2: Externalise, Re-invent, Expand			Scenario 3: Integrate, Balance		
	Minerals	Inert Waste	Potable Water	Minerals	Inert Waste	Potable Water	Minerals	Inert Waste	Potable Water
Able to secure supply of aggregates for the Bridging island Plan period with reserve, landbank provision for the period beyond	●						●		
Continues of a good proportion of supply being met by secondary / recycled aggregates									
Allows for achievement of restoration objectives within an acceptable timescale and with a specified mechanism for realising such objectives									
Meets total inert waste requirements over the study period (if not, total years' supply)									
Meets total water requirements over the study period (if not, total years' supply)						●			
No or acceptable impact on customer cost for potable water									●
Other									
Provides additional benefits to the island (e.g. additional reclaimed land, flood protection etc.)									

The conclusions from the scenarios assessment is as follows:

Scenario 1

Minerals: Whilst potentially the best scenario for minerals, it is not clear that optimum use of sites for integration of minerals and waste objectives is achieved. The scenario's strongest feature is its 'internalisation' of minerals impacts by optimising local supply sources. This also maintains current level of materials affordability (versus imports), and optimum from the perspective of meeting net zero targets.

Inert Waste: The need for a long-term solution for inert waste disposal, may be at odds with the aspiration for land reclamation projects to be completed quickly so that the land can be put to use. Whilst there might be a wider case for reclamation (which might include waste management), it is unlikely to be the optimum solution from a waste management solution.

Potable Water: Increasing the capacity of Val de la Mare reservoir is likely to be part of the solution for potable water, though there are a number of environmental impacts related with its increased land take which need to be considered further. The 'dirty water' perception of water recycling from the waste water treatment works is likely to be hard to counter.

Scenario 2

Minerals: The cost and economic impact of relying on an import-led supply of aggregates are significant disadvantages. The potential level of imports (100,000 - 150,000 tonnes per annum) is well below the viable level for an efficient bulk import berth; ro-ro and bulk container handling at existing port facilities could handle the volume but would result in substantially increased costs of materials supply together with added concentration of traffic in and around the port.

Inert Waste: If La Colette was closed and only Simon Sand and Gravel was operation, there would likely to be a need for some exports (previously discounted in longlist assessment due to cost). The scenario may disrupt supply of secondary aggregates, as inert waste (currently reprocessed and sold on the market) may be used to restore the Simon Sand and Gravel site. It would be advisable to implement this scenario with a landfill-tax, to ensure that any operator was encouraged to find beneficial secondary uses for as much of the material as possible prior to disposal.

Potable Water: Use of La Gigoulande as a reservoir site alone does not meet the potable water supply needs of the island.

Scenario 3

Minerals: This scenario makes the most of existing assets at La Gigoulande as well as at Simon Sand and Gravel, as well as the use of secondary aggregates. In this sense, it is aligned with the aspirations around sustainability and the circular economy.

Inert Waste: As above, this scenario makes the most of the interrelationship between minerals and inert waste management. It provides sufficient capacity to

meet requirements, and would allow a solution to be put in place quickly to deal with La Collette's limited lifespan. It also aligns with the existing permissions for La Gigoulande Quarry.

Potable Water: Similar to Scenario 1, increasing the capacity of Val de la Mare reservoir is likely to be part of the solution for potable water, though there are a number of environmental impacts related with its increased land take which need to be considered further.

7.6 Integrated Scenario

Following the scenarios assessment, an 'integrated scenario' has been developed and assessed against the same criteria. It should be noted that this does not necessarily mean that Government of Jersey should go with this scenario; rather, it offers a chance to iterate the assessment based on the findings from the three scenarios.

7.6.1 Integrated Scenario Definition

Figure 46: Integrated scenario

Minerals		Inert Waste		Potable Water	
045	Dual use of **La Gigoulande Quarry** as a minerals extraction site and inert waste facility (landfill or reprocessing) - with Field 966 extension			**025**	Increase capacity at **Val de La Mare Reservoir**
005	Develop an integrated extraction, waste management and restoration operation at **Simon Sand and Gravel**			**026 / 027**	Increase capacity at **La Rosière de-salination plant** OR New de-salination plant (location not currently identified)
037	Extract the area of high-value materials (materials suitable for reprocessing and resale as secondary aggregates) from **La Collette**, freeing up space for material which has no value as a secondary material			**036**	Water demand through non-household water efficiency
		014	Use inert waste to develop sea defences (Shoreline Management Plan)	**034**	Intensive media campaigns
		015	Explore further opportunities to use inert waste to replace use of non-waste (e.g. flood alleviation, climate change adaptations, recreational projects etc - projects not currently identified)		

7.6.2 Integrated Scenario Assessment

The integrated scenario assessment is included in Appendix D. A summary of the RAG assessment is provided in Figure 47.

Figure 47: Summary of integrated scenario assessment (circles denote mixed rating)

Criteria	Integrated Scenario: Minerals	Integrated Scenario: Inert Waste	Integrated Scenario: Potable Water
Environmental			
No or acceptable impact on watercourses, water table and potable water			
No or acceptable impact on air quality			
No or acceptable impact on ecology			●
No or acceptable impact on built environment and heritage			
No or acceptable impact on landscape			
No or acceptable impact on marine environment			
No or acceptable impact on highways / traffic			
Makes a contribution towards a net zero future			
Makes a contribution towards the circular economy		●	
Social			
No or acceptable impact on local amenity (including noise)			●
No or acceptable impact on open space and recreation	●		●
Supports meeting of housing needs over the study period			
Likely level of public support (based on responses to Issues and Options consultation)			
Economic			
Supports private sector investment			
Supports public sector investment and returns			
Supports wider economic growth			
Likely to be affordable to the island			
Topic-specific			
Meets total minerals requirements over the study period (if not, total years' supply)			
Able to secure supply of aggregates for the Bridging Island Plan period with reserve, landbank provision for the period beyond	●		

Criteria	Integrated Scenario		
	Minerals	Inert Waste	Potable Water
Continues of a good proportion of supply being met by secondary / recycled aggregates			
Allows for achievement of restoration objectives within an acceptable timescale and with a specified mechanism for realising such objectives			
Meets total inert waste requirements over the study period (if not, total years' supply)			
Meets total water requirements over the study period (if not, total years' supply)			
No or acceptable impact on customer cost for potable water			
Other			
Provides additional benefits to the island (e.g. additional reclaimed land, flood protection etc.)			

8 Conclusions

8.1 Overview

The implications of the various options for meeting the demand for minerals, inert waste management and potable water have been tested through the three scenarios presented in Section 7, and refined through the integrated scenario. It should be reiterated that neither the scenarios nor the integrated scenario were designed for the Government of Jersey to 'pick' as a single, complete solution. However, from the assessment it is clear that the integrated scenario has significant advantages in being able to meet the island's needs in an integrated manner.

To recap, the integrated scenario comprised the following interventions (including those assessed across all scenarios):

- Dual use of La Gigoulande Quarry as a minerals extraction site and inert waste facility – including Field 966 extension for extraction (pending planning application and process).
- Development of an integrated extraction, waste management and restoration operation at Simon Sand and Gravel's existing permitted works.
- Continued and expanded operations at Ronez Quarry.
- Extended operations of AAL Recycling at La Collette and continued operations at WP Recycling and Barette Plant Hire.
- Extraction of the area of high-value materials (material suitable for reprocessing and resale as secondary aggregates) from La Collette, freeing up space for material which has no value as a secondary material.
- Demand management of inert waste processing requirements through using the planning process as well as regulatory and fiscal measures (e.g. higher gate fees or an operator's landfill tax) to require developers to utilise recycled inert materials in projects and better control of inert waste.
- In the longer term, use of inert waste to develop sea defences (Shoreline Management Plan projects etc.) and exploration of further opportunities to use inert waste to replace use of non-waste (when such opportunities arise).
- Increased capacity at Val de La Mare Reservoir.
- Increased capacity at La Rosière de-salination plant (or a new de-salination plant).
- Water efficiency-related planning policies and building bye-laws (similar to UK BREEAM).
- Managed water demand through non-household water efficiency and through intensive media campaigns.
- Continued leakage reduction.

It is acknowledged that there will be other drivers in making a final decision on how to best meet the island's future needs for minerals, inert waste management and potable water, including public and political support.

8.2 Recommendations

Regardless of the exact package of interventions, there are a number of learning points arising from the assessment, set out below. It should be noted that these recommendations do not prejudice any subsequent planning applications, applications for licences, or similar.

- There is real value in considering minerals and inert waste management demands as an integrated system, in terms of making best use of available resources and meeting net zero and circular economy aspirations.
- On balance, the future of La Gigoulande Quarry as an integrated minerals and waste asset (including extension of extraction to Field 966), rather than as an additional reservoir, better meets the island's needs. There are a number of reasons for this, including:
    - The existing permission at La Gigoulande which supports inert waste management uses.
    - There are other interventions which meet future water demand without requiring La Gigoulande to be used as a reservoir (and potentially in a more cost-effective manner). Whilst there still might be a case for using La Gigoulande for water management, an integrated view suggests it would better serve the island in a different use.
    - The environmental impacts associated with a more aggregates import-focussed solution – particularly around the ability of the island to meet its net zero aspirations.
    - The costs associated with a more aggregates import-focussed solution. Higher costs may have an impact on scheme viability and the ability to secure affordable housing contributions of the ability to secure the potential Jersey Infrastructure Levy.
    - Such a solution could be put in place relatively quickly, helping to resolve the imminent capacity issues at La Collette. Additional measures such as extraction of high value materials and temporary superfilling at La Collette would help to extend its lifespan to allow the solution to be established.
- The operational impact to Jersey Water of the outage of Val de la Mare for construction of a dam extension will need to be consider further and assessed for suitable mitigation.
- The environmental impact of the interventions, and in particular the impact of increasing the capacity of Val de la Mare Reservoir, will need to be considered further. Criteria-based policies in the Bridging Island Plan should be included to guide applicants on the type and level of supporting information that will be required.
- Dual use of La Gigoulande has the potential to increase traffic on the constrained local road network. Mitigation is likely to be possible through access route management (making use of set routes or circuits), avoidance of

peak periods where possible, and shared vehicles and trips. Details could be included in the Bridging Island Plan or in supplementary planning guidance.

- There might be a scenario in which La Gigoulande has a triple use, also incorporating water storage – particularly in the longer term towards the end of Jersey Water's 2040 forecast period. This was not explicitly tested as part of a scenario but the nature of La Gigoulande and its extension to Field 966 could mean that a diversity of uses could be envisioned, explored and planned for.
- Use of Simon Sand and Gravel's existing permitted works as an integrated extraction, waste management and restoration site would make best use of the available resource whilst also planning for its long term future. There are also clear commercial drivers, without which there would be the risk of aspiring for an outcome that has no mechanism to be delivered – or could only be delivered if the Government of Jersey were willing to underwrite to resources required to achieve a satisfactory outcome in a short period. Consideration should be given to the exact scheme and the types of inert waste it would accept and the condition it would restore to (including whether the existing water bodies should be reduced in scale; or retained), as well as the impact of waste management operations in the context of the Coastal National Park. Such details could be included in a criteria-based policy in the Bridging Island Plan (and subsequent Island Plans if necessary), and fully assessed within a planning application.
- If the decision is made to retain the existing end date for Simon Sand and Gravel of 2023, there is strong case not to retain the restoration end date of 2025. Such a short restoration date is likely to:
  - compromise the potential quality of the restoration;
  - disrupt the market for inert waste on the island, by requiring waste to be diverted from other processors and secondary users; and
  - be uneconomical (as the need for material could not be solely met through inert waste management alone).
- There are a number of protential drivers for land reclamation; primarly to develop coastal defences (as set out in the Shoreline Management Plan), but also to provide further developable land and to act as a site for inert waste management. The case for further land reclamation to allow for inert waste management alone does not appear to have been made. However, if a wider case is made for reclamation then there is clearly an opportunity to also incorporate inert waste management. However, there may be a conflict of priorities between the need for a long-term solution for inert waste disposal and the aspiration for land reclamation projects to be completed quickly so that the land can be put to use.
- Expansion of Ronez should include a revised layout of the existing neighbouring BMX track to ensure this asset is not lost.

- If the WP Recycling site at St. Peter is redeveloped for an alternative use, there would be a need to understand and fully consider the impact of the loss of the site.
- The Bridging Island Plan should include policies on demand management for inert waste and water, alongside new building bye-laws – good practice from other jurisdictions (such as UK's BREEAM) should be drawn from. Beyond planning policy, inert waste management should be supported through wider fiscal and legislative tools such as higher gate fees or an operator's landfill tax.

Appendix A

UK Charges for Notifications of International Waste Shipments

A1 UK Charges for Notifications of International Waste Shipments

A charge must be paid when notification of International Waste Shipments to the UK is made. The Environment Agency will not process your notification without evidence that you have paid the correct amount. Other competent authorities may also impose a charge for considering your notification.

The charge depends on:

- whether the waste is being imported or exported
- the purpose of the shipment, whether it is for recovery or disposal
- the band the number of shipments included in the notification falls into

Figure B1: Charges for notifications of International Waste Shipments

Number of shipments:	1	2 to 5	6 to 20	21 to 100	101 to 500	500+
Export for recovery	£1,450	£1,450	£2,700	£4,070	£7,920	£14,380
Export for non-interim disposal	£1,540	£1,540	£3,330	£5,500	£10,600	£19,500
Export for interim disposal	£1,700	£1,700	£3,330	£6,000	£12,900	£24,000
Import for non-interim recovery	£1,250	£1,250	£2,700	£4,900	£10,600	£19,500
Import for interim recovery	£1,450	£1,450	£2,830	£5,500	£12,900	£24,000
Import for non-interim disposal	£1,540	£1,540	£3,330	£5,500	£10,600	£19,500
Import for interim disposal	£1,700	£1,700	£3,330	£6,000	£12,900	£24,000

Appendix B

Minerals Forecasting by Scenario

B1 Minerals Forecasting by Scenario

Appendix B supports the minerals forecast presented in Section 5.2.

B1.1 Future Demand

Figure C1 gives the projection of the 2021 Baseline demand of 500,000 tonnes, through to 2031 and 2041 using the growth rates calculated from the annual population increments for the Low, Medium and High scenarios.

Figure C1: Minerals demand forecast – summary

Year	Low (+800 pop. p.a.) = 0.8% p.a.	Medium (+1,000 pop. p.a.) = 1% p.a.	High (+1,500 pop. p.a.) = 1.4% p.a.
Baseline (2021)	500,000	500,000	500,000
Total annual minerals demand in 2031	540,000	552,000	575,000
Total annual minerals demand in 2041	586,000	610,000	660,000

In practice, the demand for minerals is met from the various different suppliers, currently almost all local, on-island sources. The respective share of demand met by each supplier is likely to change over time in response to physical availability, minerals planning and policy decisions, and construction market factors.

Figure CB2 disaggregates the 2031 forecast into different material types or sources, using the current (2020) shares of the total. This assumes the share of sources is the same as in 2020. Figure B2 allows for a very small percentage of imports which is not included in Chapter 1 because of its insignificance. The only reason for including it here is for comparison with the other scenarios (see below).

The shares of the respective sources are therefore:

- Local crushed rock 48%
- Local sand and gravel 12%
- Recycled aggregates 39%
- Imports (notional only) 1%

Figure C2: Minerals demand forecast for 2031 disaggregated by material type

Material type – or source	Low	Medium	High
Local crushed rock (48%) [Ronez and La Gigoulande quarries]	260,000	265,000	276,000
Local sand and gravel (12%) [Simon Sand and Gravel]	65,000	66,000	69,000
Local recycled aggregate products (39%) [Various local producers]	211,000	215,000	224,000

Material type – or source	Low	Medium	High
Imports [Included for completeness; estimated as +/-1% in 2020]	4,000	6,000	7,000
Total	**540,000**	**552,000**	**575,000**

Forecasts for the scenarios assessed as part of the scenarios assessment undertaken as part of Section 7 have also been produced – these are presented in below.

For minerals planning policy purposes the demand projections and expected supply scenario will set the framework for establishing the total volume of material expected to be supplied from the different sources over the first (2011-2031) and subsequent (2031-2041) minerals planning periods. These numbers, in turn, will enable policy makers to understand the need for, and the urgency of, the necessary planning permissions and (in the case of recycled sources) waste management permits to facilitate the reliable delivery of construction materials to market throughout the planning periods.

For all scenarios except the 'integrated scenario, forecasts are to 2031 only. For the integrated scenario a table is given for 2041 as well to facilitate planning for the future 'landbank' upon which long term security of supply construction minerals relies.

B1.2 Scenario 1

Scenario 1 entails continuation of operations at the hard rock quarries (with extensions / new permissions granted in accordance with requirements of demand). It also entails continued extraction of the Simon Sand and Gravel works until the resource is exhausted.

The main difference between this scenario and the baseline scenario is that it will entail a significantly lower prioritisation of recycled aggregates because of the concentration on new land reclamation projects which will require a higher proportion of inert waste arisings. This is likely to result in crushed rock making up most of the difference.

The shares of the respective sources are therefore:

- Local crushed rock 60% (Ronez and La Gigoulande_
- Local sand and gravel 12.5%
- Recycled aggregates 25%
- Imports 2.5%

Figure C3: Minerals demand forecast for 2031 disaggregated by material type – Scenario 1

Material type – or source	Low	Medium	High
Local crushed rock [Ronez and La Gigoulande quarries]	325,000	331,000	344,000
Local sand and gravel	68,000	69,000	72,000

Material type – or source	Low	Medium	High
[Simon Sand and Gravel]			
Local recycled aggregate products [Various local producers]	135,000	138,000	143,000
Imports	12,000	14,000	16,000
Total	540,000	552,000	575,000

B1.3 Scenario 2 – to 2031

Scenario 2 entails closure of both the Simon Sand works (for restoration) and La Gigoulande Quarry (to release the void as a new water reservoir) as soon as their current permissions and conditions expire. Although Ronez quarry could increase its production significantly to partially compensate for loss of crushed rock from La Gigoulande, this scenario would result in a requirement for significant imports of both sand / gravel and crushed rock aggregates.

In addition, the share of recycled aggregates is likely to be lower likely to be reduced because of limited proactive provision of suitable sites. The reduction would not be as great as in Scenario 1, because inert arisings will not face the same competition from reclamation fill requirements.

The respective shares might therefore be:

- Local crushed rock 45% (all from Ronez)
- Local sand and gravel 0%
- Recycled aggregates 30%
- Imports 25%

Although the table gives the volumes based on these shares as they would be 2031, in practice there would be a transition over about three years.

Figure C4: Minerals demand forecast for 2031 disaggregated by material type – Scenario 2

Material type – or source	Low	Medium	High
Local crushed rock [Ronez only]	243,000	249,000	259,000
Local sand and gravel	0	0	0
Local recycled aggregate products [Various local producers]	162,000	166,000	172,000
Imports	135,000	137,000	144,000
Total	**540,000**	**552,000**	**575,000**

B1.4 Scenario 3 – to 2031

Scenario 3 would, in practice, be very little different from the baseline scenario. Simon Sand and Gravel continues to produce for the next decade; the hard rock

quarries continue as at present. The only difference would be that with explicit provision made for only one location for commercially incentivised inert waste recycling, the share of recycled would not grow and might fall. Hence the following only slightly different share of sources compared with the baseline:

- Local crushed rock 50% (Ronez and La Gigoulande)
- Local sand and gravel 12%
- Recycled aggregates 37%
- Imports (notional only) 1%

Figure C5: Minerals demand forecast for 2031 disaggregated by material type – Scenario 3

Material type – or source	Low	Medium	High
Local crushed rock [Ronez and La Gigoulande quarries]	271,000	276,000	286,000
Local sand and gravel [Simon Sand and Gravel	65,000	66,000	69,000
Local recycled aggregate products [Various local producers]	200,000	204,000	213,000
Imports	4,000	6,000	7,000
Total	**540,000**	**552,000**	**575,000**

B1.5 Integrated Scenario – to 2031 and 2041

The integrated scenario attempts to take learning from the scenario assessment and to give expression for Jersey's broad-based commitment to sustainability and energy efficiency by drawing on commercial initiative to achieve socio-economic objectives.

In entails retention of the Simon Sand and Gravel site as an operational entity but progressively transforming the operation from extraction only to one in which processed inert waste is used for both landscaping and recycled aggregates production.

It has the potential for seeing recycled aggregates overtake crushed rock production as the main source of supply. It would also lead a fairly significant share of sand and gravel being imported.

Even with lower sand extraction, however, the resource would be expected to be exhausted soon after the first 10-year period to 2031. For purposes of the forecast for 2041, therefore, zero local sand and gravel is assumed. It is assumed that increased imports and increased production of manufactured, granite-dust based, sands by the quarries, or sand from modern, high quality recycling equipment, would take the place of the locally extracted sand.

The share of sources of this scenario is assumed to be follows for the period to 2031:

- Local crushed rock 40% (Ronez and La Gigoulande)
- Local sand and gravel 5%
- Recycled aggregates 45%
- Imports 10%

And, for the following period, to 2041:

- Local crushed rock 42.5% (Ronez and La Gigoulande)
- Local sand and gravel 0%
- Recycled aggregates 45%
- Imports 12.5%

Figure C6: Minerals demand forecast for 2031 and 2041 disaggregated by material type – integrated scenario

Material type – or source (2031)	**Low**	**Medium**	**High**
Local crushed rock (48%) [Ronez and La Gigoulande quarries]	216,000	221,000	230,000
Local sand and gravel [Simon Sand and Gravel	27,000	28,000	29,000
Local recycled aggregate products [Various local producers]	243,000	248,000	259,000
Imports	54,000	55,000	57,000
Total	**540,000**	**552,000**	**575,000**
Material type – or source (2041)	Low	Medium	High
Local crushed rock Ronez and La Gigoulande quarries]	249,000	259,000	280000
Local sand and gravel	0	0	0
Local recycled aggregate products [Various local producers]	264,000	275,000	297,000
Imports	73,000	76,000	83,000
Total	**586,000**	**610,000**	**660,000**

Appendix C

Scenario Assessment

Jersey Island Plan Review
Minerals, Waste and Water Study Stage 2
Shortlist Scenarios Assessment

Green: likely to meet criteria
Amber: likely to meet criteria with mitigation or additional technical assessment (qualitative statement explains the likely mitigation / assessment required)
Red: unlikely to meet criteria

Criteria	Scenario 1: Internalise, Reclaim, Reinforce		
	Minerals	Inert Waste	Potable Water
Environmental			
No or acceptable impact on watercourses, water table and potable water	No or acceptable impact on watercourses, water table and potable water - extraction itself does not cause unmanageable impacts. (Water problems at Simon Sand and Gravel is caused by exogenous pollution).	Disruption of the PFOS contaminated water body at Simon Sand and Gravel site has potential to impact aquifers and water sources. There could be an impact on Jersey Water extraction if Simon Sand and Gravel ponds are filled. Further work is required to understand and mitigate for this impact.	Val de la Mare is sited near Les Mielles Nature Reserve; expansion of the reservoir could impact the catchment watercourse of the nature reserve and would need to be managed. Increased water depth in reservoir(s) could led to algae bloom.
No or acceptable impact on air quality	Dust arising from extraction is manageable with mitigation e.g. damping / covering stored materials.	No or acceptable impact on air quality.	Minimal long term air quality impact and short duration for construction activity. All sites are currently operational assets. Bellazone would require transfer mains and possible pumping station but these would be either buried and create no noise or part of existing operational site and noise impact is minimal.
No or acceptable impact on ecology	Continuation of extraction at Simon Sands and Gravel continues to create unnatural ecology in a sensitive area. Good management should be able to mitigate this. Further work is required to understand the optimum restoration method for Simon Sand and Gravel - including whether a water body is left or the ground is completely made up, and whether a local topsoil/layer should be used.	Further work would be required to understand the impact of land reclamation on ecology, particularly marine ecology.	An EIA is likely to be required to access full the land take required for a higher dam and associated higher top water level in the reservoir, as well as impact on nearby ecological assets including Val de la Mare Arboretum and Les Mielles Nature Reserve. There may be a positive impact also due to increased reservoir allowing for further aquatic life.
No or acceptable impact on built environment and heritage	No or acceptable impact on built environment and heritage.	Further work would be required to understand the impact of land reclamation on the built environment.	Unlikely to have significant impact on built environment and heritage impacts given locations of existing sites and the fact that they are currently operational. However, an EIA is likely to be required to assess the impact.
No or acceptable impact on landscape	All quarrying affects the landscape, but also becomes part of the landscape. Continued / improved mitigation will make this impact manageable, particularly the eventual restoration of Simon Sand and Gravel.	Further land reclamation would alter the landscape but would also becomes part of the landscape. Further work would be required to understand the impact and mitigate for any negative impacts.	An EIA is likely to be required to access full the land take required for a higher dam and associated higher top water level in the reservoir, and the associated impact on landscape.
No or acceptable impact on marine environment	Simon Sand and Gravel is adjacent to the sea; most likely impacts are from marine to the site rather than vice versa. Similar may happen if Simon Sand and Gravel either deepens existing excavation or extends excavation westwards. Managed limitation of extraction will mitigate.	Further work would be required to understand the impact of land reclamation on the marine environment, including marine ecology and wave patterns.	Positive impact as recycled water from Bellazone would no longer be discharged to sea.
No or acceptable impact on highways / traffic	Impacts will be as current, obviously with progressive growth. But because historic peaks in demand exceed forecast average annual levels, impacts should not be unprecedented, and impacts should be managed.	Reclamation at the International Finance Centre would be closer to the main sources of inert waste (construction projects within St Helier) as well as existing facilities at La Collette. However, there would still be highways and traffic impacts to be managed.	Minimal impact on highways and traffic (albeit may be some construction impact which would need to be managed).
Makes a contribution towards a net zero future	Maintaining 100% local sourcing for as long as possible minimises transport CO_2.	Use of local inert waste in place of non-waste materials positively contributes to a net zero future. For example crushed concrete would, sand less so as its had to be extracted at some point.	Limited impact on net zero future, although possible upgraded pumps and additional pumping time could support. Additional pumping associated with water recycling could be offset if currently pumped to sea; if by gravity this would be a minimal addition, depending on energy source.
Makes a contribution towards the circular economy	The scenario does not emphasise role of recycled aggregates as much as other scenarios.	Use of inert waste in place of non-waste materials positively contributes to the circular economy, by moving up the hierarchy towards reuse. Inert waste is prevented from being sent to disposal and non-waste material is saved from being used.	Recycling of water supports the circular economy.

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Criteria	Scenario 1: Internalise, Reclaim, Reinforce		
	Minerals	Inert Waste	Potable Water
Social			
No or acceptable impact on local amenity (including noise)	Extension of extraction at La Gigoulande and continued extraction of Simon Sand and Gravel should be designed to reduce and mitigate noise and amenity impacts, and are likely to require an EIA.	Reclamation at the International Finance Centre could impact on access to Les Jardins de la Mer should be designed to reduce and mitigate construction noise impacts, and is likely to require an EIA. Depending on the location of other reclamation or projects, there could be an impact on open space and recreation. Works should be designed to protect (or have a net increase in) amenity value.	There is likely to be some construction noise impact for local communities. There is not expected to be a material increase in operational noise given they are already existing operational sites. Works should be designed to protect (or have a net increase in) amenity value, e.g. by improving the environment around the reservoirs, adding additional screening, improving walkways etc. Other elements of this scenario are not expected to have a material adverse impact on local amenity.
No or acceptable impact on open space and recreation	No impact on open space and recreation and in the long term would see Simon Sand and Gravel restored which would have a positive impact - albeit would not release the land to recreation uses in the short term. La Gigoulande's proposal for expansion changes the use of agricultural land, but not public open space. However, Simon Sand and Gravel is in the Coastal National Park and so the impact of any change/intensification of its use should be considered further and mitigated if required.	Reclamation at the International Finance Centre could impact on access to Les Jardins de la Mer. Works should be designed to protect and enhance (and possibly increase the amount of) open space and recreation. If Les Jardins de la Mer is lost or its extent is reduced, replacement open space should be sought. Depending on the location of other reclamation or projects, there could be an impact on open space and recreation. Works should be designed to protect and enhance (and possibly increase the amount of) open space and recreation.	There is likely to be some impact on open space and recreation, e.g. on Val de la Mare Arboretum Works. Val de La Mare and Les Mouriers reservoirs also fall within the Coastal National Park. Works should be designed to protect and enhance open space and recreation, e.g. by improving the environment around the reservoirs, improving walkways etc. Other elements of this scenario are not expected to have a material adverse impact on open space and recreation.
Supports meeting of housing needs over the study period	Supports meeting of housing period through providing the necessary aggregates.	Supports meeting of housing period through the necessary management of inert waste.	Supports meeting of housing period through the supply of required potable water - would achieve the supply deficit for the critical drought dry peak week in 2045.
Likely level of public support (based on responses to Issues and Options consultation)	Views expressed through responses to the Strategic Issues and Options consultation were mixed - whilst there was greater support for continued expansion within the existing constraints of existing sites, 60% of respondents viewed continued extraction and expansion of existing sites to be not very acceptable or not at all acceptable. Continued extraction at Simon Sand and Gravel may not receive public support. There may be possible opposition to the extension of La Gigoulande.	Views on land reclamation expressed through responses to the Strategic Issues and Options consultation were mixed - 55% either agreed or strongly agreed that further future land reclamation is a way of meeting the island's future development needs, whereas 44% of respondents either disagreed or strongly disagreed with this statement. Only 37% of respondents thought land reclamation for inert waste management would be favourable.	Other comments expressed in the Strategic Issues and Options consultation supported measures to address water supply shortages, the need to incorporate water conservation and management in new domestic and commercial development and that policies on the Green Zone and Coastal National Park to include measures for water supply infrastructure. Customer perceived 'dirty water' from recycled water would need to be managed.
Economic			
Supports private sector investment	Would support private sector investment at La Gigoulande and Simon Sand and Gravel - all extraction sites are viable private sector businesses.	Would support private sector investment at and Simon Sand and Gravel. Land reclamation could support private investment through providing additional developable land at in-demand locations, including at South West St Helier and the International Financial Centre. The Government of Jersey should undertake work to be confident there is a market for this developable land.	Would support private sector investment from Jersey Water.
Supports public sector investment and returns	N/A	Use of inert waste in delivering the Shoreline Management Plan and other public sector projects would have a positive impact on public sector finances as it would have multiple benefits of waste management and flood risk etc. management. It is not expected this would lead to public sector returns per se. The delivery of developable land would lead to a return to the public sector.	N/A
Supports wider economic growth	Supports wider economic growth through delivering required aggregates. Keeps extraction-related investment and jobs on the island.	Supports wider economic growth through delivering required inert waste management. Land reclamation could support wider economic growth through providing additional developable land at in-demand locations, including at South West St Helier and the International Financial Centre. The Government of Jersey should undertake work to be confident there is a market for this developable land.	Supports wider economic growth through the supply of required potable water - would achieve the supply deficit for the critical drought dry peak week in 2045.
Likely to be affordable to the Island	Most affordable scenario because all aggregates continue to be locally supplied as long as possible (versus imports and/or substitution by local manufactured /dust-based sands).	Land reclamation is can be an expensive option and its use would need to be maximised by both i) optimising its use as a inert waste management solution, and ii) providing prime developable land or delivering necessary projects such as the Shoreline Management Plan. It is expected that the costs of reclamation are outweighed by the returns from land, but the Government of Jersey should undertake work to be confident there is a market for this developable land.	Jersey Water have use an Average Incremental Cost (AIC) model for each option. AIC - The net present value of the capital (including maintenance and replacement costs, as well as the cost to finance the capital) and operating costs of the option, divided by the net present value of the extra water available for use or demand saving. The draft option appraisal provided by Jersey Water states that the Val del Mar is the preferred option for existing asset
Topic-specific			
Meets total minerals requirements over the study period (if not, total years' supply)	Meets total minerals requirements over the study period, subject to permissions / extensions. Keeping Simon Sand and Gravel going only just covers the study period (10 years).		

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Criteria	Scenario 1: Internalise, Reclaim, Reinforce		
	Minerals	Inert Waste	Potable Water
Able to secure supply of aggregates for the Bridging Island Plan period with reserve, landbank provision for the period beyond	Able to secure supply of crushed rock for the next 10 years with reserve, subject to permission. Simon Sands going is insufficient for the period beyond and import of sand will be required.		
Continues of a good proportion of supply being met by secondary / recycled aggregates	Secondary and recycled aggregates are likely but not emphasised in this scenario.		
Allows for achievement of restoration objectives within an acceptable timescale and with a specified mechanism for realising such objectives	It is not currently clear that mechanisms to secure satisfactory restoration are clear and/or enforced.		
Meets total inert waste requirements over the study period (if not, total years' supply)		Scheme would have to be developed, planned and started very quickly, if there was to be no gap during which La Collette was filled and unable to accept waste, and the new site was not yet operational. If La Colette was closed and only Simon Sand and Gravel was operation, there would likely to be a need for some exports (previously discounted in longlist assessment due to cost). Alternatively, superfilling of La Collette might be used in the short term to extend its life, but is only likely to be acceptable if a replacement is identified.	
Meets total water requirements over the study period (if not, total years' supply)			A deficiency of 8.1 Mld is predicted in the critical drought dry annual average year. It is anticipated by Jersey Water that the Val del Mar increase would yield an additional approximate 1.9 Ml/d, in drought year. Water recycling from the Bellazone treatment is anticipated to yield 6Ml/d. The combination of these two supply side options (7.9Ml/d) and a base demand side saving of 0.19 Ml/d along with the combined demand side saving of 0.6 Ml/d will achieve an additional WAFU of 8.69Ml/d, which is a surplus of 0.59 Ml/d
No or acceptable impact on customer cost for potable water			Possible increase in bills due to investment in new assets. Demand management can be used to reduce bill cost by decreasing customer water use and metered billing.
Other			
Provides additional benefits to the Island (e.g. additional reclaimed land, flood protection etc.)		Provides additional benefits in the form of additional developable land and flood protection through the Shoreline Management Plan projects.	
Other comments		The need for a long-term solution for inert waste disposal, may be at odds with the aspiration for land reclamation projects to be completed quickly so that the land can be put to use.	Jersey Water do not operated the waste water treatment works and would not have control over the final discharge quality from site, which might cause obstacles to water recycling. Recycled water would need to be blended with raw water, any water quality issue could impact on the raw water supply.
Overall comments	**Minerals: Whilst potentially the best scenario for minerals, it is not clear that optimum use of sites for integration of minerals and waste objectives is achieved. The scenario's strongest feature is its 'internalisation' of minerals impacts by optimising local supply sources. This also maintains current level of materials affordability (versus imports), and optimum from the perspective of meeting net zero targets.** **Inert Waste: The need for a long-term solution for inert waste disposal, may be at odds with the aspiration for land reclamation projects to be completed quickly so that the land can be put to use. Whilst there might be a wider case for reclamation (which might include waste management), it is unlikely to be the optimum solution from a waste management solution.** **Potable Water: Increasing the capacity of Val de la Mare reservoir is likely to be part of the solution for potable water, though there are a number of environmental impacts related with its increased land take which need to be considered further. The 'dirty water' perception of water recycling from the waste water treatment works is likely to be hard to counter.**		

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Criteria	Scenario 2: Externalise, Re-invent, Expand		
	Minerals	Inert Waste	Potable Water
Environmental			
No or acceptable impact on watercourses, water table and potable water	Early closure of two of the existing minerals extraction sites would reduce any existing level of impacts on watercourses etc.	Disruption of the PFOS contaminated water body at Simon Sand and Gravel site has potential to impact aquifers and water sources. There could be an impact on Jersey Water extraction if Simon Sand and Gravel ponds are filled. Further work is required to understand and mitigate for this impact.	La Gigoulande Quarry would require water abstraction This would be via borehole or stream abstraction which would impact on water table and or water catchment. If lining/waterproofing is required, the impact on any underlying aquifer would likely to be need to be assessed via an EIA.
No or acceptable impact on air quality	Early closure of two of the existing minerals extraction sites would reduce any existing level of impacts on air quality, including dust.	No or acceptable impact on air quality.	Minimal long term air quality impact and short duration for construction activity. All sites are currently operational assets.
No or acceptable impact on ecology	Early closure of two of the existing minerals extraction sites would reduce any existing level of impacts on ecology.	No or acceptable impact on ecology.	An EIA is likely to be required to access fully the ecological impact of the change in land use. There may be a positive impact also due to allowing for further aquatic life.
No or acceptable impact on built environment and heritage	Early closure of two of the existing minerals extraction sites would reduce any existing level of impacts on built environment and heritage. However, the Simon Sand and Gravel works, which has been operating for over 100 years, could itself be regarded as part of the Island's heritage which would be lost prematurely.	No or acceptable impact on built environment and heritage.	Unlikely to have significant impact on built environment and heritage impacts given the location of the site and the fact that it is currently operational as an quarry. However, an EIA is likely to be required to assess the impact.
No or acceptable impact on landscape	Early closure of two of the existing minerals extraction sites would reduce any existing level of impacts on landscape. However, the short restoration period for Simon Sand and Gravel carries a significant risk that such restoration would be suboptimal.	There would be an improvement in landscape, as land would be restored to original level. With an appropriate restoration plan the land could be 'blended' into the surrounding landscape.	An EIA is likely to be required to access the change in land use required for a reservoir, change in water level and the associated impact on landscape. However, the impact may be positive compared with existing use.
No or acceptable impact on marine environment	Early closure of two of the existing minerals extraction sites would reduce any existing level of on marine environment.	No or acceptable impact on the marine environment with proper control measures. There is minor risk of suspended solids discharging into the sea, however this risk is low due to dilution factor.	No impact on the marine environment is foreseen.
No or acceptable impact on highways / traffic	Although local traffic impacts around the two minerals extraction locations would be greatly reduced, it would be replaced by the concentration of impacts in and around the port. All vehicles would have to pass through the town centre. This would be difficult to mitigate.	Dual use of local roads has the potential to increase traffic on the constrained local road network. Mitigation might include routes, circuits, timing, shared vehicles etc. However, waste vehicles in might displace the reduced aggregate vehicles out due to the closure of Simon Sand and Gravel as an extraction site.	Minimal impact on highways and traffic (albeit may be some construction impact which would need to be managed). Jersey Water site visits when operational would only be a small vehicle and there would be a decrease in overall traffic in comparison to current use.
Makes a contribution towards a net zero future	Although some of the foregone output from La Gigoulande and Simon Sand and Gravel could be made up from increased production at Ronez and increased recycling, this option would call for importation of a significant proportion of the Island's mineral requirements, thus incurring greater energy / carbon expenditure in transporting.	It makes a contribution to net zero future, if the only option was export off the island which would have a higher level carbon impact.	Limited impact on net zero future, although pumps and water abstraction are required.
Makes a contribution towards the circular economy	Jersey would have a less sustainable economy than scenarios in which it makes provision for its minerals needs from local sources.	As a landfill it does not contribute to circular economy as it is disposal, which is the least favourable option of the hierarchy. However, its use in the long term restoration of Simon Sand and Gravel would represent a form of circular economy.	The scenario does not emphasise role of water recycling as much as other scenarios.

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Criteria	Scenario 2: Externalise, Re-invent, Expand		
	Minerals	Inert Waste	Potable Water
Social			
No or acceptable impact on local amenity (including noise)	Change of use of La Gigoulande Quarry from quarrying to water storage likely to have a positive impact on local amenity once operational. Long term restoration of Simon Sand and Gravel restored which would have a positive impact. However, given the short restoration period it is unlikely that Simon Sand and Gravel could be restored in a way which would have a positive impact on social amenity. Change from extraction to inert waste management (through restoration) not expected to have an unacceptable impact on local amenity, with mitigation measures in place.	Long term restoration of Simon Sand and Gravel restored which would have a positive impact. Change from extraction to inert waste management (through restoration) not expected to have an unacceptable impact on local amenity, with mitigation measures in place.	There is not expected to be a material increase in operational noise given they are already existing operational sites. Works should be designed to protect (or have a net increase in) amenity value, e.g. by improving the environment around the reservoirs, adding additional screening, improving walkways etc. There is likely to be some construction noise impact for local communities.
No or acceptable impact on open space and recreation	No impact on open space and recreation in the long term would see Simon Sand and Gravel restored which would have a positive impact.	No impact on open space and recreation, and in the long term would see Simon Sand and Gravel restored which would have a positive impact.	No impact on open space as existing void would be used for water storage Potential for use as recreational site in the future.
Supports meeting of housing needs over the study period	Supports meeting of housing period through providing the necessary aggregates.	Supports meeting of housing period through the necessary management of inert waste.	The new reservoir alone will not meet the supply demand deficit in 2045.
Likely level of public support (based on responses to Issues and Options consultation)	Views expressed through responses to the Strategic Issues and Options consultation suggested support for minerals import infrastructure - 71% of respondents felt that creating facilities at St Helier Harbour to enable future importation of minerals to offset any reductions in local supply would be very acceptable or fairly acceptable. However, numerous respondents stated that corresponding increases in noise and air pollution (via greater numbers of transport vehicles) must be avoided.	Not covered in the Strategic Issues and Options consultation. Long term restoration of Simon Sand and Gravel is likely to have public support, with appropriate measures in place to i) protect the use of the Coastal National Park during its restoration, and ii) the overall quality of the final restored landscape.	Other comments expressed in the Strategic Issues and Options consultation supported measures to address water supply shortages, such as the use of La Gigoulande Quarry as a reservoir.
Economic			
Supports private sector investment	Would involve the loss of privately run site at La Gigoulande. Investment in extraction would be externalised to other countries. (However, it would support investment at the Port.)	Would support private sector investment in the long term restoration of Simon Sand and Gravel.	Would support private sector investment from Jersey Water.
Supports public sector investment and returns	N/A	N/A	N/A
Supports wider economic growth	Supports wider economic growth through delivering required aggregates. However, extraction-related investment and jobs is lost to the island.	Supports wider economic growth through delivering required inert waste management.	The new reservoir alone will not meet the supply demand deficit in 2045.
Likely to be affordable to the Island	It is expected that importation of materials would effectively double minerals costs. This would have an knock-on impact on construction costs. It may also impact on the Government of Jersey's ability to ask for affordable housing and (if enacted) contributions towards infrastructure through the Jersey Infrastructure Levy, due to impacts on scheme viability.	Expected to be affordable to the island, compared with costs involved in exporting waste from the island.	The total AIC for the options discussed in this scenario is as follows: La Gigoulande Quarry conversion 1775 (£/Ml) The current AIC in the draft option appraisal does not include the purchase of land associated with this option.
Topic-specific			
Meets total minerals requirements over the study period (if not, total years' supply)	This scenario would bring considerable uncertainty into the process of planning for the supply of mineral requirements with imports eventually becoming responsible for up to 30% of all aggregate requirements. Lack of proactive planning for the role of recycled aggregates in this scenario would introduce even more uncertainty to long term minerals planning.		

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Criteria	Scenario 2: Externalise, Re-invent, Expand		
	Minerals	Inert Waste	Potable Water
Able to secure supply of aggregates for the Bridging Island Plan period with reserve, landbank provision for the period beyond	This scenario would bring considerable uncertainty into the process of planning for the supply of mineral requirements with imports eventually becoming responsible for up to 30% of all aggregate requirements. Lack of proactive planning for the role of recycled aggregates in this scenario would introduce even more uncertainty to long term minerals planning.		
Continues of a good proportion of supply being met by secondary / recycled aggregates	This scenario would bring considerable uncertainty into the process of planning for the supply of mineral requirements with imports eventually becoming responsible for up to 30% of all aggregate requirements. Lack of proactive planning for the role of recycled aggregates in this scenario would introduce even more uncertainty to long term minerals planning.	May disrupt supply of secondary aggregates, as inert waste currently reprocessed and sold on the market, may be used to restore the Simon Sand and Gravel site. It would be advisable to implement this scenario with a landfill-tax, to ensure that any operator was encourage to find beneficial secondary uses for as much of the material as possible prior to disposal.	
Allows for achievement of restoration objectives within an acceptable timescale and with a specified mechanism for realising such objectives	Closure of Simon Sand and Gravel with only a short restoration period, and without a viable mechanism for achieving satisfactory outcome would be most unlikely to achieve this objective.		
Meets total inert waste requirements over the study period (if not, total years' supply)		Simon Sand and Gravel site may not be suited to aggregate reprocessing due to its location in an amenity area, and so it may not be able to replicate the functions of La Collette in full. If La Colette was closed and only Simon Sand and Gravel was operation, there would likely to be a need for some exports (previously discounted in longlist assessment due to cost). Alternatively, superfilling of La Collette might be used in the short term to extend its life, but is only likely to be acceptable if a replacement is identified.	
Meets total water requirements over the study period (if not, total years' supply)			A deficit of 8.1 Ml/d in 2045 is predicted in the critical drought dry annual average. It is anticipated by Jersey Water that the La Gigoulande would yield an additional approximate 1.1 Mld, in drought year, along with the combined demand side saving of 0.6 Ml/d. A total increase in WAFU is 2.7 Ml/d To achieve the deficit this scenario would require a supply input either water recycling or desalination as covered in other scenarios.
No or acceptable impact on customer cost for potable water			Possible increase in bills due to investment in new assets. Demand management can be used to reduce bill cost by decreasing customer water use and metered billing.
Other			
Provides additional benefits to the Island (e.g. additional reclaimed land, flood protection etc.)			
Other comments	The potential level of imports (100,000 - 150,000 tonnes per annum) is well below the viable level for an efficient bulk import berth. Ro-ro and bulk container handling at existing port facilities could handle the volume but would result in substantially increased costs of materials supply together with added concentration of traffic in and around the port.	In order to restrict La Gigoulande from becoming an inert waste site in the future, the existing permission would need to be amended. The mechanism for doing so is not clear.	The new reservoir provides additional water blending.
Overall comments	**Minerals: The cost and economic impact of relying on an import-led supply of aggregates are significant disadvantages. The potential level of imports (100,000 - 150,000 tonnes per annum) is well below the viable level for an efficient bulk import berth; ro-ro and bulk container handling at existing port facilities could handle the volume but would result in substantially increased costs of materials supply together with added concentration of traffic in and around the port.** **Inert Waste: If La Colette was closed and only Simon Sand and Gravel was operation, there would likely to be a need for some exports (previously discounted in longlist assessment due to cost). The scenario may disrupt supply of secondary aggregates, as inert waste (currently reprocessed and sold on the market) may be used to restore the Simon Sand and Gravel site. It would be advisable to implement this scenario with a landfill-tax, to ensure that any operator was encouraged to find beneficial secondary uses for as much of the material as possible prior to disposal.** **Potable Water: Use of La Gigoulande as a reservoir site alone does not meet the potable water supply needs of the island.**		

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Green: likely to meet criteria
Amber: likely to meet criteria with mitigation or additional technical assessment (qualitative statement explains the likely mitigation / assessment required)
Red: unlikely to meet criteria

Criteria	Scenario 3: Integrate, Balance		
	Minerals	Inert Waste	Potable Water
Environmental			
No or acceptable impact on watercourses, water table and potable water	No or acceptable impact on watercourses, water table and potable water - extraction itself does not cause unmanageable impacts. (Water problems at Simon Sand and Gravel is caused by exogenous pollution).	Further work is likely to be required to understand any impacts water table and possible changes in the hyrolics (rather than pollution per se, which is not applicable for inert waste).	Val de la Mare is sited near Les Mielles Nature Reserve; expansion of the reservoir could impact the catchment watercourse of the nature reserve and would need to be managed. Increased water depth in reservoir(s) could led to algae bloom. Additional water abstraction from boreholes would impact on localised water table and its impact would need to be assessed. The borehole abstraction would also need to be assessed for water quality impact.
No or acceptable impact on air quality	Dust arising from extraction is manageable with mitigation e.g. damping / covering stored materials. With waste management / recycling as well, mitigation will need more careful attention.	No or acceptable impact on air quality, in comparison to quarry operation.	Minimal long term air quality impact and short duration for construction activity. All sites are currently operational assets.
No or acceptable impact on ecology	Continuation of extraction at Simon Sands and Gravel continues to create unnatural ecology in a sensitive area. Good management should be able to mitigate this. Further work is required to understand the optimum restoration method for Simon Sand and Gravel - including whether a water body is left or the ground is completely made up, and whether a local topsoil/layer should be used.	No or acceptable impact on ecology, as La Gigoulande is already an operational site.	An EIA is likely to be required to access full the land take required for a higher dam and associated higher top water level in the reservoir, as well as impact on nearby ecological assets including Val de la Mare Arboretum and Les Mielles Nature Reserve. There may be a positive impact also due to increased reservoir allowing for further aquatic life.
No or acceptable impact on built environment and heritage	No or acceptable impact on built environment and heritage.	No or acceptable impact on built environment and heritage.	Unlikely to have significant impact on built environment and heritage impacts given locations of existing sites and the fact that they are currently operational. However, an EIA is likely to be required to assess the impact. Desalination and borehole treatment would require additional facilities on their current site or other Jersey Water operational sites.
No or acceptable impact on landscape	All quarrying affects the landscape, but also becomes part of the landscape. Continued / improved mitigation will make this impact manageable, particularly the eventual restoration of Simon Sand and Gravel.	There would be an improvement in landscape, as land would be restored to original level. With an appropriate restoration plan the land could be 'blended' into the surrounding landscape.	An EIA is likely to be required to access full the land take required for a higher dam and associated higher top water level in the reservoir, and the associated impact on landscape.
No or acceptable impact on marine environment	Simon Sand and Gravel is adjacent to the sea; most likely impacts are from marine to the site rather than vice versa. Similar may happen if Simon Sand and Gravel either deepens existing excavation or extends excavation westwards. Managed limitation of extraction will mitigate.	No or acceptable impact on the marine environment.	An increase in water abstraction from the sea would occur for the upgraded desalination plant; the impact of which would need to be assessed and mitigated for.
No or acceptable impact on highways / traffic	Dual use of La Gigoulande has the potential to increase traffic on the constrained local road network. Mitigation through access route management; avoidance of peak periods where possible.	Dual use of La Gigoulande has the potential to increase traffic on the constrained local road network, as vehicles delivering waste are unlikely to be used to take aggregates away from the site. Mitigation might include routes, circuits, timing, shared vehicles etc.	Minimal impact on highways and traffic (albeit may be some construction impact which would need to be managed).
Makes a contribution towards a net zero future	Maintaining 100% local sourcing for as long as possible minimises transport CO_2.	It makes a contribution to net zero future, if the only option was export off the island which would have a higher level carbon impact.	Increased pumping and operational energy requirement for treatment and abstraction would increase energy use. Desalination and borehole treatment would require additional water treatment and pumping facilities.
Makes a contribution towards the circular economy	Introducing inert waste management and recycled aggregates production at La Gigoulande quarry represents a positive commitment to sustainability.	As a landfill it does not contribute to circular economy as it is disposal, which is the least favourable option of the hierarchy. However, its use in the long term restoration of Simon Sand and Gravel would represent a form of circular economy. Reprocessing of inert waste would contribute to a circular economy.	The scenario does not emphasise role of water recycling as much as other scenarios.

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Criteria	Scenario 3: Integrate, Balance		
	Minerals	Inert Waste	Potable Water
Social			
No or acceptable impact on local amenity (including noise)	Extension of extraction at La Gigoulande and continued extraction of Simon Sand and Gravel should be designed to reduce and mitigate noise and amenity impacts, and are likely to require an EIA.	Extraction of high-value materials at La Collette is not expected to have a greater impact on noise and amenity than current activities on site. Use of La Gigoulande as an inert waste facility is not is not expected to have a greater impact on noise and amenity than current activities on site. If additional locations for inert waste are required, proposals should be designed to reduce and mitigate noise and amenity impacts, and are likely to require an EIA.	There is likely to be some construction noise impact for local communities. There is not expected to be a material increase in operational noise given they are already existing operational sites. Works should be designed to protect (or have a net increase in) amenity value, e.g. by improving the environment around the reservoirs, adding additional screening, improving walkways etc. If new borehole extraction or a new de-salinisation plant is required, it should be located and designed to have no or an acceptable impact (or a net increase) in local amenity.
No or acceptable impact on open space and recreation	No impact on open space and recreation in the long term would see Simon Sand and Gravel restored which would have a positive impact. Careful planning / monitoring would be needed to ensure that restoration at Simon Sand and Gravel does indeed create such outcome.	No impact on open space and recreation in the long term would see Simon Sand and Gravel restored which would have a positive impact.	There is likely to be some impact on open space and recreation, e.g. on Val de la Mare Arboretum Works. Val de La Mare and Les Mouriers reservoirs also fall within the Coastal National Park. Works should be designed to protect and enhance open space and recreation, e.g. by improving the environment around the reservoirs, improving walkways etc. If new borehole extraction or a new de-salinisation plant is required, it should be located and designed to have no or an acceptable impact (or a net increase) in open space and recreation.
Supports meeting of housing needs over the study period	Supports meeting of housing period through providing the necessary aggregates.	Supports meeting of housing period through the necessary management of inert waste.	Supports meeting of housing period through the supply of required potable water - would achieve the supply deficit for the critical drought dry peak week in 2045.
Likely level of public support (based on responses to Issues and Options consultation)	Views expressed through responses to the Strategic Issues and Options consultation referenced the possibility of recycling minerals from existing buildings (i.e. inert waste). There was also support for using existing minerals extraction sites for inert waste management. Views expressed through responses to the Strategic Issues and Options consultation were mixed - whilst there was greater support for continued expansion within the existing constraints of existing sites, 60% of respondents viewed continued extraction and expansion of existing sites to be not very acceptable or not at all acceptable. Continued extraction at Simon Sand and Gravel may not receive public support. There may be possible opposition to the extension of La Gigoulande.	Views expressed through responses to the Strategic Issues and Options consultation referenced the possibility of recycling minerals from existing buildings (i.e. inert waste). There was also support for using existing minerals extraction sites for inert waste management.	Other comments expressed in the Strategic Issues and Options consultation supported measures to address water supply shortages and for the Island Plan to include policies on the Green Zone and Coastal National Park to include measures for water supply infrastructure.
Economic			**supply infrastructure.**
Supports private sector investment	Would support private sector investment at La Gigoulande and Simon Sand and Gravel - all extraction sites are viable private sector businesses.	Would support private sector investment at La Gigoulande and Simon Sand and Gravel.	Would support private sector investment from Jersey Water.
Supports public sector investment and returns	Would support public sector returns through extraction at La Collette.	Would support public sector returns through extraction at La Collette.	N/A
Supports wider economic growth	Supports wider economic growth through delivering required aggregates. Keeps extraction-related investment and jobs on the island.	Supports wider economic growth through delivering required inert waste management.	Supports wider economic growth through the supply of required potable water - would achieve the supply deficit for the critical drought dry peak week in 2045.
Likely to be affordable to the Island	Affordable scenario because all aggregates continue to be locally supplied as long as possible (versus imports and/or substitution by local manufactured /dust-based sands).	Expected to be affordable to the island, compared with costs involved in exporting waste from the island.	The draft option appraisal provided by Jersey Water states that the Val del Mar is the preferred option for existing asset expansion. The total AIC for the options discussed in this scenario is as follows: Val Del Mar expansion 1856 (£/Ml), Expansion of desalinisation with additional stream 321 (£/Ml) and Increase abstraction from St boreholes 469 (£/Ml) With a total overall costed scenario = 2646 (£/Ml)
Topic-specific			

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Green: likely to meet criteria
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Red: unlikely to meet criteria

Criteria	Scenario 3: Integrate, Balance		
	Minerals	Inert Waste	Potable Water
Meets total minerals requirements over the study period (if not, total years' supply)	Meets total minerals requirements over the study period, subject to permissions / extensions. Keeping Simon Sand and Gravel going only just covers the study period (10 years).		
Able to secure supply of aggregates for the Bridging Island Plan period with reserve, landbank provision for the period beyond	Able to secure supply of crushed rock for the next 10 years with reserve, subject to permissions. Simon Sands going is insufficient for the period beyond and import of sand will be required.		
Continues of a good proportion of supply being met by secondary / recycled aggregates	Not optimal in terms of site planning for sustainable supply of recycled aggregates, but satisfactory on the assumption that the private sector would seek additional facilities.		
Allows for achievement of restoration objectives within an acceptable timescale and with a specified mechanism for realising such objectives	Restoration depends on good planning, and effective means of both implementing and then enforcing agreed conditions. Subject to these being entailed in a proposed integrated approach at Simon Sand and Gravel, this criterion can be met. But because this scenario creates an open-ended situation at Simon Sand and Gravel, restoration efforts might be delayed.		
Meets total inert waste requirements over the study period (if not, total years' supply)		Would meet total inert waste requirements.	
Meets total water requirements over the study period (if not, total years' supply)			A deficit of 8.1 Ml/d in 2045 is predicted in the critical drought dry annual average. It is anticipated by Jersey Water that the Val del Mar increase would yield an additional approximate 1.9 Ml/d, and additional borehole abstraction at Ouen borehole provide a yield of 0.7Mld in drought year. An additional desalination stream at the current site is anticipated to yield 5Ml/d, this is not impacted by climate change. The combination of these 3 supply side options (7.6Ml/d) and the combined demand side saving of 0.6Ml/d, will achieve an additional WAFU of 8.2 Ml/d, which is 0.1 Ml/d higher than the expected deficit in 2045.
No or acceptable impact on customer cost for potable water			Possible increase in bills due to investment in new assets. Demand management can be used to reduce bill cost by decreasing customer water use and metered billing. However, overall AIC is lowest of three scenarios.
Other			
Provides additional benefits to the Island (e.g. additional reclaimed land, flood protection etc.)			
Other comments			The current discharge from boreholes is impacted by PFOS and PFOAS; any increase could cause issue to the current supply. Treatment would be required which is currently not fully investigated for long term quality (GAC).

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Red: unlikely to meet criteria

Criteria	Scenario 3: Integrate, Balance		
	Minerals	Inert Waste	Potable Water
Overall comments	**Minerals: This scenario makes the most of existing assets at La Gigoulande as well as at Simon Sand and Gravel, as well as the use of secondary aggregates. In this sense, it is aligned with the aspirations around sustainability and the circular economy.** **Inert Waste: As above, this scenario makes the most of the interrelationship between minerals and inert waste management. It provides sufficient capacity to meet requirements, and would allow a solution to be put in place quickly to deal with La Collette's limited lifespan. It also aligns with the existing permissions for La Gigoulande Quarry.** **Potable Water: Similar to Scenario 1, increasing the capacity of Val de la Mare reservoir is likely to be part of the solution for potable water, though there are a number of environmental impacts related with its increased land take which need to be considered further.**		

Appendix D

Integrated Scenario Assessment

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Shortlist Scenarios Assessment

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Red: unlikely to meet criteria

Criteria	Integrated Scenario		
	Minerals	Inert Waste	Potable Water
Environmental			
No or acceptable impact on watercourses, water table and potable water	No or acceptable impact on watercourses, water table and potable water - extraction itself does not cause unmanageable impacts. (Water problems at Simon Sand and Gravel is caused by exogenous pollution).	Further work is likely to be required to understand any impacts water table and possible changes in the hyrolics (rather than pollution per se, which is not applicable for inert waste).	Val de la Mare is sited near Les Mielles Nature Reserve; expansion of the reservoir could impact the catchment watercourse of the nature reserve and would need to be managed. Increased water depth in reservoir(s) could led to algae bloom.
No or acceptable impact on air quality	Dust arising from extraction is manageable with mitigation e.g. damping / covering stored materials. With waste management / recycling as well, mitigation will need more careful attention.	No or acceptable impact on air quality, in comparison to quarry operation.	Minimal long term air quality impact and short duration for construction activity. All sites are currently operational assets.
No or acceptable impact on ecology	Continuation of extraction at Simon Sands and Gravel continues to create unnatural ecology in a sensitive area. Good management should be able to mitigate this. Further work is required to understand the optimum restoration method for Simon Sand and Gravel - including whether a water body is left or the ground is completely made up, and whether a local topsoil/layer should be used.	No or acceptable impact on ecology, as La Gigoulande is already an operational site.	An EIA is likely to be required to access full the land take required for a higher dam and associated higher top water level in the reservoir, as well as impact on nearby ecological assets including Val de la Mare Arboretum and Les Mielles Nature Reserve. There may be a positive impact also due to increased reservoir allowing for further aquatic life.
No or acceptable impact on built environment and heritage	No or acceptable impact on built environment and heritage.	No or acceptable impact on built environment and heritage.	Unlikely to have significant impact on built environment and heritage impacts given locations of existing sites and the fact that they are currently operational. However, an EIA is likely to be required to assess the impact. Desalination would require additional facilities on their current site or other Jersey Water operational sites.
No or acceptable impact on landscape	All quarrying affects the landscape, but also becomes part of the landscape. Continued / improved mitigation will make this impact manageable, particularly the eventual restoration of Simon Sand and Gravel.	There would be an improvement in landscape, as land would be restored to original level. With an appropriate restoration plan the land could be 'blended' into the surrounding landscape.	An EIA is likely to be required to access full the land take required for a higher dam and associated higher top water level in the reservoir, and the associated impact on landscape.
No or acceptable impact on marine environment	Simon Sand and Gravel is adjacent to the sea; most likely impacts are from marine to the site rather than vice versa. Similar may happen if Simon Sand and Gravel either deepens existing excavation or extends excavation westwards. Managed limitation of extraction will mitigate.	No or acceptable impact on the marine environment.	An increase in water abstraction from the sea would occur for the upgraded desalination plant; the impact of which would need to be assessed and mitigated for.
No or acceptable impact on highways / traffic	With integrated extraction / waste management / recycling facilities at La Gigoulande and Simon Sand Gravel, traffic levels will increase and will require careful management. Mitigation might include routes, circuits, timing, shared vehicles etc.	Dual use of La Gigoulande and Simon Sand and Gravel has the potential to increase traffic on the constrained local road network, as vehicles delivering waste are unlikely to be used to take aggregates away from the site. Mitigation might include routes, circuits, timing, shared vehicles etc.	Minimal impact on highways and traffic (albeit may be some construction impact which would need to be managed).
Makes a contribution towards a net zero future	Maintaining 100% local sourcing for as long as possible minimises transport CO_2.	It makes a contribution to net zero future, if the only option was export off the island which would have a higher level carbon impact.	Increased pumping and operational energy requirement for treatment and abstraction would increase energy use. Desalination would require additional water treatment and pumping facilities.
Makes a contribution towards the circular economy	Having integrated extraction, inert waste management and recycled aggregates production at both La Gigoulande quarry and Simon Sand and Gravel represents a positive commitment to sustainability.	As a landfill it does not contribute to circular economy as it is disposal, which is the least favourable option of the hierarchy. However, its use in the long term restoration of Simon Sand and Gravel would represent a form of circular economy. Reprocessing of inert waste would contribute to a circular economy. Use of inert waste in place of non-waste materials positively contributes to the circular economy, by moving up the hierarchy towards reuse. Inert waste is prevented from being sent to disposal and non-waste material is saved from being used.	The scenario does not emphasise role of water recycling as much as other scenarios.

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Red: unlikely to meet criteria

Criteria	Integrated Scenario		
	Minerals	Inert Waste	Potable Water
Social			
No or acceptable impact on local amenity (including noise)	Extension of extraction at La Gigoulande and continued extraction of Simon Sand and Gravel should be designed to reduce and mitigate noise and amenity impacts, and are likely to require an EIA.	Long term restoration of Simon Sand and Gravel restored which would have a positive impact - change from extraction to inert waste management (through restoration) not expected to have an unacceptable impact on local amenity, with mitigation measures in place.	There is likely to be some construction noise impact for local communities. There is not expected to be a material increase in operational noise given they are already existing operational sites. Works should be designed to protect (or have a net increase in) amenity value, e.g. by improving the environment around the reservoirs, adding additional screening, improving walkways etc. Other elements of this scenario are not expected to have a material adverse impact on local amenity.
No or acceptable impact on open space and recreation	No impact on open space and recreation and in the long term would see Simon Sand and Gravel restored which would have a positive impact - albeit would not release the land to recreation uses in the short term. La Gigoulande's proposal for expansion changes the use of agricultural land, but not public open space. However, Simon Sand and Gravel is in the Coastal National Park and so the impact of any change/intensification of its use should be considered further and mitigated if required.	No impact on open space and recreation, and in the long term would see Simon Sand and Gravel restored which would have a positive impact.	There is likely to be some impact on open space and recreation, e.g. on Val de la Mare Arboretum Works. Val de La Mare also fall within the Coastal National Park. Works should be designed to protect and enhance open space and recreation, e.g. by improving the environment around the reservoirs, improving walkways etc. Other elements of this scenario are not expected to have a material adverse impact on open space and recreation.
Supports meeting of housing needs over the study period	Supports meeting of housing period through providing the necessary aggregates.	Supports meeting of housing period through the necessary management of inert waste.	Supports meeting of housing period through the supply of required potable water - would broadly achieve the supply deficit for the critical drought dry peak week in 2045.
Likely level of public support (based on responses to Issues and Options consultation)	Views expressed through responses to the Strategic Issues and Options consultation were mixed - whilst there was greater support for continued expansion within the existing constraints of existing sites, 60% of respondents viewed continued extraction and expansion of existing sites to be not very acceptable or not at all acceptable. Continued extraction at Simon Sand and Gravel may not receive public support. There may be possible opposition to the extension of La Gigoulande.	Not covered in the Strategic Issues and Options consultation. Long term restoration of Simon Sand and Gravel is likely to have public support, with appropriate measures in place to i) protect the use of the Coastal National Park during its restoration, and ii) the overall quality of the final restored landscape.	Other comments expressed in the Strategic Issues and Options consultation supported measures to address water supply shortages, the need to incorporate water conservation and management in new domestic and commercial development and that policies on the Green Zone and Coastal National Park to include measures for water supply infrastructure.
Economic			
Supports private sector investment	Would support private sector investment at La Gigoulande and Simon Sand and Gravel - all extraction sites are viable private sector businesses.	Would support private sector investment at La Gigoulande and Simon Sand and Gravel.	Would support private sector investment from Jersey Water.
Supports public sector investment and returns	Would support public sector returns through extraction at La Collette.	Would support public sector returns through extraction at La Collette.	N/A
Supports wider economic growth	Supports wider economic growth through delivering required aggregates. Keeps extraction-related investment and jobs on the island.	Supports wider economic growth through delivering required inert waste management.	Supports wider economic growth through the supply of required potable water - would broadly achieve the supply deficit for the critical drought dry peak week in 2045.
Likely to be affordable to the Island	Most affordable scenario because all aggregates continue to be locally supplied as long as possible (versus imports and/or substitution by local manufactured /dust-based sands).	Expected to be affordable to the island, compared with costs involved in exporting waste from the island.	The draft option appraisal provided by Jersey Water states that the Val del Mar is the preferred option for existing asset expansion. The total AIC for the options discussed in this scenario is as follows: Val Del Mar expansion 1856 (£/Ml), Expansion of desalinisation with additional stream 321 (£/Ml) and Base demand management (media) =630(£/Ml) With a total overall costed scenario = 2807 (£/Ml)
Topic-specific			
Meets total minerals requirements over the study period (if not, total years' supply)	Meets total minerals requirements over the study period, subject to permissions / extensions. Keeping Simon Sand and Gravel going only just covers the study period (10 years).		

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Red: unlikely to meet criteria

Criteria	Integrated Scenario		
	Minerals	Inert Waste	Potable Water
Able to secure supply of aggregates for the Bridging Island Plan period with reserve, landbank provision for the period beyond	Able to secure supply of crushed rock with reserve for the next 10 years , subject to permissions. Keeping Simon Sand and Gravel operating is insufficient for the period beyond and imports of sand will be required.		
Continues of a good proportion of supply being met by secondary / recycled aggregates	This scenario is optimal from the perspective of recycled aggregates production because of having two integrated inert waste / recycling facilities co-located with primary aggregates sources. The co-location could lead to development of blended products.		
Allows for achievement of restoration objectives within an acceptable timescale and with a specified mechanism for realising such objectives	Restoration depends on good planning, and effective means of both implementing and then enforcing agreed conditions. Subject to these being entailed in a proposed integrated approach at Simon Sand and Gravel, this criterion can be met. An integrated commercial scheme linking extraction and waste management with restoration has the potential for being a reliable mechanism to achieve planning objectives.		
Meets total inert waste requirements over the study period (if not, total years' supply)		Would meet total inert waste requirements.	
Meets total water requirements over the study period (if not, total years' supply)			A deficit of 8.1 Ml/d in 2045 is predicted in the critical drought dry annual average. It is anticipated by Jersey Water that the Val del Mar increase would yield an additional approximate 1.9 Mld, in drought year and an additional desalination stream at the current facility in is anticipated to yield 5Mld (not affected by climate change or drought). The combination of these 2 supply side options (6.9Ml/d) and the base demand management (intensive media and audits) of 0.19Ml/d along with the combined demand side saving of 0.6 Ml/d, will achieve an additional WAFU of 7.69 Ml/d, which is 0.9Ml/d lower than the expected deficit in 2045.
No or acceptable impact on customer cost for potable water			Possible increase in bills due to investment in new assets. Demand management can be used to reduce bill cost by decreasing customer water use and metered billing.
Other			
Provides additional benefits to the Island (e.g. additional reclaimed land, flood protection etc.)		Provides additional benefits in the form of flood protection through the Shoreline Management Plan projects.	
Other comments			The existing streams for Desalination have an allowable output of 5.4Mld. If the new stream has the same output the overall balance would be 8.09Mld which is approximate to the anticipated deficit.