



Moray Hydrogen Strategy

Scoping Report Phase 2

December 2023

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Moray Hydrogen Strategy

Scoping Report Phase 2

December 2023

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Executive Summary

Moray Council approved a Climate Change Strategy on 10th March 2021 with a high-level action plan. Moray has a population circa 97,000 and has high levels of manufacturing including 50% of Scotland's distilleries and global brands.

Hydrogen is fast becoming a key energy resource in the transition to a low carbon future. To achieve Moray Council's commitment to achieve Net Zero by 2030 and enable the energy transition, the Council has engaged Mott MacDonald to develop a strategy for hydrogen, including opportunities for the transition of Council owned buildings and the transport fleet. Highlands and Islands Enterprise (HIE) also sought for the strategy to include information on the decarbonisation of Moray's distilling industry and other key hydrogen projects; and the associated infrastructure requirements to produce, store and supply hydrogen.

Developing a hydrogen economy in Moray during the short to medium term, including connecting into adjacent regions, could contribute to a reduction in greenhouse gases and particulate emissions, improve security of energy supply, contribute towards the decarbonisation of transport, increase and make better use of renewable energy generation, and could help address fuel poverty issues, particularly in rural areas.

Moray Council and HIE developed a Hydrogen Strategy and Action Plan which explores the use of green hydrogen to help achieve the benefits of a hydrogen economy. The Council recognises that hydrogen could have a key role in providing an alternative energy to fossil fuels.

The challenge is to understand the market context within Moray to develop short-, medium- and long-term hydrogen demand profiles which can then be used to determine the viability of hydrogen generation and storage.

The Moray Hydrogen Scoping Report for Phase 2 expands on the previous phase of the project by offering further support for the establishment of a hydrogen stakeholder network, examination of hydrogen delivery infrastructure and actions required to develop a hydrogen economy. Moreover, as the Council has expressed a strong desire to provide "a life of opportunity for all, where people can thrive in vibrant communities, and where we work together to enrich our future.", an in-depth social outcome analysis has also been developed to help maximise the benefits of hydrogen investment.

Developing a hydrogen economy to meet the Scottish Government's and Moray Council's Net Zero targets will require the parallel growth of supply and demand. The hydrogen strategy for Moray sets out how the supply for hydrogen can be increased over time to meet the increasing local demand for hydrogen from industrial users, transport, hospitals, and public sector organisations as well as local communities.

The development of a hydrogen economy within Moray will bring many benefits to the region including inward investment, creation of new opportunities and jobs, retention and development of young persons in Moray. Inward investment in the hydrogen supply, demand and infrastructure within Moray offers a sustainable economic growth opportunity with a positive impact on reducing poverty.

Moray has access to significant sources of green renewable power including offshore and onshore wind farms which, subject to contract, could create the conditions required to produce green hydrogen within Moray at scale. To deliver a hydrogen economy the following key steps were proposed in the initial Strategy and further developed within Phase 2:

- Create a hydrogen steering group within Moray to drive the development of hydrogen opportunities, stimulating both supply and demand. This group could be led by Moray Council and include key stakeholders from the industrial base and wider community. This steering group and a wider hydrogen stakeholder network have been set-up as part of Phase 2. The steering group meets monthly, and a number of successful stakeholder events have been held to date including a transport focused event.
- Start to generate hydrogen within Moray to generate demand. A small-scale pilot project or projects are proposed to include combined hydrogen generators, storage and refuelling at a single site. Regional scale-up options will be considered when selecting pilot project(s). The potential locations (as identified in Phase 1) to be considered are Lossiemouth, Aberlour, Buckie Harbour, Keith and Elgin. The target users for the hydrogen in the first instance would be the “back to base” and transport fleets such as local buses and refuse trucks.
- In the short to medium term, the aim would be to expand the hydrogen generation facilities to further stimulate the demand from road freight transport and from the industrial users such as the distilleries. Hydrogen can start to be distributed by road tanker from the generator to the end user. A network of hydrogen refuelling stations can be developed, further stimulating demand from the road freight transport users.
- In the long term, the hydrogen economy for Moray could be based on generating hydrogen from green electricity sources within Moray, purchasing hydrogen from outside the area, and distributing hydrogen through the area through a pipeline network. The demand for hydrogen would come from a wider range of sectors including the distilleries, other high-heat industry, the road haulage industry, council services and potentially to heat homes and businesses.

Following on from the Phase 1 report that identified potential hydrogen hub locations, a key action for Phase 2 was to pinpoint where the highest hydrogen demand is coming from, and thus support the deployment of Moray’s first Hydrogen Refuelling Station (HRS) or as part of a hydrogen “hub”.

In the context of the Phase 2, the initial ‘high level’ considerations of the site selection were further investigated based on an overarching set of criteria, such as hydrogen demand, stakeholder proximity and engagement and social outcomes. This exercise scored criteria against the broad range of disciplines, for a comprehensive assessment of specific sites.

In terms of future hydrogen demand, the locations closer to higher traffic flows and high density of whisky distilleries, such as Elgin or Aberlour have scored higher than the rest of the evaluated possible sites. There is a strong desire to implement a hydrogen economy, since some transport logistics companies, which count distilleries as clients, within Aberlour are investing in hydrogen fuelled vehicles. Therefore, Elgin and Aberlour are two key strategic sites for a future hydrogen hub based on foreseeable future demand.

Notwithstanding, the social outcome assessment has revealed that the high need for socio-economic intervention in places such as Buckie, Aberlour and Keith could be addressed by deploying pilot hydrogen, end-use or storage projects within the area. It is noted that the highest levels of unemployment and deprivation were observed in Buckie and as such the effects of a community benefit strategy would be favourable.

Due to Buckie’s strategic location on the Scottish North-East coast, it has high potential to serve as a HRS for crew transport vessels transferring technicians to nearby offshore windfarms for maintenance and technical surveillance. Nevertheless, from a traffic demand standpoint of view, Elgin and Aberlour provide more advantageous prospects.

Therefore, Elgin and Aberlour should be considered as potential HRS location for road haulage end-users and Buckie should be considered as potential HRS for maritime end-users. Further stages of the project should consider the feasibility of a dual-purpose HRS for supporting fuel transition of both transport means.

To conclude, although not an exhaustive study on the qualitative and quantitative criteria set, this report has provided greater context and detail on the matter of technical feasibility of a HRS and "hydrogen hub" development in Moray but also on how to retain the benefits of hydrogen energy investment for the people and communities.

Section 11 provides a list of recommendations to determine the most suitable and appropriate HRS site for Moray and to maximise the leverage of a hydrogen economy within Moray.

Additionally, a Fuel Switching study was carried with the scope to highlight decarbonisation opportunities for Moray Council's fleet. For further information please refer to the separate "Moray Hydrogen Strategy - Fuel Switching Strategy Report".

1 Introduction

Moray is an ideal location to establish a hydrogen economy with direct access to existing and future large scale renewable energy sources, including onshore and offshore wind power, and reliable water sources, providing the essential resources required for green hydrogen production. Moray Council has set an ambitious commitment to take a leading role to assist in the Scottish Government's target of a 75% reduction in regional emissions by 2030 and Net Zero emissions by 2045.

Hydrogen provides a sustainable alternative to burning fossil fuels and its contribution to helping Scotland reach its Net Zero targets for industry, transport, power and heat is recognised by the Scottish Government. Hydrogen, produced from renewable energy sources, is a zero carbon, zero emission fuel that can be used for heavy duty vehicles including buses, trucks, agricultural vehicles, marine vessels and trains, and also used to provide heat for industrial uses and for homes. In addition to hydrogen, it is recognised that a significant amount of energy will also be needed from other low carbon sources including electricity.

The Scottish Government Hydrogen Policy Statement, published December 2020, sets out Scottish Government support for the strategic growth of a strong hydrogen economy in Scotland. The Minister for Energy, Connectivity, and the Islands provides the following vision in the ministerial forward:

“Our vision is for Scotland to become a leading Hydrogen Nation in the production of reliable, competitive, sustainable hydrogen and secure Scotland’s future as a centre for international excellence as we establish the innovation skills and supply chain that will underpin our energy transition. Scotland’s unique selling points, are its natural resources, infrastructure and skilled energy workforce which enable us to become the producer of lowest cost hydrogen in Europe by 2045.”

The Scottish Government Draft Hydrogen Action Plan, published November 2021, sets out the actions for the next five years to support the development of a hydrogen economy. The Cabinet Secretary for Net Zero, Energy and Transport includes the following statement as part of the ministerial forward:

“Hydrogen has a role to play across Scotland in our islands and rural communities, cities and industrial clusters, and strategies for its production and application are expected to vary across these geographic regions. We are committed to realising the benefits of hydrogen to our regions and local communities and so will support regional hubs of hydrogen activity across Scotland, recognising the differing resources, strengths and focuses of each location.”

The Moray Hydrogen Phase 2 Strategy aims to expand on the previous phase of the project by supplementing the initial scope of work by offering further support for the establishment of a hydrogen stakeholder network, examination of hydrogen delivery infrastructure and actions required to develop a hydrogen economy. Moreover, as the Council has expressed a strong desire to provide “a life of opportunity for all, where people can thrive in vibrant communities, and where we work together to enrich our future.”, an in-depth social outcome analysis has also been developed to help maximise the benefits of hydrogen investment.

1.1 Project Background

Moray Council has committed to achieving Net Zero by 2030 and aims to provide the necessary local and regional leadership to support businesses and communities in Moray to transition to

net zero. Moray Council, along with Highlands and Islands Enterprise (HIE), recognise the potential that hydrogen may play in this transition by providing an alternative source of energy to traditional fossil fuels.

Accordingly, in 2022 Moray Council commissioned Mott MacDonald to develop a strategy for hydrogen; setting out the market context – particularly in light of the significant potential for the use of hydrogen in Moray’s distilling industry – and proposing a set of short, medium and long-term actions which establish the associated infrastructure requirements to produce, store and supply hydrogen.

As part of that exercise, a key action is to pinpoint where the highest hydrogen demand is coming from, and thus support the deployment of Moray’s first HRS or as part of a hydrogen “hub”. While the Phase 1 strategy report identifies a number of potential locations across Moray, the initial considerations are very much ‘high level’.

In the context of the Phase 2, the initial ‘high level’ considerations of the site selection are further investigated based on an overarching set of criteria, such as hydrogen demand, stakeholder proximity and engagement and social outcomes. This exercise will be scoring criteria against the broad range of disciplines, for a comprehensive assessment of specific sites.

Additionally, a Fuel Switching study was carried with the scope to highlight decarbonisation opportunities for Moray Council’s fleet. For further information please refer to the separate “Moray Hydrogen Strategy - Fuel Switching Strategy Report”.

2 Abbreviations

Table 2.1: List of Abbreviations

Abbreviation	Definition
AADF	Annual Average Daily Flow
CTV	Crew Transport Vessel
DfT	Department for Transport
ERSI	Environmental Systems Research Institute
EV	Electric Vehicle
HGV	Heavy Goods Vehicle
HRS	Hydrogen Refuelling Station
ICE	Internal Combustion Engine
LGV	Light Goods Vehicle
MoD	Ministry of Defence
NFRT	National Road Traffic Forecast
NHS	National Health Service
OWF	Off-Shore Wind Farm
PSV	Public Service Vehicle
RAF	Royal Air Force
SME	Subject Matter Expert

3 Hydrogen Demand Analysis

3.1 Purpose

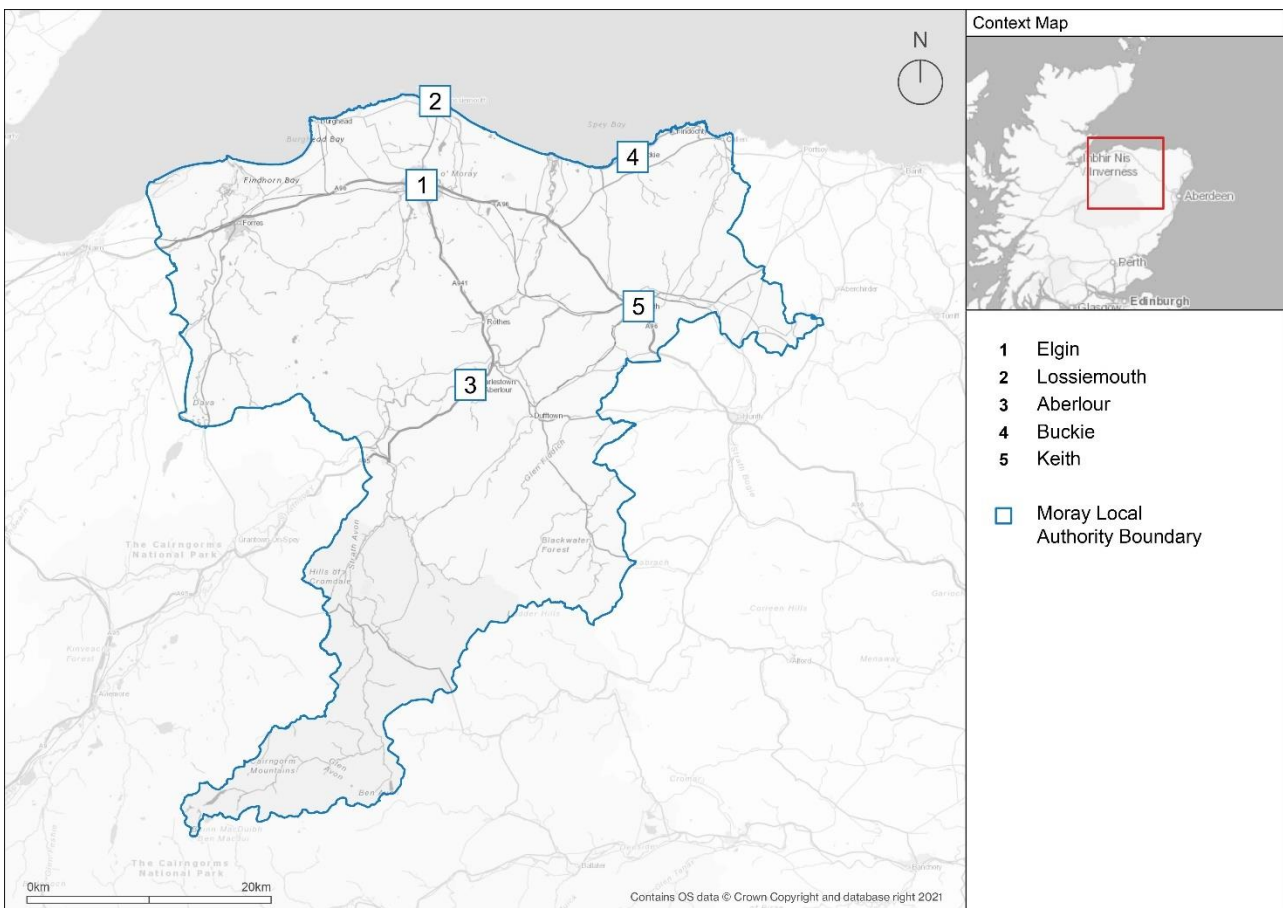
This Hydrogen Demand Analysis has been prepared to support the selection of a potential location for Moray’s first Hydrogen Refuelling Station (HRS). Hydrogen demand is a decisive factor when it comes to commitment to investment in hydrogen energy.

As such this section presents a quantitative multi-criteria assessment supported by qualitative information derived from stakeholders’ input to support the identification of a suitable HRS location process.

The analysis supplements the wider endeavour being undertaken to identify and assess potential locations through a strategic assessment of locations using transport-specific criteria. This assessment considers the five broad ‘hubs’ across the local authority area: Elgin, Lossiemouth, Aberlour, Buckie and Keith.

A plan showing the potential locations within Moray is provided in Figure 3.1.

Figure 3.1: Hydrogen Fuelling Station Potential Locations



Source: Mott MacDonald

3.2 Overview

This assessment aims to help identify the first of a series of future HRS locations with respect to hydrogen demand. This analysis therefore seeks to determine where the most likely *immediate* future demand will be located within Moray in order to help guide future decision-making.

The widespread rollout of hydrogen-fuel vehicles (and crucially, the supporting refuelling infrastructure) is still in its relative infancy compared to other non-ICE vehicle types (e.g., Battery Electric Vehicles). As such, the ability to accurately forecast the likely future uptake of hydrogen as a vehicle fuel is limited.

However, the use of hydrogen as a vehicle fuel is increasing. First Bus has notably invested in a fleet of hydrogen-fuelled double-decker buses in Aberdeen¹. Feasibility and pilot studies continue to build momentum both in the UK and abroad. The majority of these are focused on commercial vehicles such as HGVs and LGVs and there are comparatively fewer hydrogen manufacturers in the personal car market.

It therefore stands to reason that Moray will follow trends in hydrogen use seen elsewhere – namely that initial uptake will be driven by commercial and fleet vehicles and latterly (if at all) by personal car use. Within the context of this report, it is reasonable to assume that the locations with the highest PSV, HGV and LGV flows will have the greatest immediate potential need in future for a HRS and are therefore prioritised within the assessment.

As part of the initial development of the Moray Hydrogen Strategy, fleet owners were engaged across Moray to establish fleet sizes, compositions, as well as any plans concerning fleet transitions away from traditional ICE vehicles. These stakeholders were contacted again for this phase, to update existing intelligence and in particular, identify if new plans for vehicle transition have developed, or if existing plans have accelerated. Any information gathered is incorporated into the assessment process.

3.3 Assessment Methodology

There are two separate elements to the methodology:

- A quantitative **multi-criteria assessment** considering the spatial distribution of fleet locations, traffic flows and routing patterns across Moray to assess where the most likely future demand for hydrogen fuel will be located.
- A qualitative **stakeholder engagement exercise** which seeks to draw out further detail from major fleet owners in Moray; particular around fleet movements and compositions, as well as any information regarding transition plans to hydrogen fuelled vehicles.

3.3.1 Multi-Criteria Assessment

In order to evaluate the suitability of each of the potential locations, a high-level quantitative multi-criteria assessment was undertaken using a combination of traffic data and GIS software.

A set of scoring criteria was developed and used to assess each location in turn, with each potential location assigned a ranking of one to five (i.e., 'best' to 'worst') as seen in Section 4. Each criterion was then weighted based on the study team's knowledge and current understanding of the hydrogen vehicle roadmaps and a cumulative 'final' score was then derived to identify the location with the greatest potential for Moray's first HRS. Details of the scoring criteria have been included in Table 3.1.

¹ <https://www.firstbus.co.uk/aberdeen/plan-journey/zero-emission-mission/hydrogen-buses>, last accessed 13 June 2023

Table 3.1: Multi-Criteria Assessment Scoring Criteria

Scoring Criteria	Description	Weighting	Weighting Justification
HGV Flows	Average HGVs flow on study network (within 10 minute drive of location)	High	Most likely vehicle type to transition to hydrogen fuel in the short-medium term and therefore most likely to be indicative of initial future demand for a HRS
LGV Flows	Average LGVs flow on study network (within 10 minute drive of location)	Medium	Suggestion that LGVs are a likely candidate to transition to Hydrogen fuel in future, however, likely to be slower uptake than HGVs and PSVs and therefore considered secondary to these vehicle types
Car/Taxi Flows	Average Car/Taxi Vehicle flow on study network (within 10 minute drive of location)	Low	Potential for transition to hydrogen-fuelled cars and taxis in future but anticipated to be a much lower level/uptake speed than both HGVs/PSVs and LGVs
PSV Flows	Average PSVs flow on study network (within 10 minute drive of location)	High	Along with HGVs, another 'most likely' vehicle type to transition to hydrogen fuel in the short-medium term and therefore most likely to be indicative of initial future demand for a HRS
Proximity to Key Stakeholders	Number of stakeholders (within 10km of location)	Medium	Indicative of potential to support fleet operations of key organisations within the local authority
Proximity to Distilleries	Number of distilleries (within 10km of location)	High	Indicative of potential to support fleet operations of industry widely considered to be an 'early' adopter of hydrogen technology with significant potential to translate into hydrogen vehicle uptake

Source: Mott MacDonald

DfT AADF counts² have been used in the assessment and provide disaggregated counts of all road vehicle types. The vehicle types used – as set out in Table 3.1 – are defined by the DfT as follows:

- HGVs – all goods vehicles over 3.5 tonnes gross vehicle weight
- LGVs – goods vehicles not exceeding 3.5 tonnes gross vehicle weight
- Cars and Taxis – defined as passenger vehicles with nine or fewer seats
- PSVs – all public service vehicles and works buses which have a gross weight greater than 3.5 tonnes

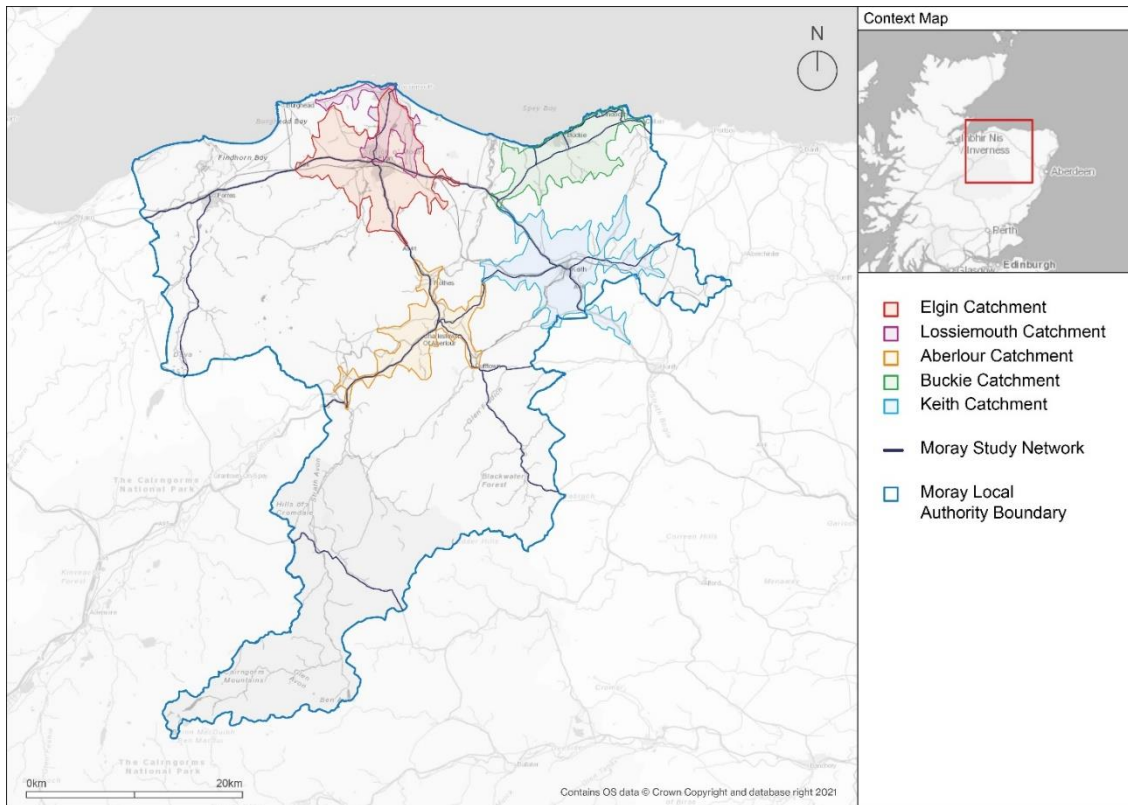
NRTF growth factors have been applied to provide 'future year' traffic flows. An 'opening' year of 2025 has been assumed based on the proposed pilot project timelines set out in the Moray Hydrogen Strategy.

DfT traffic data is only available for certain roads within the UK and as such, for Moray, the study network is limited to the trunk road and A-roads within the local authority. Analysis of these roads is considered reasonable for the scale of assessment and furthermore, representative of traffic flows within the local authority. ESRI ArcMap software was used to identify a 10-minute driving catchment for each of the proposed locations. Sections of the study network which fall within each catchment were then assessed and an average vehicle flow for each vehicle type was derived.

A plan showing each of the 10-minute driving catchments used to calculate traffic flows alongside the Moray study network is provided in Figure 3.2.

² Department of Transport Road Traffic Statistics: <https://roadtraffic.dft.gov.uk/#6/55.254/-6.053/basemap-regions-countpoints>, last accessed 13 June 2023

Figure 3.2: Study Network & Driving Catchment Analysis



Source: Mott MacDonald

3.3.2 Stakeholder Engagement Exercise

The stakeholders who were previously engaged in the development of the Moray Hydrogen Strategy were contacted again for phase 2. A sub-group of ‘transport’ stakeholders were identified who are either owners or operators of sizeable fleets across Moray and the wider region.

This list included Moray Council themselves, local freight and logistics operators, Ministry of Defence (Kinloss Barracks, RAF Lossiemouth), Scottish Water, NHS Grampian, emergency services, as well as major businesses located across Moray. A full list of those stakeholders contacted by the study team has been included in Appendix A.

The principal reason for this exercise is to understand if plans for vehicle fleet transitions to low carbon technology have either developed or accelerated in the time since they were previously contacted in early 2022. In addition, engaging with these stakeholders allowed the study team to gather additional information not previously captured that may assist in the HRS site selection process. For example, whether fleets operated solely within specific locations or if certain routes were commonly used, strengthening the case for potentially higher levels of future hydrogen fuel demand in a given location.

A total of 21 stakeholders were contacted with responses received from nine organisations indicating a willingness to take part in the study. At the time of writing, consultations have been completed via MS Teams with seven of the stakeholder organisations who initially responded. The remaining two stakeholders were not available within the timeframe for the report and therefore their input was not included in this report.

3.4 Assessment Limitations

Given that hydrogen-fuelled vehicles are not yet widespread, the study team are not able to draw upon accurate forecasting tools which exist for other non-ICE vehicles (e.g. DfT forecasts for Electric Vehicle adoption). However, given that this exercise constitutes a high-level review, the approach of analysing traffic data across Moray's strategic road network to derive future potential hydrogen use **is deemed reasonable and appropriate for the purposes of supporting the initial HRS site selection process.**

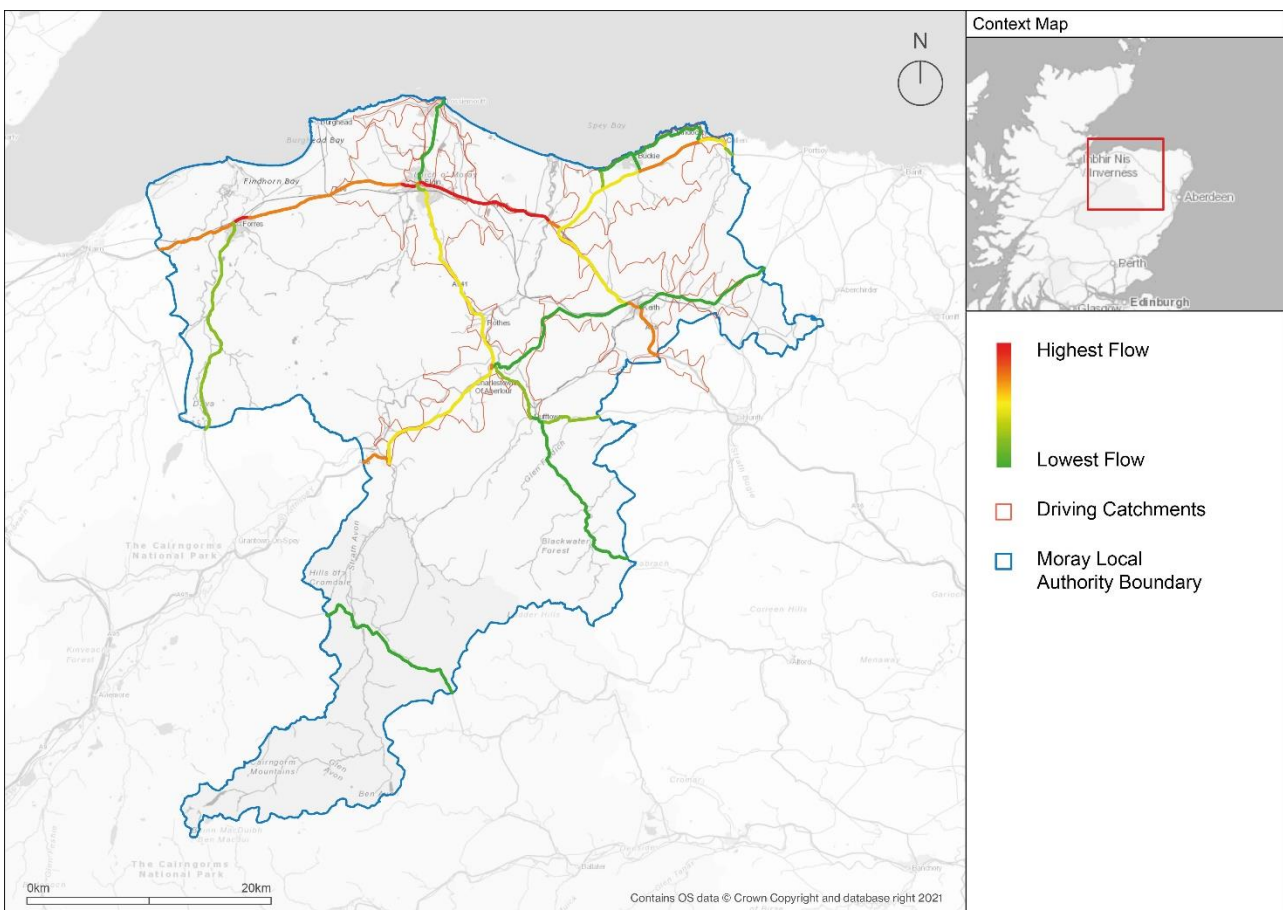
4 Multi-Criteria Assessment Findings

This section provides the results of the quantitative multi-criteria assessment. Traffic movements across Moray, as well as the proximity of each potential location to fleet depots and other stakeholder locations have been analysed to produce a ranked preference for each of the potential HRS locations. Analysis for HGV flows, LGV flows, car and taxi flows, PSV flows, as well as stakeholder proximity is presented in Sections 4.1 to 4.5 with a weighted 'summary' ranking provided in Section 4.6.

4.1 HGV Flows

Figure 4.1 indicates the distribution of HGV flows across Moray. Road links highlighted in red indicate the highest levels of HGV traffic, with those in green denoting the lowest. Red outlines indicate the catchments used to analyse the potential future demand at each of the high-level potential HRS locations. Analysis of this data has been summarised in Table 4.1.

Figure 4.1: HGV Flows



Source: Mott MacDonald

Analysis reveals that the highest HGV flows are concentrated along the 'spine' of the A96 as it runs along a broad west-east axis from Inverness through Moray; particularly on those stretches of road between the local authority boundary (between Nairn and Forres), through Elgin, to Fochabers. This is unsurprising given the role of the A96 as a major transport artery across the region. It plays a crucial role in connecting key towns across Moray and also serves as a

strategically important route for freight across the wider region, particularly between Inverness and Aberdeen.

Table 4.1: Potential HRS Location Ranking by Potential HGV Demand

Potential HRS Location	Av. Daily HGV Flow [within 10-minute drive]	Ranking
Elgin	380	1
Lossiemouth	335	2
Buckie	314	3
Keith	277	4
Aberlour	266	5

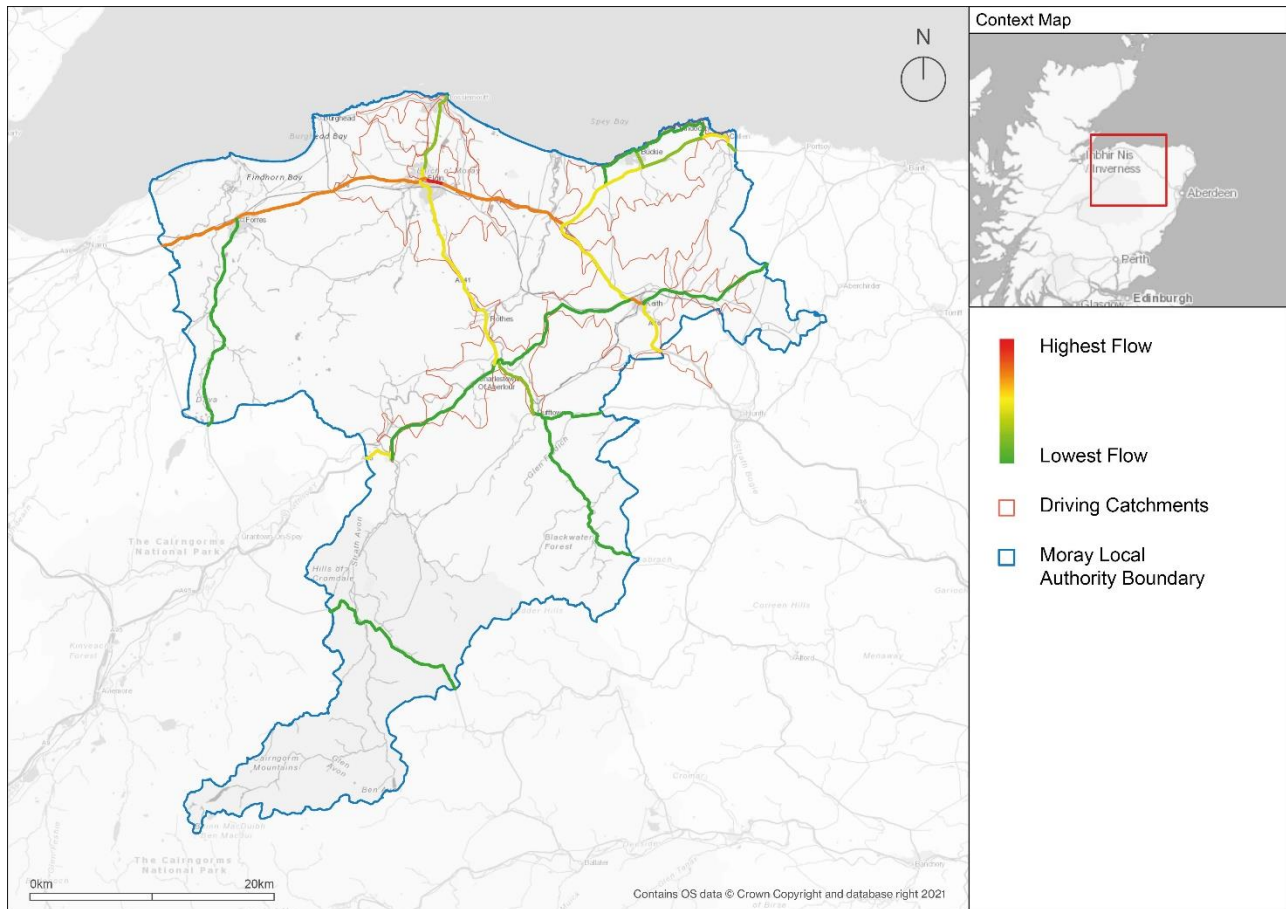
Source: Mott MacDonald

This has resulted in those potential locations which are in close proximity to the A96 ranking higher, with Elgin, followed by Lossiemouth as the preferred locations under this analysis. Buckie ranking third is indicative of higher presences of HGV traffic along other strategic regional routes; in this case on the A98 towards Buckie and the Moray Coast. The road network south of Elgin (i.e., the A941 and A95) also registers high presence of HGVs – likely due to this route serving as a key strategic road link southwards towards the A9 – but to a lesser degree than elsewhere in local authority area.

4.2 LGV Flows

Figure 4.2 indicates the distribution of LGV flows across Moray. Road links highlighted in red indicate the highest levels of LGV traffic, with those in green denoting the lowest. Red outlines indicate the catchments used to analyse the potential future demand at each of the high-level potential HRS locations. Analysis of this data has been summarised in Table 4.2.

Figure 4.2: LGV Flow Analysis



Source: Mott MacDonald

Results for LGVs resemble that of the HGV analysis detailed in Section 4.6. The highest flows are concentrated in around Elgin and broadly correlate with key arterial transport routes across the region. The highest LGV flows are present on the A96 and, to a lesser degree, along the A98 and A941. Most commonly used as commercial vehicles for distribution, courier services, small-scale logistics and as tradesperson vehicles, this evidence confirms that higher LGV flows are present in and around key population centres where such activity is likely to occur more frequently.

Table 4.2: Potential HRS Location Ranking by Potential LGV Demand

Potential HRS Location	Av. Daily HGV Flow [within 10-minute drive]	Ranking
Elgin	1,330	1
Lossiemouth	1,290	2
Keith	1,154	3
Aberlour	1,081	4
Buckie	1,042	5

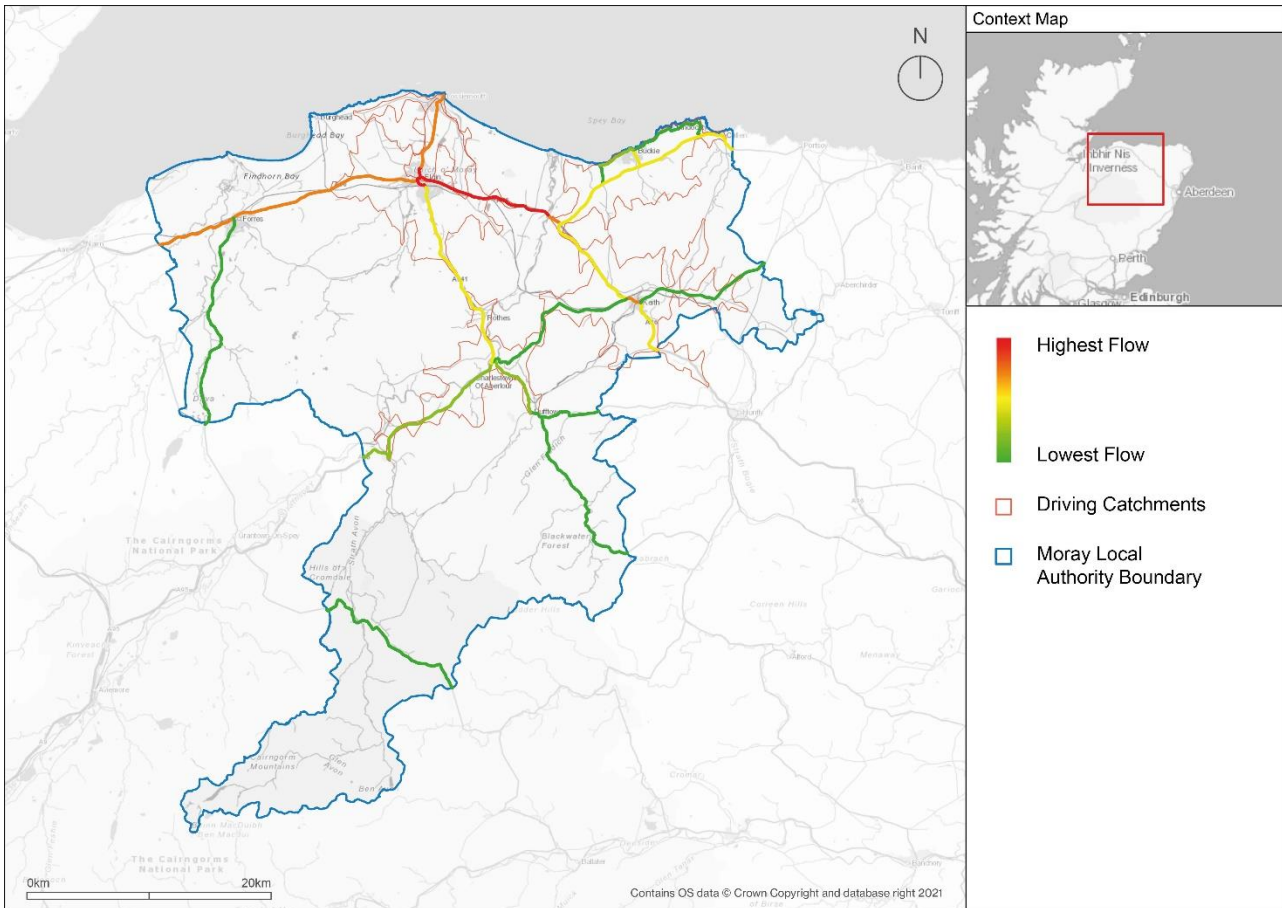
Source: Mott MacDonald

As such, analysis of LGV flows has again resulted in Elgin ranking the highest of the proposed locations, followed closely by Lossiemouth in second and Keith third.

4.3 Car/Taxi Flows

Figure 4.3 indicates the distribution of car and taxi flows across Moray. Road links highlighted in red indicate the highest levels of cars and taxis, with those in green denoting the lowest. Red outlines indicate the catchments used to analyse the potential future demand at each of the high-level potential HRS locations. Analysis of this data has been summarised in Table 4.3.

Figure 4.3: Car/Taxi Flow Analysis



Source: Mott MacDonald

The highest levels of Car and Taxi traffic within Moray are clearly located within the vicinity of Elgin. The A96 east of the town (between Elgin and Fochabers) and certain stretches of the A941 northwards towards Lossiemouth are some of the most heavily trafficked routes within the local authority. This is reflective of Elgin’s status as both Moray’s administrative centre and largest settlement, with a total population of around 23,000.

Table 4.3: Potential HRS Location Ranking by Potential Car/Taxi Demand

Potential HRS Location	Av. Daily Car/Taxi Flow [within 10-minute drive]	Ranking
Lossiemouth	5,269	1
Elgin	5,043	2
Keith	4,106	3
Aberlour	4,013	4
Buckie	3,974	5

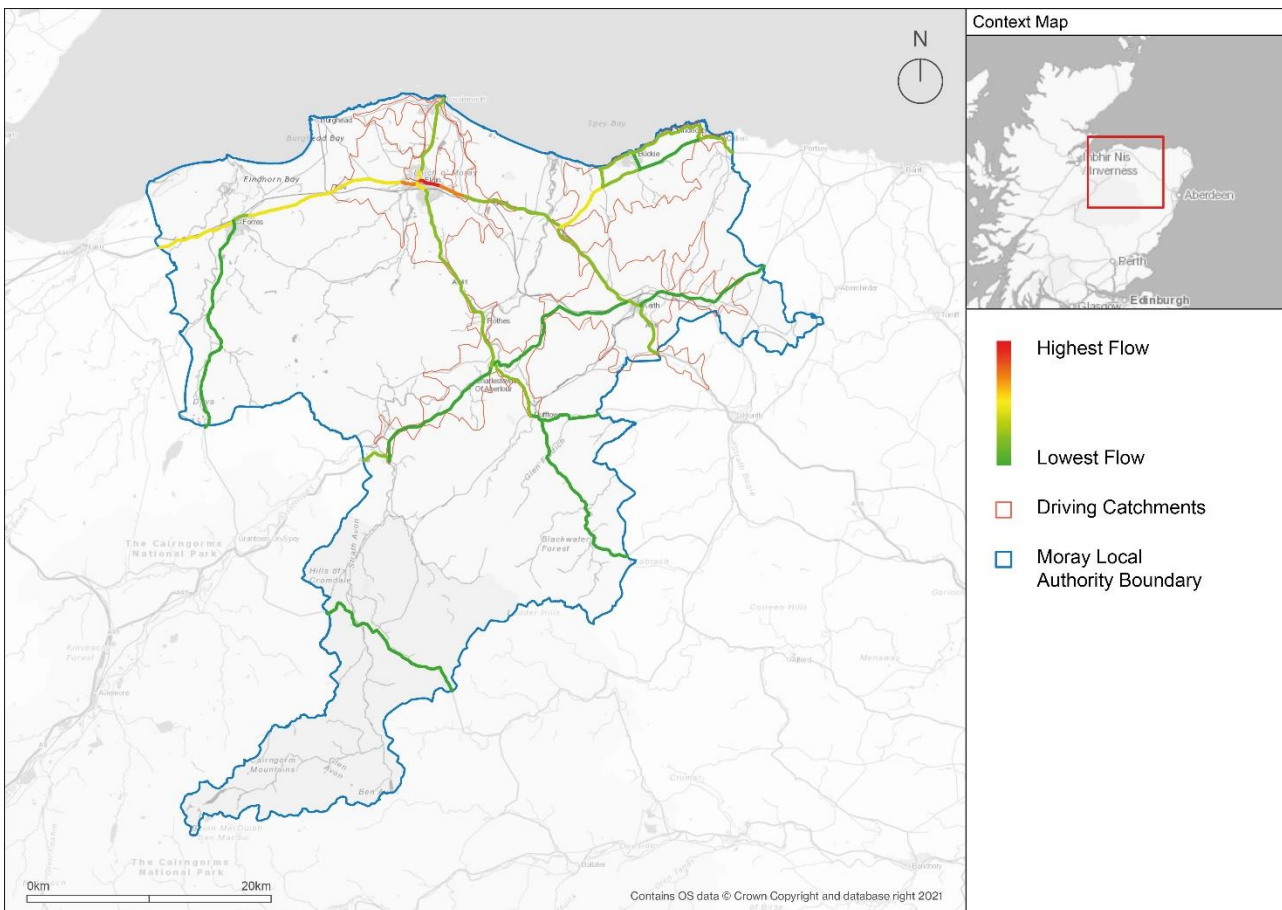
Source: Mott MacDonald

However, analysis of each of the potential HRS locations as set out in Table 4.3 ranks Lossiemouth, not Elgin, as the preferred location in this instance. This is likely due to the proximity of, and interdependency between, Elgin and Lossiemouth in terms of services, amenities and employment opportunities. Furthermore, the presence of RAF Lossiemouth is likely to generate significant additional car traffic, including military personnel, civilian staff, and visitors accessing the base.

4.4 PSV Flow

Figure 4.4 indicates the distribution of PSV flows across Moray. Road links highlighted in red indicate the highest levels of PSV traffic, with those in green denoting the lowest. Red outlines indicate the catchments used to analyse the potential future demand at each of the high-level potential HRS locations. Analysis of this data has been summarised in Table 4.4.

Figure 4.4: PSV Flow Analysis



Source: Mott MacDonald

Figure 4.4 suggests that the higher PSV flows are again focused in and around Elgin, with isolated instances of higher PSV traffic east of Elgin towards Buckie on the A98. Similar to the analysis of car and taxi flows set out in Section 4.3, however, Lossiemouth ranks first out of the potential HRS locations; followed closely by Elgin in second and Buckie in third. Again, this is suggestive of the significant impact that proximity between the two settlements has on traffic movements within the area.

Table 4.4: Potential HRS Location Ranking by Potential PSV Demand

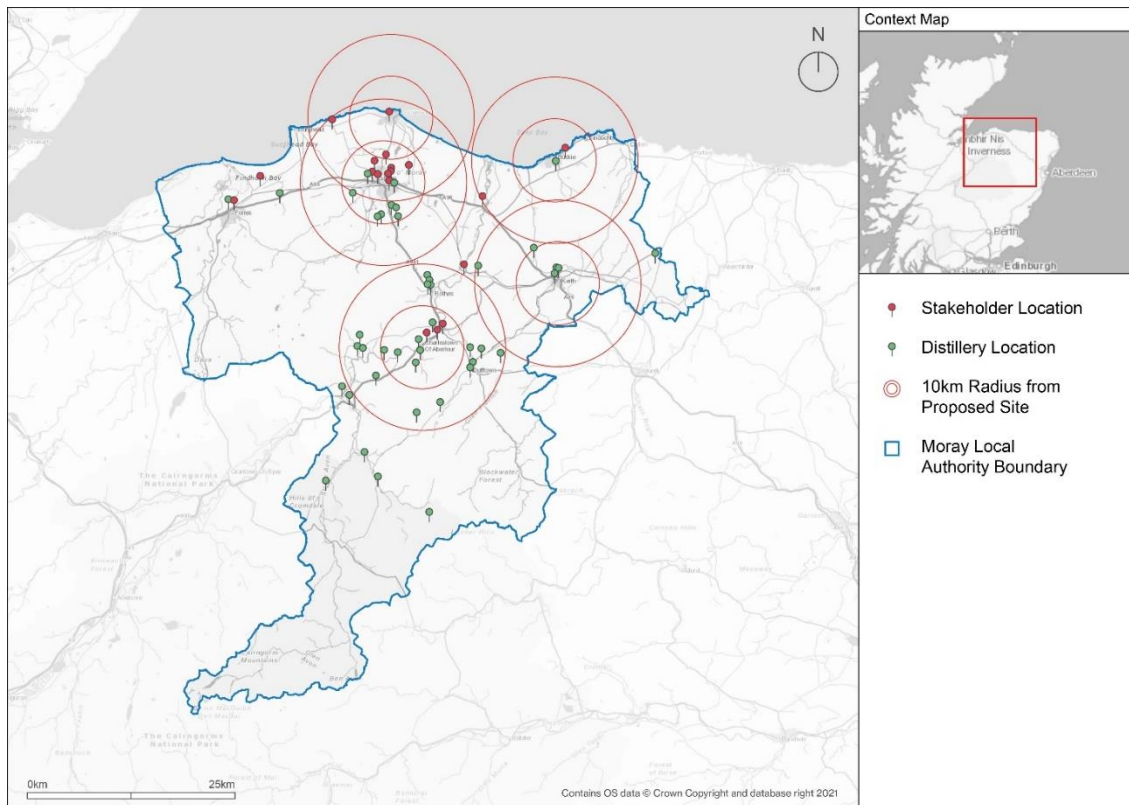
Potential HRS Location	Av. Daily PSV Flow [within 10-minute drive]	Ranking
Lossiemouth	53	1
Elgin	51	2
Buckie	38	3
Aberlour	36	4
Keith	28	5

Source: Mott MacDonald

4.5 Stakeholder Proximity Analysis

Figure 4.5 reveals the proximity of key stakeholders to each of the potential HRS locations. Red pins denote stakeholders included as part of our concurrent engagement exercise and green pins denote distilleries. Analysis of each potential HRS location (including ranking) is summarised in Table 4.5 and Table 4.6.

Figure 4.5: Stakeholder Proximity to Proposed HRS Locations



Source: Mott MacDonald

Table 4.5: Potential HRS Location Ranking by Proximity to Key Stakeholders

Potential HRS Location	No. Key Stakeholders [within 10km radius]	Ranking
Elgin	11	1
Lossiemouth	4	2
Aberlour	3	3
Buckie	2	4
Keith	0	5

Source: Mott MacDonald

Elgin with Moray’s largest population and serving as the local authority’s administrative centre, ranks highest of the five potential HRS locations in the proximity analysis to key stakeholders. Moray Council, local emergency services, NHS Grampian, Scottish Water and Stagecoach are some of the organisations which have depots either nearby or within Elgin itself. Additionally, RAF Lossiemouth is located less than 10km away from the centre of Elgin and could feasibly make use of an Elgin-based HRS should this location be taken forward as part of the pilot. Lossiemouth, with four key stakeholders within 10km, ranks second; although it should be noted that these four would also be served by Elgin (likewise being within 10km of Elgin).

Aberlour ranks third and, in addition to being geographically located at the centre of Moray’s whisky industry, is also home to several businesses and logistics companies with sizeable fleets, such as Carntyne Logistics and the Forsyth Group. Buckie and Keith ranked fourth and fifth respectively with significantly fewer of the key stakeholders within range. It is worth noting, however, that Baxter’s – a major local employer with a sizeable fleet and logistics operation – would sit within range of a potential Buckie-based HRS location.

Predictably, the highly concentrated nature of the whisky industry within Moray has resulted in Aberlour ranking first in the proximity analysis to distilleries. Located within the heart of Speyside, an Aberlour-based HRS has the potential to support the operations of 21 nearby distilleries including major whisky distillers such as Glenfiddich and Macallan. Elgin and Keith ranked second and third with eight and five distilleries in close proximity respectively. Buckie has only a single distillery nearby and Lossiemouth has none.

Table 4.6: Potential HRS Location Ranking by Proximity to Distilleries

Potential HRS Location	No. Distilleries [within 10km radius]	Ranking
Aberlour	21	1
Elgin	8	2
Keith	5	3
Buckie	1	4
Lossiemouth	0	5

Source: Mott MacDonald

4.6 Summary of Analysis

The results of the multi-criteria analysis are summarised in Table 4.7. Weightings, as set out in Table 3.1, have been applied to each criterion with a summary ranking score subsequently calculated.

Table 4.7: Potential HRS Location Ranking – Summary of Analysis

Potential HRS Location	HGV Ranking	LGV Ranking	Car/Taxi Ranking	PSV Ranking	Stakeholder Proximity Ranking	Distillery Proximity Ranking	Summary Ranking
Elgin	1	1	2	2	1	2	1
Lossiemouth	2	2	1	1	2	5	2
Aberlour	5	4	4	4	3	1	3
Keith	4	3	3	5	5	3	4
Buckie	3	5	5	3	4	4	5

Source: Mott MacDonald

The assessment reveals that **Elgin** scores highest amongst the five potential HRS locations. The road network in and immediately around the town sees significantly higher average HGV and LGV flows compared to Moray as a whole, as well as some of the highest average PSV flows. Assuming that adoption of hydrogen fuelled vehicles materialises in line with anticipated market trends, locating Moray’s first HRS near Elgin would likely serve the highest levels of future demand across the local authority. Additionally, the high concentration of stakeholders with sizeable fleets in and around Elgin cements the likelihood of future demand, particularly amongst commercial vehicles.

Lossiemouth ranks second highest of the potential HRS locations – in large part due to its proximity to both Elgin and some of the most heavily trafficked routes across Moray. Many of the stakeholders located in Elgin itself are within a short distance and could equally be served by a Lossiemouth-based HRS.

While scoring less than Elgin and Lossiemouth on traffic metrics, **Aberlour** ranks third based on the potential to support stakeholders and, crucially, the whisky industry within Moray.

Comparatively, both **Keith** and **Buckie** scored poorly when considering both traffic metrics and stakeholder proximity. While both are located on well trafficked routes spanning Moray, demand is consistently higher in the west of the local authority. Furthermore, there are considerably less stakeholder within close proximity to both locations, with far greater potential to serve higher numbers of key stakeholders or distilleries in Elgin/Lossiemouth and Aberlour respectively.

5 Stakeholder Engagement Exercise

At the time of writing, stakeholder engagement discussions have been held with representatives from the following organisations:

- Kinloss Barracks (MoD)
- RAF Lossiemouth (MoD)
- Carntyne Transport
- Forsyth Group
- NHS Grampian
- Scottish Water
- Moray Council

Representatives from each organisation are those who either have an interest in or responsibility for transport and fleet operations. Discussions were held virtually via MS Teams over the course of May and June 2023.

A broad topic guide was issued in advance of each session, with questions covering four separate sections:

- **Existing Fleets:** an opportunity to establish fleet information if no previous data was made available, as well as updates on both fleet size and composition if applicable.
- **Fleet Movements:** an opportunity to better understand the travel patterns and traffic movements undertaken by fleets, with a particular focus on key routes, destinations and service catchments.
- **Fleet Transition Plans:** an opportunity to discuss current plans or aspirations to transition existing fleet to hydrogen (and other non-ICE vehicle types) as well as timescales (i.e., short, medium, long-term).
- **Barriers:** an opportunity for stakeholders to describe what they believe the key barriers are with regards to fleet transition towards hydrogen.
- **Final Thoughts:** This segment provided stakeholders with a space to voice any further thoughts not previously covered; including a preference (if any) for a potential HRS location, as well as any other points they felt may be important to the ongoing study.

5.1 Existing Fleets

Fleet sizes of those stakeholders engaged ranged from a minimum of 150 to well over 500 vehicles. Generally, there has been very little change since initial engagement as part of the development of the Moray Hydrogen Strategy with no sizeable expansions or reductions in the number of vehicles.

Composition of fleets varies significantly, with some primarily comprising HGVs (Carntyne and the Forsyth Group) and others focused more heavily on cars and lighter commercial vehicles (Scottish Water and NHS Grampian). All stakeholders have HGVs as part of their fleets to some degree. Kinloss Barracks, RAF Lossiemouth and Moray Council instead own fleets with a broad range of vehicles; many of which are explicitly classed as service vehicles – for example, airside vehicles at Lossiemouth or Moray Council's fleet of gritters.

5.2 Fleet Movements

Six out of seven of the organisations operate at, at least, a regional level with fleet movements covering the breadth of Moray and in some cases operating into the wider Highlands and parts of Aberdeenshire. Movements are typically made on the strategic road network, with some (Carntyne and the Forsyth Group) also utilising cross-country routes southwards towards the A9 in their respective capacities at logistics services supporting the whisky industry. RAF Lossiemouth was the only organisation stating that fleet movements were largely restricted within the grounds of the airbase. The RAF notes that due to the high numbers of civilian and military staff both living and working on site, there are around 1,300 cars driving to and from Lossiemouth on a daily basis. Despite larger fleet vehicles operating locally, the base is significant trip generator within Moray.

5.3 Fleet Transition Plans

All organisations noted aspirations to convert their fleets to more sustainable vehicle types. Some, for example Kinloss Barracks, noted that while there is interest in conversion to hydrogen fuelled vehicles, the current lack of supporting infrastructure has resulted, instead, in a concerted focus on EVs. This is a general theme across the MoD estate where, currently, the ability to refuel vehicles using hydrogen is extremely limited. As critical elements of the UK's defence infrastructure, locations such as Kinloss Barracks need to have a continual and guaranteed fuel supply; something which is simply not possible with hydrogen at present. Conversely, although RAF Lossiemouth too noted that vehicles were generally moving towards battery electric, a successful trial of hydrogen vehicles at an airbase in England took place last year and demonstrated the potential for viability for larger hydrogen vehicles supporting airside operations. The RAF may therefore still consider hydrogen fuel as a potential option to supplement fleet transition plans.

Public sector organisations, such as NHS Grampian, Scottish Water and Moray Council, noted a willingness to transition to hydrogen fuelled vehicles. NHS Grampian in particular suggested that in the longer-term it is hoped that HGVs and LGVs within their fleet would be hydrogen fuelled. The current focus for these organisations – in line with respective net zero and carbon reduction strategies – is addressing what is currently feasible. For both organisations, this means converting cars and smaller commercial vehicles to battery electric vehicles in the absence of widespread, commercially feasible hydrogen options.

In a similar vein, both Carntyne and the Forsyth Group noted the likelihood of fleets transitioning in a similar manner. Cars and smaller commercial vehicles would likely switch to battery electric vehicles, with HGVs and larger vehicles fully converting to Hydrogen. Crucially, both Carntyne and the Forsyth Group expressed their intentions to convert their entire HGV fleets to hydrogen in the future. Carntyne in particular advised of recent developments in applying for grant funding to support these activities, as well as plans to bring a small number of hydrogen HGVs (3-4) into their operations this year.

5.4 Barriers to Hydrogen Uptake

When asked what was preventing the conversion of fleets to hydrogen, organisations unanimously noted the lack of available technology and supporting infrastructure required to enable such activities. Some organisations noted that where technology *is* currently available, restrictive costs – both in terms of capital investment (vehicles) and operations (fuel) – were the primary barrier. Notably, Carntyne and the Forsyth Group; the two organisations with the clearest strategies for moving forward with hydrogen uptake, also identified a lack of widespread skills within the hydrogen technology space and supply chain. Both voiced concerns over a lack of potential engineers to support the repair and maintenance of vehicles and equipment as and when fleet conversion occurs.

5.5 Final Thoughts

Stakeholders were then given the opportunity to discuss any items not previously covered, including a preference (if any) for a future HRS in Moray. Carntyne advised that in addition to their plans for acquiring a small number of hydrogen HGVs, the organisation was also in the process of undertaking a feasibility study into the development of site facilities which would potentially enable on-site storage of hydrogen.

Broadly, Elgin was considered as a strong potential location for a future HRS. A location which would “support the whisky sector” was also considered an appropriate choice by a number of organisations.

5.6 Implications for Hydrogen Refuelling Station Selection Process

Ultimately, our stakeholder engagement exercise revealed a broad consensus for the transition of existing fleets to low-emission vehicle types. All stakeholders now hold strategies and policies leading their respective organisations towards net-zero targets which include the uptake of both battery electric, and hydrogen fuelled vehicles.

In line with our own understanding of potential market trends, fleet operators within Moray also see a likely future where they operate ‘hybrid’ fleets; comprising smaller battery electric vehicles for personal and commercial use and larger hydrogen fuelled service vehicles to support the movement of freight, fuel and logistics.

Considering the results of the ranking exercise as set out in Table 4.7 none of the information gathered as part of the stakeholder engagement exercise suggests that the rankings assigned to Keith (4), or Buckie (5) should change. Aberlour (3), however, is home to two organisations which have: expressed a strong preference for uptake in hydrogen fuelled vehicles; have sizeable HGV numbers within their fleets; and (in one instance), are actively taking measures to advance their own fleet transition plans. It is therefore deemed reasonable to lift Aberlour’s ranking above that of Lossiemouth (2). While Lossiemouth is home to RAF Lossiemouth, the organisation themselves have noted that in future, hydrogen vehicles would likely operate within the confines of the base. A future HRS may therefore see limited wider benefits compared to other high-scoring potential locations.

Given the broad preference for Elgin as a potential HRS location, it’s ranking at (1) remains unchanged.

A revised summary ranking table considering the findings of the stakeholder engagement exercise is included in Table 5.1.

Table 5.1: Revised Potential HRS Location Ranking

Potential HRS Location	Previous Score	Change (After Stakeholder Engagement Exercise)	Revised Score
Elgin	1	–	1
Aberlour	3	↑	2
Lossiemouth	2	↓	3
Keith	4	–	4
Buckie	5	–	5

Source: Mott MacDonald

6 Social Outcomes

Moray Council have expressed their strong wishes with respects to capitalising on the benefits of a hydrogen economy to improve local communities by creating sustainable economic growth, youngster retention in Moray and decreasing regional unemployment rates. As such, a nearly exhaustive local needs assessment in all of the potential "hub" locations was conducted. Several key factors like labour markets in local areas, skills and training, local economy as well as health and wellbeing have contributed to the overall evaluation. Please refer to Appendices C to G for further detail.

6.1 Moray – Local Context

Moray, with an estimated population of 95,700, has 61.2% of its population in the working age bracket, which is lower than both Scotland (63.9%) and UK (62.4%) averages. 77.4% of the local population are economically active, with 17% of the workforce engaged in manufacturing, 10% in food and drink manufacturing, and 10% in tourism. In contrast to the Scotland and UK averages, Moray has a significantly larger proportion of skilled trade occupations (13.2%) and process plant & machine operatives (10.85%), and a lower share of employment in higher-level occupations.

Although the regional unemployment rate is lower in Moray than in Scotland and GB, there is a marked increase in unemployment among the 16-24 age group. Reports indicate that a key barrier to employment in the region is the disparity between young people and employers' perceptions of entering the world of work. Specific barriers for young people are anxiety and confidence issues (23%), the need for previous experience (22%), discrimination on age, gender, or race (11%), health conditions (10%), and a lack of local opportunities (10%).

Fuel poverty is a significant issue in Moray affecting around 32% of households, the third highest level of Scottish authorities.

Approximately 300 businesses start each year in Moray, with a high proportion of micro and SME businesses located in the region. Despite having a low business birth rate compared to the Scottish average, perhaps owing to its unique health ecosystem, Moray has potential to become a leading location for research and development in the life sciences, digital, and technology sectors. The area has several purpose-built business parks located at Elgin and Forres, which are home to thriving local businesses such as Hunted Cow, IT Central, Fibre 1, Orbex, and Biomatrix Water Solutions.

6.2 Location Appraisal

Moray is considered a natural location to establish a hydrogen economy and develop wider green technologies to support Scotland's renewable energy supply chain. There are significant opportunities to generate local community benefits in relation to social, economic, and environmental wellbeing.

In this report, we assess five key locations across Moray to determine which requires the most socio-economic and community benefit intervention to support council identify where pilot-project, end-use or storage of hydrogen-based facilities should be based.

The five locations as seen in Figure 6.1 have been selected based on the outcomes of the potential demand assessment conducted as part of the scope for Phase 1:

- Elgin

- Lossiemouth
- Aberlour
- Blackhillock (Keith)
- Buckie Harbour

Figure 6.1: Map showing potential hydrogen ‘hubs’



Source: Moray Council

6.3 Approach

A desk-based analysis was conducted a desk-based analysis for each location. This involved examining the relevant local development plans, economic development strategies, and area profiles to gain a comprehensive understanding of the local needs. The aim was to determine the level of local need across each site to determine which required the most socio-economic and community benefit intervention to improve the outcomes of the area against Scottish national averages.

We utilised socio-economic, public, and census data, along with baseline Scottish national averages as seen in Table 6.2, to assign a score for each theme to each location using a scoring matrix of one to five as per Table 6.1. The total score obtained for each location determined its ranking, with higher scores indicating a greater local need for intervention.

Four key themes were selected to categorise data and support our analysis, to determine how each location performed was measured against each theme:

- **Labour Market and Local Area** – data researched included local population figures, employment and unemployment rates, occupation groupings, and levels of deprivation.


- **Skills and Training** – data researched included number of schools and colleges, local education attainment, and proportion of skilled labour in the market.
- **Local Economy** – our research included explore current local businesses, diversity of local economy, productivity rates and industry employment levels.
- **Health and Wellbeing** – data researched included greenspace per 1000 population, community facilities and assets, and health and wellbeing data.

6.4 Location Ranking

6.4.1 Scoring Matrix

For this report, a scoring matrix that outlines the correlation between level of socio-economic and community benefit intervention level of local need against Scottish national averages was developed as seen in Table 6.1. The need, associated with each location’s performance and ranking. The score assigned for each location is a cumulative figure out of 20 that reflects how a location compares against Scottish national averages, and comparatively against each other based on data contained within local development plans, and strategies.

Table 6.1: Scoring Matrix

Score	1	2	3	4	5
Site compared to Scottish average	Significantly better than average	Better than average	Average	Below average	Significantly below average
Level intervention needed	Least				Most

Source: Mott MacDonald

6.4.2 Scottish National Baseline Criteria

Several key Scottish national baseline metrics and criteria were utilised to support the development of the scoring matrix and map out the level of local need required for each of the five locations as per Table 6.2.

Table 6.2: Scottish Baseline Statistics

Theme	Criteria	Scottish Statistics	Baseline
Labour Market and Local Area	Unemployment Rate (2022)	3.2% ³	
	Percentage of population experiencing income deprivation	12% ⁴	
	Percentage of population in managerial or professional occupations (2011)	37.8% ⁵	
Skills and Training	Percentage of population with no qualifications (2011)	26.8% ⁶	

³ <https://www.bbc.co.uk/news/uk-scotland-62560395>

⁴ <https://simd.scot/#/simd2020/BTTTTFTT/9/-4.0000/55.9000/>

⁵ [Finalised Area Profile 2015 - ABERLOUR \(yourmoray.org.uk\)](#)

⁶ [Education | Scotland's Census \(scotlandscensus.gov.uk\)](#)

Theme	Criteria	Scottish Statistics	Baseline
	Percentage of population with a standard grade or equivalent as highest qualification (2011)	23.1% ⁷	
	Percentage of population with degree or professional qualification (2011)	26.1% ⁸	
	Percentage of people in skilled trades occupations (2011)	12.5% ⁹	
Health and Wellbeing	Percentage of population who described their health as 'very good' or 'good' (2011)	82.2% ¹⁰	
	Percentage of population who consider themselves limited by a long-term health problem or disability (2011)	19.6% ¹¹	
	Percentage of population with a mental health condition (2011)	4.4% ¹²	
	Obesity rate per 100 patients (2011)	8.05 ¹³	
Local Economy	Economic Activity Level (2019)	77.9% ¹⁴	
	Self-employment rate (2019)	11% ¹⁵	
	Participation in Manufacturing Industry (2019)	7.5% ¹⁶	
	Gross Domestic Product Growth Rate (Dec 2022)	0.1% ¹⁷	

Source: Mott MacDonald

6.5 Location ranking and scoring

This section presents the ranking for each location based on the desk-based analysis of available socio-economic data. Each location was scored on a scale of one (least need) to five (most need) for each theme, to identify which site requires the most socio-economic and community benefit intervention. The location with the highest score was considered to have the greatest need for intervention.

Through this scoring and ranking process, **Buckie** emerged as the highest ranked location, indicating that both the site and local community would benefit from significant social and economic intervention across all categories. On the other hand, **Lossiemouth** was ranked the lowest, with relatively higher levels of good health, educational attainment, and employment.

For a detailed summary of scores and the justification that informed the ranking, please refer to Table 6.3 below.

⁷ [Area Profile 2016 - LOSSIEMOUTH - Draft2 \(yourmoray.org.uk\)](#)

⁸ [Education | Scotland's Census \(scotlandscensus.gov.uk\)](#)

⁹ [Finalised Area Profile 2015 - ABERLOUR \(yourmoray.org.uk\)](#)

¹⁰ [Area Profile 2016 - LOSSIEMOUTH - Draft2 \(yourmoray.org.uk\)](#)

¹¹ [Area Profile 2016 - LOSSIEMOUTH - Draft2 \(yourmoray.org.uk\)](#)

¹² [Finalised Area Profile 2015 - ABERLOUR \(yourmoray.org.uk\)](#)

¹³ [Finalised Area Profile 2015 - ABERLOUR \(yourmoray.org.uk\)](#)

¹⁴ <https://www.hie.co.uk/media/6342/moraypluskeyplusstatisticsplus2019.pdf>

¹⁵ <https://www.hie.co.uk/media/6342/moraypluskeyplusstatisticsplus2019.pdf>

¹⁶ <https://www.hie.co.uk/media/6342/moraypluskeyplusstatisticsplus2019.pdf>

¹⁷ <https://www.gov.uk/government/news/scottish-secretary-responds-to-gdp-for-q4-2022-and-december-2022>

Table 6.3: Location ranking against key themes

Overview		Labour Market and Local Area	Skills and Training	Local Economy	Health and Wellbeing	Total Score	Rank
Location	Maximum Score	5	5	5	5	20	N/A
Elgin	Score	4	2	1	4		
	Justification	<p>Elgin's unemployment rate has increased in recent years, rising from 4% in 2011 to 6.49% in Dec 2022 – significantly higher than the national average. The town also has high levels of deprivation in the East – with two areas ranking within the most deprived 20% of data zones, and one within the most deprived 10% (figure. A.1). These areas scored poorly in and could benefit from interventions in the areas of education/skills, income, and employment – all which hydrogen development could benefit. However, although lower than the national average, the proportion of people in managerial and professional occupations is higher than most site areas. Furthermore, some areas in West Elgin were within the least deprived 10% of data zones bringing down the score.</p>	<p>After Lossiemouth, fewer people have no qualifications in Elgin compared to the other locations (26.6%). This is also consistent with the national average. There is also a similar percentage of people with (higher education) degrees in Elgin compared to Lossiemouth and Aberlour. However, this is still lower than the national average. Elgin also has a wider range of education establishments compared to other areas including the only higher education college in Moray – UHI Moray. This greatly benefits the skills and training of people in the area.</p>	<p>Good level of diversification and identified as a primary growth area in Moray Local Development Plan 2020 – already a focus for economic development through creation of a cultural quarter. Intervention in this area would have more benefit in other towns.</p>	<p>Following Lossiemouth, people in Elgin reported fewer health issues in the 2011 census compared to the other locations. Elgin also has a range of community facilities and green spaces. However, health statistics in Elgin East are significantly lower compared to other parts of Elgin, Moray, and the rest of Scotland.</p>	11	4
Lossiemouth	Score	1	2	3	1		
	Justification	<p>The local population is largely employed by the local RAF base, and as such the area</p>	<p>Lossiemouth has the smallest proportion of people who don't have any</p>	<p>Market diversification is lower in Lossiemouth due to the significant presence</p>	<p>Lossiemouth has the lowest levels of health or other related issues compared to</p>	7	5

Overview	Labour Market and Local Area	Skills and Training	Local Economy	Health and Wellbeing	Total Score	Rank
	has lower rates of unemployment (4.3%) compared with other sites. The proportion of people in managerial and professional occupations is also higher than the average for Moray and Scotland. A hydrogen economy could support future labour market diversification, however, other locations, e.g. Buckie, would require more immediate intervention.	qualifications of the 5 locations (21.9%). This is also significantly lower than the national average (26.8%). It also comes a close second in terms of the proportion of people who have a (higher education) degree (21.5%) – despite this, the figure is still lower than the national average.	of the RAF base which is the primary employer. Development of a hydrogen and market diversification could benefit local residents by supporting a more diverse labour market, however, compared to other locations, Lossiemouth does not require the most intervention.	the other locations, as a result, there is less need for intervention compared to other sites under consideration.		
Aberlour	Score 1	4	4	5		
	Justification Aberlour has the lowest levels of unemployment (2.3%) compared to other sites. Aberlour also has low levels of deprivation, with all areas in the town being identified as the least deprived 30% and 40% of Scottish data zones. Although the proportion of people in professional and managerial occupations is lower than the average, it is mid-range compared to the other site areas. Considering this, other locations would benefit more from intervention.	Aberlour could benefit from intervention in this area to an extent. While it scores the second highest % of people who have no qualifications (35.7%), and the lowest percentage of people achieving a standard grade or equivalent compared to other areas (23.5%), 21.8% of the population have (higher education) degrees – the highest of all 5 sites.	Market diversification is lower in Aberlour compared to other areas with 35% of the population working in manufacturing due to the proximity of the food manufacturers and whisky distilleries here. The increased market diversification that will be brought about by hydrogen development can support the increase in people working in different industries.	Aberlour would benefit the most from intervention in this area. It has the lowest proportion of people who rated their health as 'good' or 'very good' compared to the other sites and has a significantly higher proportion of people with long-term health issues compared to other sites and the national average.	14	2
Blackhillock (Keith)	Score 4	5	2	3		
	Justification Keith had the second lowest levels of unemployment of the sites (3.4%). However, only 20.6% of those	Keith has the highest % of people who have no qualifications compared to the other locations (37.2% of	Good level of market diversification however majority of manufacturing	Other areas like Aberlour and Elgin would benefit more from intervention in this area. Keith's health	14	2

Overview	Labour Market and Local Area	Skills and Training	Local Economy	Health and Wellbeing	Total Score	Rank
	employed work within high income occupations, significantly lower than the national average (37.8%), and the lowest of all site areas. Southern Keith has higher levels of deprivation compared to the North, with one area being part of the most deprived 30% of data zones.	population). It also has the lowest percentage of people who hold a degree or higher degree (14.2%). Although Keith has the highest proportion of people in skilled occupations compared to the other locations, and significantly higher than the national average, intervention is particularly needed in skills and training as parts of Southern Keith (within most deprived 30% of Scotland) scored poorly in education/skills.	linked to 4Nr whisky distilleries located here.	statistics were mid-range compared to other areas and displayed similarities when compared to national averages. However, obesity rates in Keith were significantly higher than the national average, and when compared to the other locations.		
Buckie	Score 5	4	4	3		
	Justification Buckie is the second largest town within the Moray region, with the highest levels of unemployment (9.7%) and deprivation. Buckie also has one of the lowest proportions of people in high income occupations compared to the other locations. To improve this, socio-economic initiatives associated with a hydrogen economy should prioritise Buckie as an area of focus.	Buckie has the third highest % of people who have no qualifications (34%), and the second lowest % of people with a (higher) degree (15.4%). However, compared to the other sites and the national average, there is a higher proportion of people who have achieved a standard grade or equivalent (28.9%). While intervention may be needed in terms of formal education routes, practical skills in the labour market is high with a high proportion of people in skilled occupations (18.7%).	While market diversification is highest in Buckie compared to the other locations, residents have expressed that access to quality employment is a concern, limited by poor transport options. Buckie East also scored poorly in terms of income and employment, contributing to the high levels of deprivation in the area. Buckie could benefit from the economic impact that hydrogen development will bring to the area.	Other areas like Aberlour and Elgin would benefit more from intervention in this area. Buckie's health statistics were mid-range compared to other areas. However, a quarter of community members in Buckie Central East felt powerless in their influence on community matters.	16	1

Source: Mott MacDonald

6.6 Community Benefit Measuring Success

To maximise the benefits of a potential hydrogen economy, aligned with four key themes, we have identified several KPIs, and metrics that could be utilised to measure success of any community benefit intervention, aligned to reflect the Scottish Government’s Community Wellbeing Model. This is supported by a high-level list of potential initiatives that would help deliver the council’s hydrogen community benefits objectives.

Table 6.4: Initiatives and Metrics for Measuring Success

Theme	Potential Initiatives	Metrics
1 Labour Market	<ul style="list-style-type: none"> Develop bespoke Employment and Skills Plan (ESP) for all hydrogen related projects in Moray The ESP should identify employment and training opportunities, including establishing and setting out key KPIs, targets and focus areas for skills development. Use the ESP to map out the pipeline of potential opportunities to ensure stakeholders, businesses and education providers have sufficient capacity, skill, and resource to capture the benefits of hydrogen in Moray. Ring fenced employment for residents Consider ring-fencing a percentage of potential employment opportunities resulting from a hydrogen economy. Set a defined target and KPIs, e.g. 20% local people employed per contract, with a stretch target of 30% - 50%, and embed this commitment into the supply chain and other contractual agreements. 	<ul style="list-style-type: none"> Reduced levels of unemployment Improved employment rates Increased proportion of those employed in hydrogen related sector Wage growth due to higher paid employment opportunities associated with hydrogen technology. The number of full-time equivalent (FTE) employment opportunities created for those who were made redundant due to COVID-19. A defined target for ring-fencing jobs related to hydrogen economy and development.
	<ul style="list-style-type: none"> STEM School Engagement Connect with local schools to deliver STEM workshops, events, talks and industry engagement days to inspire the next generation about careers in the hydrogen sector. To ensure there is consistent and sustainable development of local skills and knowledge around hydrogen, local project teams can look to deliver engagement sessions (e.g., industry insight days, careers talk, project talks, mentoring, CV advice, mock interviews) focused on building awareness, providing an opportunity to attract more people to hydrogen careers. Apprenticeships and Industry Placements Work with local training and educational providers, including UHI Moray, to develop bespoke apprenticeship programmes, aligned with the hydrogen based high-level specialist skills required for the development of a hydrogen economy in Moray. Set targets and KPIs to ensure apprenticeships and industry placements are delivered. Opportunities should be promoted and support young people, those furthest from the labour market, from disadvantaged backgrounds or from underrepresented groups. Work Placements Develop a bespoke work placement programme with defined targets. Identify relevant delivery partners and educational institutions to deliver programme. Focus on hydrogen skill development, promoted to young people, those furthest from the labour market, from disadvantaged backgrounds or from underrepresented groups. 	<ul style="list-style-type: none"> Improved business benefits Increased training investment for local people Increased apprenticeships, internships, and graduate opportunities in the decarbonisation space The number of apprenticeship opportunities (Level 2, 3, and 4+) created or retained. The number of training opportunities (Level 2, 3, and 4+) created or retained. The number of people-hours of learning interventions delivered. Work placements for local people to boost skills

Theme	Potential Initiatives	Metrics
	<ul style="list-style-type: none"> ● Improved Training Provisions <p>Work with local education providers, universities, and colleges, including UHI Moray, to identify gaps in local skills and educational provision ahead of a development of a hydrogen economy create pipeline of relevant training and educational courses. Utilise industry expertise to co-design hydrogen training programmes and circulation to ensure stakeholders have access to adequate and best-practice training to capture opportunities presented by the hydrogen industry.</p>	
3	<p>Local Economy</p>	<ul style="list-style-type: none"> ● Local Business Engagement <p>Explore developing a series of general engagements with local businesses to increase local awareness of hydrogen technologies and associated business opportunities for organisations willing to engage. This will help build early awareness and provide the local supply chain opportunities to upskill and build capacity.</p> <ul style="list-style-type: none"> ● Meet the Buyer Events <p>Host regular Meet the Buyer Events as networking opportunities for local businesses and SMEs to ensure opportunities for wider supply chain involvement are promoted to ensure businesses are aware of upcoming opportunities and have sufficient time to prepare to capture the opportunities presented by hydrogen.</p> <ul style="list-style-type: none"> ● Supply Chain Capacity Building <p>Develop co-designed local supply chain capacity building sessions with local businesses to identify skills gaps, raise awareness of opportunities and support collaboration across the local economy, supporting market diversification.</p> <ul style="list-style-type: none"> ● Regional and National Partnerships <p>Explore regional and national programmes across the hydrogen supply chain to support more efficient delivery and increase value for money. This may also give communities and businesses greater access to industry networks and best practice from other schemes, helping to better inform local skills, share best practice and knowledge development to support an emerging hydrogen economy in Moray.</p>
4	<p>Health and Wellbeing</p>	<ul style="list-style-type: none"> ● Community Development Fund <p>Work with local community and organisations to explore establishment of a dedicated local community fund, to ensure profits or benefits of a hydrogen economy directly feed back into the local region or community projects, much like a social enterprise model¹⁸. This could facilitate a community development group to support and benefit from the overarching hydrogen investment.</p> <ul style="list-style-type: none"> ● Hydrogen fuelled Public Transport

¹⁸ In the Netherlands, social enterprises (companies with a primarily social mission) are pioneering the transition to a new economy, playing a crucial role in the transition of the business community towards creating a more sustainable economy with social benefits. Various examples from the Dutch social enterprise sector illustrate these activities, such as Tony's Chocolonely, Fairphone and Frank About Tea.

<https://www.social-enterprise.nl/english>

<https://business-spirit.news/news/dutch-social-enterprises-have-a-strong-influence-on-building-a-new-economy>

Theme	Potential Initiatives	Metrics
	<p>Improved accessibility and public transport provisions across Moray could support better access to employment hubs and other community assets that are essential to supporting a sense of community. Explore utilising hydrogen technology to develop a network of hydrogen bus shuttle routes for stakeholders to improve accessibility and access to opportunities.</p> <ul style="list-style-type: none">● Green hydrogen for food production The use of green hydrogen in food production, such as hydroponic farming, can reduce the use of harmful pesticides and improve the health and wellbeing of both consumers and workers.● Hydrogen for heating in homes and buildings In the long term, the use of hydrogen as a low-carbon heating source in homes and buildings can improve indoor air quality and reduce the risk of respiratory illnesses associated with traditional fossil fuel heating systems. Whilst a decision on the use of hydrogen for heating domestic properties is still to be made by the UK Government, this could be explored, particularly as an option for off-grid properties reliant on fuel oils or where other renewable energy options are not available.	

Source: Mott MacDonald

7 Road Refuelling Site Selection

This section outlines the site selection process which uses the findings of a quantitative multi-criteria assessment and the transport demand and social value analysis to recommend a suitable location for Moray's first HRS. This exercise will consider the five broad 'hubs' across the local authority area; Aberlour, Buckie, Elgin, Keith and Lossiemouth.

7.1 Assessment Methodology

This evaluation aims to identify the most suitable location of the first of a series of future HRS locations using the following elements:

- A qualitative **multi-criteria assessment** considering factors such as land, power, water, wastewater, road access, transport demand and social value.
- Land – Available suitable land at site for building a refuelling facility.
- Power, Water, Wastewater – Proximity Utilities required for a refuelling facility.
- Road Access – Ease of access for large vehicles, which are required for operations and potentially users.
- Transport Demand – Immediate transport (focus on PSV, HGV and LGV) demand.
- Social Value – Social value to the area of developing a refuelling facility.

The multi-criteria assessment was developed in the form of a scoring matrix, with each of the prospect sites evaluated ranking from three to one (i.e., 'best' to 'worst') as seen in Section 7.3.

Each criterion was allocated a weighting to reflect its considered impact on the suitability of a site location as outlined in Sections 7.2.1 to 7.2.7.

An initial screening of each of the 5 selected locations was carried out. Sites from each location were identified via desktop research, considering available space and proximity to potential offtakers and main roads.

These sites were presented to Moray Council via a Teams call. The council identified sites that were deemed to be unsuitable due to several issues that the Council had pre-existing knowledge of e.g. flood risk etc. The remaining sites compiled the initial prospects which are outlined below:

- Elgin
 - Ashgrove Road
 - A96 Travelodge Area
 - A96 Industrial Area
 - A941 adjacent to Culzean Avenue
 - A941 adjacent to Linkwood Road
 - Boroughbriggs Road/North Street
- Lossiemouth
 - RAF Lossiemouth ("outside the wire" location)
- Aberlour
 - A95 opposite Walker's Head Office
 - A95 SW Aberlour
- Keith

- Blackhillock Substation
- A96 South Keith
- Buckie
 - Buckie Harbour 1
 - Buckie Harbour 2
 - A942

Please refer to Appendices B to B.5 for a full overview of the prospect locations and sites.

7.2 Multi-Criteria Assessment

7.2.1 The Land

The site prospects were scored from three to one, i.e., from “best” to “worst” based on the availability of land for constructing a hydrogen refuelling facility as follows:

- 3 - 3000m² or more of available land for a hydrogen refuelling facility.
- 2 - Between 2000 and 3000m² of available land for a hydrogen refuelling facility.
- 1 - 2000m² or smaller of available land for hydrogen refuelling facility.

The size of the plot is a significant factor although as landowner engagement and geotechnical properties of the land had not been considered, therefore the land criterion was allocated a high weighting of 20%.

7.2.2 Power

The site prospects were scored from three to one, i.e., from “best” to “worst” based on the distance to the nearest suitable power supply option (substation/high voltage cable):

- 3 - Nearest suitable power supply option is within 100m of site location.
- 2 - Nearest suitable power supply option is between 100-500m of site location.
- 1 - Nearest suitable power supply option is further than 500m of site location.

As a hydrogen refuelling facility without on-site production does not have significant power demands, the power criterion was allocated a low weighting of 5%.

7.2.3 Water

The site prospects were scored from three to one, i.e., from “best” to “worst” based on the distance to the nearest water supply option (water distribution pipe):

- 3 - Nearest water supply option is within 100m of site location.
- 2 - Nearest water supply option is between 100-500m of site location.
- 1 - Nearest water supply option is further than 500m of site location.

Water supply is an important consideration in the selection of a suitable site location, but it was not considered as critical to the feasibility and cost of the project, therefore the water supply criterion was allocated a low weighting of 5%.

7.2.4 Wastewater

The site prospects were scored from three to one, i.e., from “best” to “worst” based on the distance to the nearest wastewater main (gravity pipe):

- 3 - Nearest wastewater main is within 100m of site location.
- 2 - Nearest wastewater main is between 100-500m of site location.
- 1 - Nearest wastewater main is further than 500m of site location.

Due to the relatively low anticipated volumes of wastewater from the hydrogen refuelling facility, the wastewater criterion was allocated a low weighting of 5%.

7.2.5 Road Access

The site prospects were scored three to one, i.e., from “best” to “worst” based on the proximity and access to a ‘main’ road (A-road):

- 3 - The site is located on or close (<100m) to a main road with no restrictions for large vehicles.
- 2 - The site is reachable from a main road via several smaller but still accessible roads.
- 1 - The site has restricted access for large vehicles.

Road access was a significant factor to consider as large vehicles will frequently be using the facility. Hydrogen is likely to be delivered via tube trailer trucks and some potential users (HGVs, buses etc.) are large vehicles, therefore the road access criterion was allocated a high weighting of 20%.

7.2.6 Transport Demand

Each of the 5 ‘hubs’ were allocated a score from three to one, i.e., from “best” to “worst” on the results of the transport demand analysis on section 3. The assessment involved analysing traffic movements across Moray, as well as the proximity of each potential location to fleet depots and other stakeholder locations to produce a ranked preference for each of the areas selected as potential HRS locations. HGV flows, LGV flows, car and taxi flows, PSV flows, as well as stakeholder proximity analysis were considered. The following scores were allocated:

- 3 - Elgin and Aberlour were allocated a 3 as Elgin scored highly in HGV, LGV and PSV flows and Aberlour has a high concentration of potential stakeholders nearby.
- 2 - No areas were allocated a score of 2.
- 1 - Buckie, Keith, and Lossiemouth, were allocated a 1. Buckie and Keith both scored poorly when considering both traffic metrics and stakeholder proximity. Lossiemouth scored relatively highly in traffic metrics although upon engaging with the RAF, the organisation stated that their hydrogen vehicles using the refuelling facility would operate only within the confines of the base; however, the facility could be shared with others if it was located “outside the wire”.

Transport demand is an important factor; therefore, this criterion was allocated a high weighting of 25%.

7.2.7 Social Value

Each of the 5 ‘hubs’ were allocated a score from three to one, i.e., from “best” to “worst” based on the social value assessment scoring in Section 6. The assessment determined and scored each of the 5 hubs’ need for socio-economic and community benefit intervention. It considered the labour market and local area, skills and training, the local economy, and health and wellbeing. Based on the scoring out of 20, the following scores were allocated:

- 3 - Scored more than 15: Buckie.
- 2 - Scored between 10 and 15: Elgin, Aberlour, and Keith.

- 1 - Scored less than 10: Lossiemouth.

As outlined in the social value section, a hydrogen refuelling station can be the first step in developing a hydrogen economy. If hydrogen continues to be adopted, this economy will develop further and provide even more benefits to the local area. Therefore, social value has been allocated a high weighting 20%.

7.3 Scoring Results

Table 7.1 shows the results of the scoring process, including each prospect’s weighted total. For ease of comparison, an average of each criterion and weighted total has also been provided.

Table 7.1: Final Scoring Matrix with Criteria Weightings

Site Number	Area/Site	Land	Power	Water	Wastewater	Road Access	Transport Demand	Social Value	Weighted Total
Weighting		20%	5%	5%	5%	20%	25%	20%	100%
1	Elgin: Ashgrove Road	2	2	3	3	2	3	2	2.35
2	Elgin: A96 Travelodge Area	3	1	3	3	3	3	2	2.7
3	Elgin: Industrial Area	2	2	3	3	2	3	2	2.35
4	Elgin: A941 adjacent to Culzean Avenue	3	3	3	3	3	3	2	2.8
5	Elgin: A941 adjacent to Linkwood Road	3	2	3	3	2	3	2	2.55
6	Elgin: Boroughbriggs Road/North Street Carpark	1	3	3	3	2	3	2	2.2
7	Lossiemouth: RAF	3	3	2	1	2	1	1	1.75
8	Aberlour: A95 opposite Walker's Head Office	1	2	2	2	3	3	2	2.25
9	Aberlour: A95 SW Aberlour	3	3	3	3	3	3	2	2.8
10	Keith: Blackhillock Substation	3	3	3	1	1	1	2	1.8
11	Keith: A96 South Keith	3	3	2	2	3	1	2	2.2
12	Buckie: Buckie Harbour 1	2	3	3	3	2	1	3	2.1
13	Buckie: Buckie Harbour 2	1	3	3	3	1	1	3	1.7
14	Buckie: A942	3	3	3	2	3	1	3	2.45
Average		2.36	2.50	2.79	2.50	2.29	2.14	2.14	2.28

Source: MML Analysis

Generally, sites in Elgin and Aberlour scored highly. The sites in these towns all achieved an above average weighted total, except for one site in Elgin, Boroughbriggs/North Street Carpark, which scored 2.2. This is likely due to these sites scoring a three in transport demand, which has a high weighting of 25%.

Sites in Buckie and Keith scored poorly, although the Buckie A942 site scored above average. Again, this is likely to the transport demand score of one. The RAF Lossiemouth site was the second lowest scoring site, which scored low in transport demand and social value, the only site to score one in both.

There were a range of scores for land, although only three sites scored one and the average was still relatively high, which was 2.36. All the sites generally scored highly in the utilities' criteria (power, water, and wastewater). These criteria had the three highest averages of 2.5, 2.79 and 2.5 respectively. With respects to the water criterion, no sites scored 1, i.e., "worst" and therefore should not be an issue for a refuelling situation close to a town.

Most sites had good road access and scored highly, however two sites scored one, Blackhillock Substation and Buckie Harbour 2.

7.4 Site Selection Shortlist & Final Site Recommendation

Table 7.2 shows the site prospects ranked only by their weighted totals.

Table 7.2: Site Prospects Ranked by Weighted Total Score

Rank	Site Number	Area/Site	Weighted Total
1	4	Elgin: A941 adjacent to Culzean Avenue	2.8
2	9	Aberlour: A95 SW Aberlour	2.8
3	2	Elgin: A96 Travelodge Area	2.7
4	5	Elgin: A941 adjacent to Linkwood Road	2.55
5	14	Buckie: A942	2.45
6	1	Elgin: Ashgrove Road	2.35
7	3	Elgin: Industrial Area	2.35
8	8	Aberlour: A95 opposite Walker's Head Office	2.25
9	6	Elgin: Boroughbriggs Road/North Street	2.2
10	11	Keith: A96 South Keith	2.2
11	12	Buckie: Buckie Harbour 1	2.1
12	10	Keith: Blackhillock Substation	1.8
13	7	Lossiemouth: RAF	1.75
14	13	Buckie: Buckie Harbour 2	1.7

Source: MML Analysis

As shown in the table, the three highest scoring sites at the end of this stage of the assessment were as follows:

- Site 4 - Elgin: A941 adjacent to Culzean Avenue
- Site 9 - Aberlour: A95 SW Aberlour
- Site 2 - Elgin: A96 Travelodge Area

Table 7.3 shows the designation for each of the site prospects, if applicable, under the Moray Local Development Plan 2020 as well as further feedback subsequently provided by Moray Council on the availability of the site and any other constraints to be considered.

Table 7.3: Moray Local Development Plan Status and Moray Council Feedback

Rank	Site Number	Area/Site	Moray Local Development Plan 2020	Moray Council Comments
1	4	Elgin: A941 adjacent to Culzean Avenue	LONG2 Elgin South Designated as long-term housing site	Not suitable due to strategic housing designation and close proximity to existing residential properties
2	9	Aberlour: A95 SW Aberlour	R2 Speyview Designated for 60 houses and 1ha of industrial land	Not suitable due to strategic housing designation. Also close to existing residential properties. Site also forms part of Council's Strategic Housing Investment Programme (SHIP) and is subject to a live planning application (23/00494/APP)
3	2	Elgin: A96 Travelodge Area	17 Barmuckity Business Park Designated as industrial estate	Acceptable site in principle Consideration would need to be given to the overhead power line and required clearances
4	5	Elgin: A941 adjacent to Linkwood Road	OPP1 Flemings Sawmill, Linkwood Road Designated for mixed uses including commercial and/or industrial	Not suitable. Adjacent to Gleaner Milnefield (Hazardous Site) Potential for contamination issues due to former use as sawmill Known surface water flooding and transportation issues on site and immediate area. Site has potential to play significant role in addressing these Potential masterplan for this area through levelling up fund
5	14	Buckie: A942	MU High Street (W) Designated for mixed uses including residential and/or class 2 & 4 users	Not suitable. Potential issues due to proximity to two adjacent petrol stations
6	1	Elgin: Ashgrove Road	OPP4 Ashgrove Road Designated for mixed uses including housing, industrial and/or commercial uses	Acceptable site in principle Potential for contamination issues due to former use as railway and gas works
7	3	Elgin: Industrial Area	I6 Linkwood East Industrial Estate	Not suitable – currently occupied by car dealership
8	8	Aberlour: A95 opposite Walker's Head Office	N/A	Not suitable – potential road safety issue due to location opposite junction Prime Agricultural Land
9	6	Elgin: Boroughbriggs Road/North Street	OPP8 Lossie Green Designated for mixed uses including leisure, office and/or retail	Not suitable – potential ownership issue (Public Trust/Common Good) Site plays significant strategic role in the Elgin City Centre Masterplan and Moray Growth Deal (Cultural Quarter project)
10	11	Keith: A96 South Keith	ENV6 Denwell Road	Acceptable site in principle

Rank	Site Number	Area/Site	Moray Local Development Plan 2020	Moray Council Comments
				Potential ownership issue (Common Good to the north of area)
11	12	Buckie: Buckie Harbour 1	N/A	Acceptable site in principle Potential for contamination issues due to former uses Consideration will need to be given to Buckie Harbour Masterplan (in development)
12	10	Keith: Blackhillock Substation	N/A	Acceptable site in principle Links to the Keith Green Energy & Infrastructure Frameworks
13	7	Lossiemouth: RAF	N/A	Not suitable – rural location away from main routes in area
14	13	Buckie: Buckie Harbour 2	OPP4 Bank Street / I5 Harbour Area	Acceptable site in principle Consideration will need to be given to Buckie Harbour Masterplan (in development)

Source: Moray Local Development Plan and Moray Council

As outlined in the table above, Site 4 (Elgin: A941 adjacent to Culzean Avenue) and Site 9 (Aberlour: A95 SW Aberlour) have been designated as land for housing development in the Moray Local Development Plan and are considered unsuitable for construction of a hydrogen refuelling station. The three highest scoring site prospects considered acceptable in principle are as follows:

- Site 2 - Elgin: A96 Travelodge Area
- Site 1 - Elgin: Ashgrove Road
- Site 11 - Keith: A96 South Keith

As the site prospects in Keith generally scored poorly, with both Site 11 and Site 10 scoring below the average weighted total, whilst site prospects in Aberlour scored higher due to the increased transport demand, it is recommended that, instead of shortlisting Site 11, alternative site locations in Aberlour are explored in the next stage instead of shortlisting Site 11.

Site 2 and Site 1 are described in further detail in the sections below:

7.4.1.1 Location 2 – Elgin: A96 Travelodge Area

The Elgin: A96 Travelodge site is the highest scoring site once those considered not in line with the Moray Local Development Plan or unsuitable for other reasons had been ruled out. It scored 3 in land, water, wastewater, road access, and transport demand, a 2 in social value and 1 in power. The site achieved a weighted total of 2.7.

The proposed site is situated in a 'service station' style break area east of Elgin on the A96. It is understood that there are multiple plots that are not currently being used. The selected plot can be seen in Figure 7.1 below.

Figure 7.1: Elgin: A96 Travelodge Area Site Location

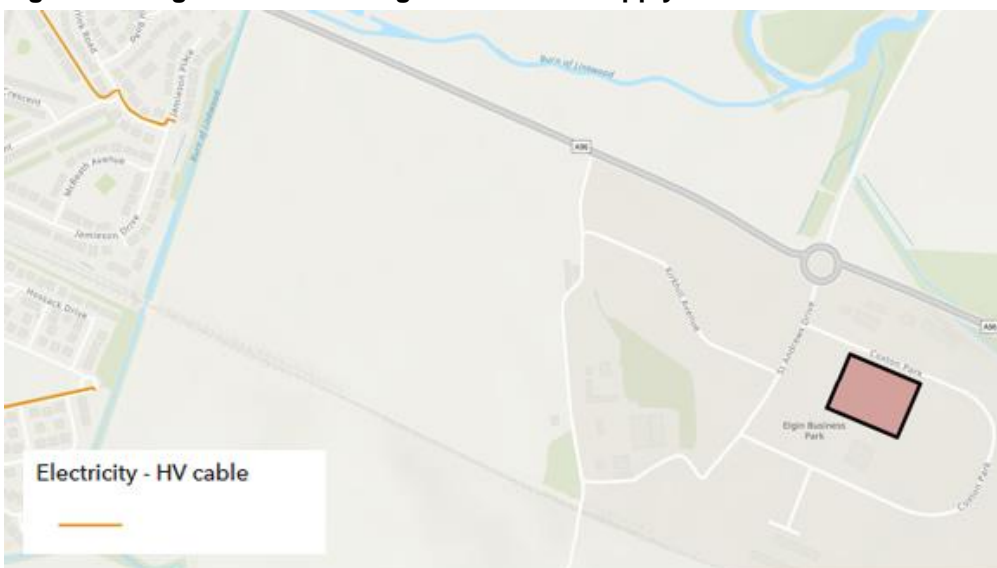


Source: ArcGIS

Figure 7.1 **Error! Reference source not found.** shows the proposed site area, and the construction of the rest of the businesses at the service stop. The ArcGIS satellite image was taken in 2021, hence the other businesses yet to be built. Today, the Travelodge hotel, Shell Petrol station, Starbucks and several smaller commercial buildings are built and are operating. The highlighted area for the proposed site is larger than what is required for a hydrogen refuelling facility without on-site production.

For utilities, this site scored 3 for water and wastewater, however scored 1 for power. The several businesses close by are currently supplied by infrastructure that can be utilised for the refuelling facility. This can be seen in the following figures.

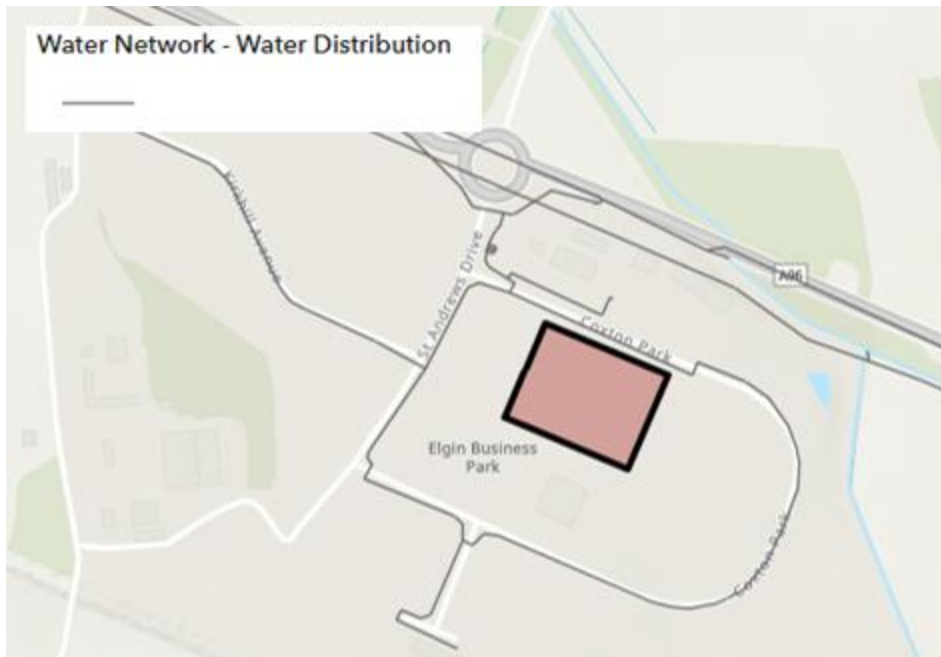
Figure 7.2: Elgin: A96 Travelodge Area Power Supply



Source: ArcGIS

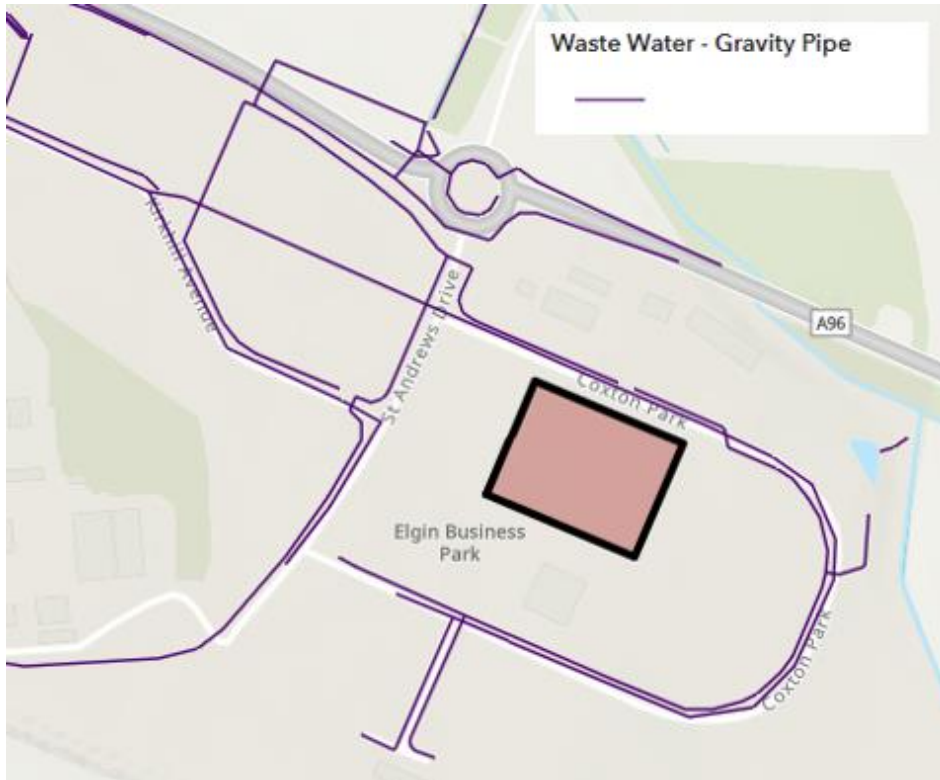
The nearest connection to a HV cable would be around 400m east of site further along the A96. This can be seen in Figure 7.2. However, this power distribution data may be out of date as the service stop could have had an extension since it is recently built. It is recommended further research and stakeholder engagement is carried out to understand the available power infrastructure in the area.

Figure 7.3: Elgin: A96 Travelodge Area Water Distribution



Source: ArcGIS

Figure 7.4: Elgin: A96 Travelodge Area Wastewater Discharge



Source: ArcGIS

Figure 7.3 and Figure 7.4 show the water and wastewater mains in the proposed site and the surrounding service stop area. It is a comprehensive network covering all the plots and should not be an issue for this site.

As the site is located adjacent to the A96 it scored 3 in road access as large vehicles will not have any restrictions accessing the facility.

As this site is in Elgin, it scored 3 and 2 in transport demand and social value respectively. Elgin scored highly in transport demand as it has high heavy-goods transport flows and many potential industrial users in the area. This site also adjacent to the A96, the main travel route between Aberdeen and Inverness. Elgin scored 2 in social value as it is largest town and commercial centre in Moray, and therefore is not in high need of intervention. Please see sections 7.2.6 and 7.2.7 and for further detail into why these scores were allocated.

7.4.1.2 Location 2: Elgin Ashgrove Road

Elgin Ashgrove Road was the 6th highest scoring site in the overall scoring matrix and 2nd of those considered suitable by Moray Council. It scored 3 in the water, wastewater and transport demand criteria and 2 in the remaining criteria, with a final weighted score of 2.35 which is slightly above the average of 2.28.

The site is located in central Elgin on Ashgrove Road next to the Howden's Kitchen Furniture shop. It was identified as it is a large brownfield plot of land which appears to be unused and is located near the A96 and several industrial estates with potential commercial users as well as the Moray Council Ashgrove Depot. The A96 is the main travel route between Elgin and Aberdeen, as outlined Section 3.

Figure 7.5: Elgin: Ashgrove Road Site

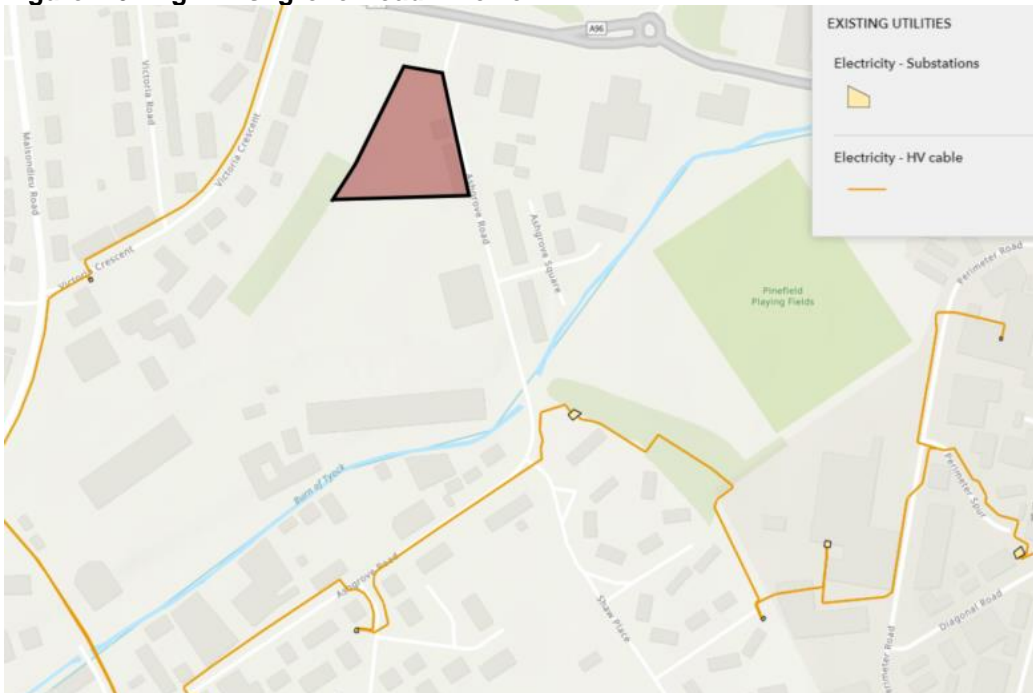


Source: ArcGIS

There is up to 6700 m³ of available space on this plot which is larger than required and therefore allows flexibility in the position and layout of a hydrogen refuelling station.

Elgin: Ashgrove Road scored 2 for the Power criterion as the available data does not indicate any immediately adjacent power supply options but there are HV power cables and substations within 500m of the site as shown in Figure 7.6.

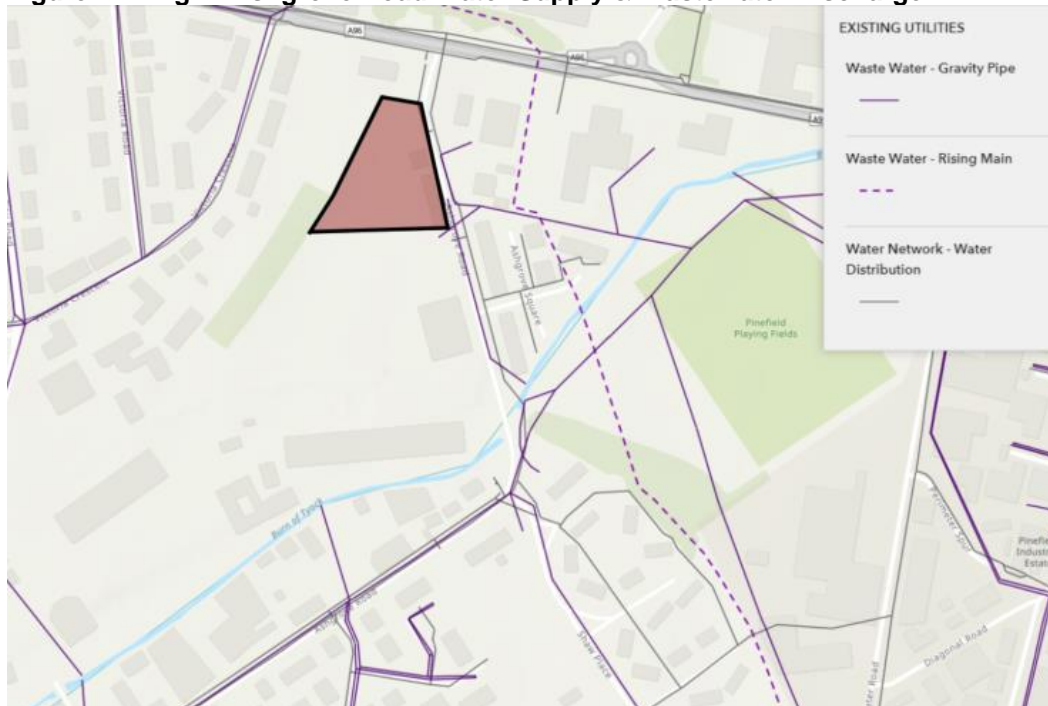
Figure 7.6: Elgin: Ashgrove Road – Power



Source: ArcGIS

The site scored 3 for both the Water and Wastewater criteria given the access to the Scottish Water water distribution and wastewater networks on Ashgrove Road immediately adjacent to the site location. This is shown in Figure 7.7.

Figure 7.7: Elgin: Ashgrove Road Water Supply & Wastewater Discharge



Source: ArcGIS

Although the site is located in close proximity to the A96, it has been scored 2 for road access as it would need to be accessed via Ashgrove Road which is still considered acceptable for large vehicles but less preferable than access directly from the A96.

As with the Elgin: A96 Travelodge Area site, this site also scored 3 and 2 in transport demand and social value respectively as Elgin is located on the A96, has a high heavy-goods transport flow and numerous potential industrial users in the area and is not considered to be in high need of intervention in relation to social value. Please refer to sections 7.2.6 and 7.2.7 for further detail on allocation of these scores for Elgin.

7.4.2 Final Site Recommendation

At this stage of site selection process, the current recommendation is for a hydrogen refuelling facility to be constructed at Location 1 (Elgin: A96 Travelodge area), subject to assessment of whether the required clearances can be achieved underneath the overhead power line. There is a large plot of land currently not being used, which is larger than required for a refuelling facility without on-site production. There is easy access to the required power, water, and wastewater utilities. In addition, Elgin also scored highly in transport demand and the proposed plot is on a main travel route between Elgin and the South, A941. It also achieved an average social value score.

Although this is the current recommendation, further investigation into land ownership, stakeholder engagement and site visits may highlight a more suitable site. This proposed site is also located close to residential estates which may require additional permissions and approvals.

The Elgin: Ashgrove Road site should be retained as a backup option in Elgin should the A96 Travelodge Area site be found to be unavailable or unsuitable during further investigation.

Additionally, as both sites in Aberlour have been found unsuitable based on the Moray Local Development Plan but generally scored highly due to the transport demand in Aberlour, it is

recommended that alternative site options in line with the Moray Local Development Plan within Aberlour are explored during the next stage and compared to the sites above before any final decision is made on site selection.

It should also be noted that the new Moray Local Development Plan is currently being developed and is expected to be adopted in 2027 and it is recommended that future work also considers how this hydrogen strategy could feed into the development of the new Moray Local Development Plan.

8 Road Refuelling

8.1 Overview

Hydrogen Refuelling Stations are provided to dispense hydrogen for transport use. The hydrogen supply pressure for large vehicles such as refuse trucks, buses, and HGVs is typically 350 bar, since larger vehicles such as buses and trains tend to have more available storage space, while cars and smaller commercial vehicles have adopted the 700-bar standard.

A Hydrogen refuelling station typically consists of the following main components:

- MP hydrogen storage tank:
- Hydrogen HP gas compressors,
- High pressure hydrogen storage tanks, and
- Hydrogen dispenser.

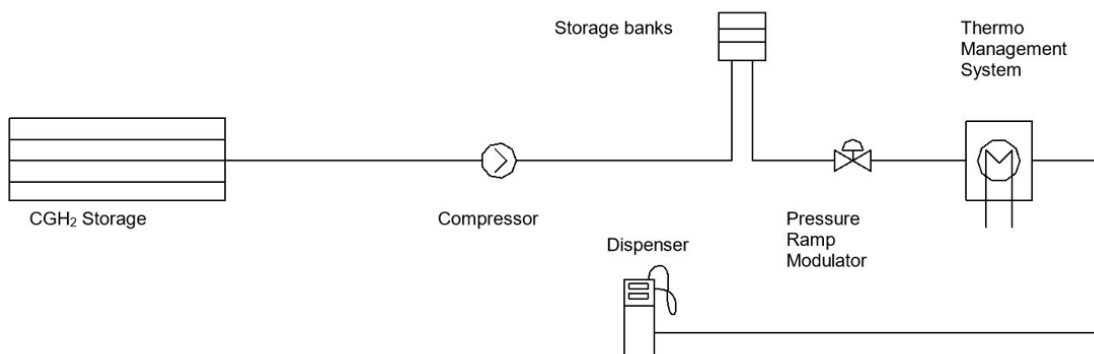
Hydrogen refuelling station equipment is now widely available from many suppliers within the UK and Europe for hydrogen cars, busses, and HGVs.

Hydrogen refuelling stations can store and dispense hydrogen in the form of either liquid or gas. Refer to Figure 8.1: Typical Hydrogen Refuelling System for an example of main equipment and process for a typical gas HRS. While liquid hydrogen can reduce storage footprint requirements, it requires an intensive cooling system which can be more energy intensive compared to hydrogen gas.

A hydrogen refuelling station that can produce 1000 to 1125kg of hydrogen a day is suitable for operating approximately 30 HGVs per day.

Figure 8.1: Typical Hydrogen Refuelling System

Basic concept: Ionic Compressor System



Source: Mott MacDonald

8.1.1 Storage

Within Moray, it is assumed that local hydrogen will be bulk stored as pressurised gas (separate liquid hydrogen storage may be required depending on identified liquid hydrogen consumers), so pressurized storage will be required on site.

Compressed hydrogen storage options include:

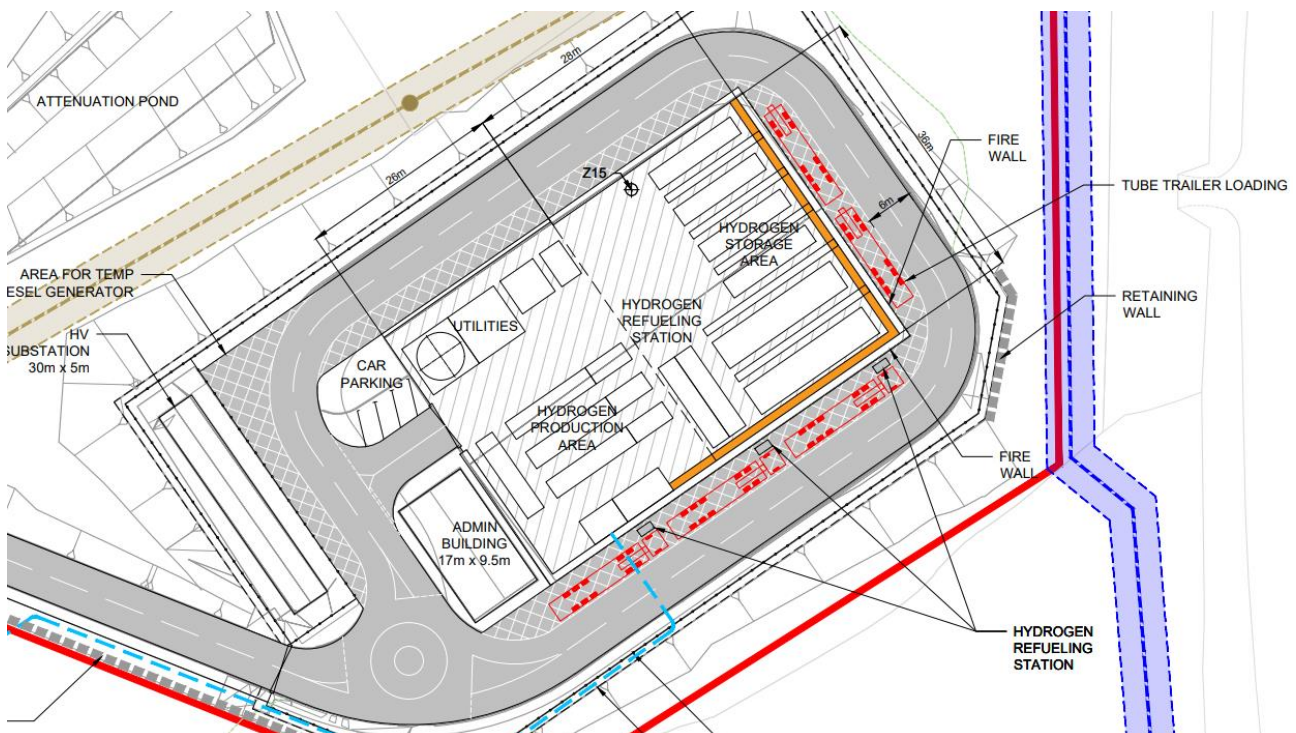
- In horizontal or vertical cylindrical tanks (50-80bar) with capacities from 1,300m³ to 4,500 m³ (diameters of up to 2.8m and lengths from 7.3m to 19m).
- Spherical vessels with capacities of about 2,000m³, pressurised to about 185bar.
- Tubular high-pressure storage 50 to 500bar. These are the most common high-pressure vessels today and can be carried on trailers for flexible low-demand transportation. One tube trailer can deliver approximately 280 kg of hydrogen.
- Hydrogen transmission pipelines can also be used as storage by increasing the pressure inside the pipeline (termed linepack). The storage capacity depends on the size and strength of the pipeline, although this will only be realised if there is a scale transition to a hydrogen economy.

8.1.2 Layout & Footprint

The land footprint requirements are influenced by the traffic intake, i.e., refuelling rates and size of the hydrogen system.

A typical HRS, with on-site generation of hydrogen, is the HyBont Green Hydrogen Project¹⁹ in Bridgend. This is shown in more detail in Figure 8.2. This facility has the capacity to produce 1200kg/day and has 3 goods vehicle dispensers.

Figure 8.2: Typical Hydrogen Refuelling Station Layout



Source: HyBont

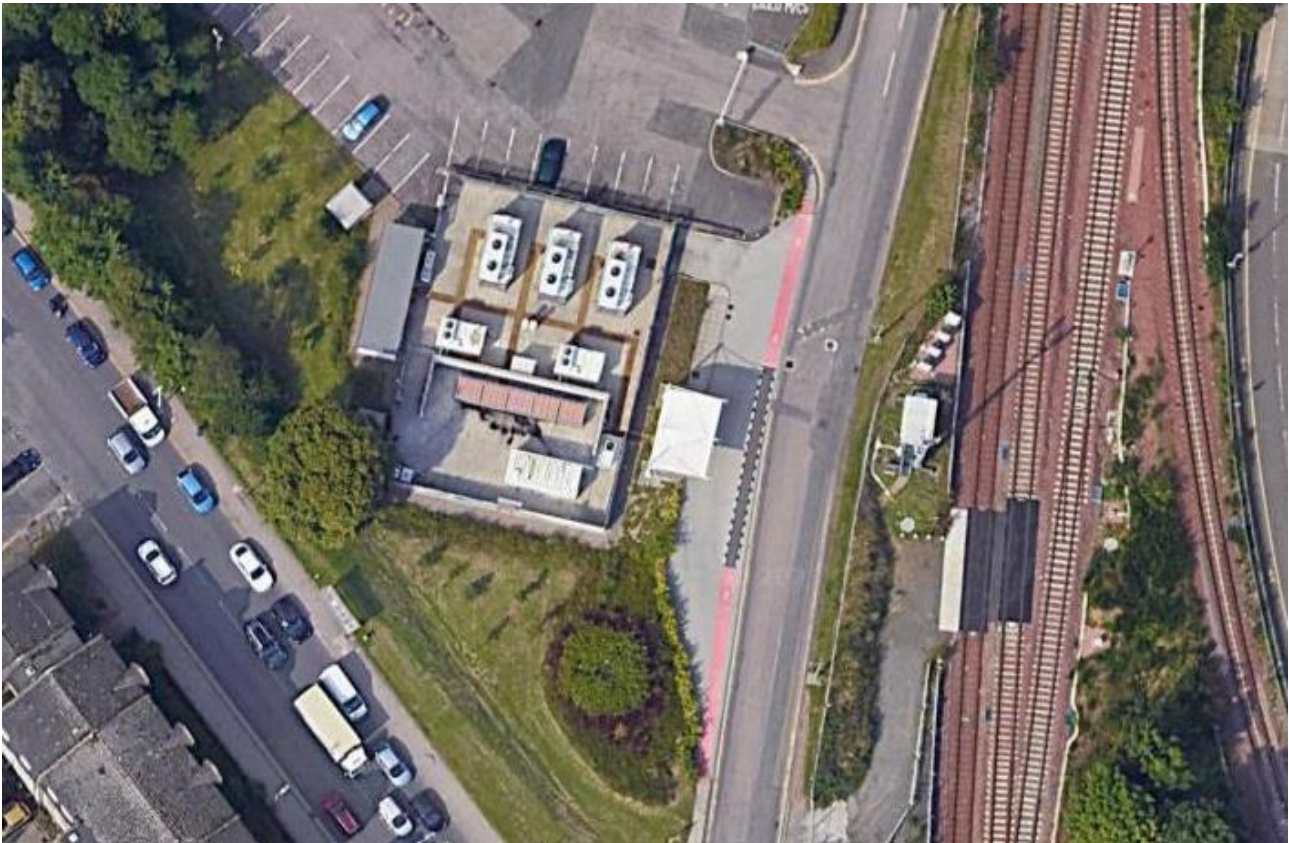
This example layout includes on site production. If this was not required this will reduce the necessary footprint. However, if hydrogen is transported tube trailers then greater separation distances will be required to account for the tube trailers. In addition, this example layout is not

¹⁹ HyBont Green Hydrogen Project, <https://www.hybont.co.uk/index.html>, Accessed on 6 February 2023

directly joined to a main road, you need to access using the side roads leading to the facility. This will significantly increase the footprint. Excluding the production components and side roads, the estimated footprint of the layout presented in Figure 8.3, is 1500m². Including all the elements the footprint is approximately 10,000m².

The example hydrogen site, shown in Figure 8.3, has its pumping area directly parallel to the road, unlike the previous example. It has the capacity to capacity to produce 360kg of hydrogen daily via 1 dispenser.

Figure 8.3: Aberdeen BOC Hydrogen Refuelling Station



Source: ArcGIS

Although this site also has hydrogen production on-site, as it has reduced footprint being parallel to the road, the estimated footprint of this layout is 1150m².

A typical HRS, with the required separation distances to account for tube trailers, has a footprint of approximately 2000m².

9 Maritime Refuelling & Footprint

As part of the Phase 2 scope to further develop the Moray Hydrogen Strategy and delivery plan for a hydrogen economy, this section focuses on the maritime sector hydrogen refuelling infrastructure. The Moray hydrogen and maritime economy can benefit from hydrogen fuelled vessels, as pure hydrogen is a key option for short distance ships and vessels. ²⁰

Electrolytic hydrogen can power Crew Transport Vessels from Buckie Harbour to nearby OWFs to enable technicians to carry out required maintenance work.

To understand the feasibility of such endeavour, a high-level study of the necessary bunkering infrastructure and land footprint was developed.

9.1 Buckie Harbour

Buckie Harbour is the main commercial harbour in Moray and could act as an HRS for the maritime sector. Buckie Harbour is the base for the Operational and Maintenance teams for a number of the Moray Firth Off-Shore Wind farms and CTVs operate from Buckie Harbour. Buckie Harbour is also the main fishing harbour in Moray.

The CTVs would be used to transport technicians to nearby offshore windfarms to be developed in the Outer Moray Firth area such as the 950 MW Moray East Offshore Windfarm ²¹ as seen Figure 9.1 below.

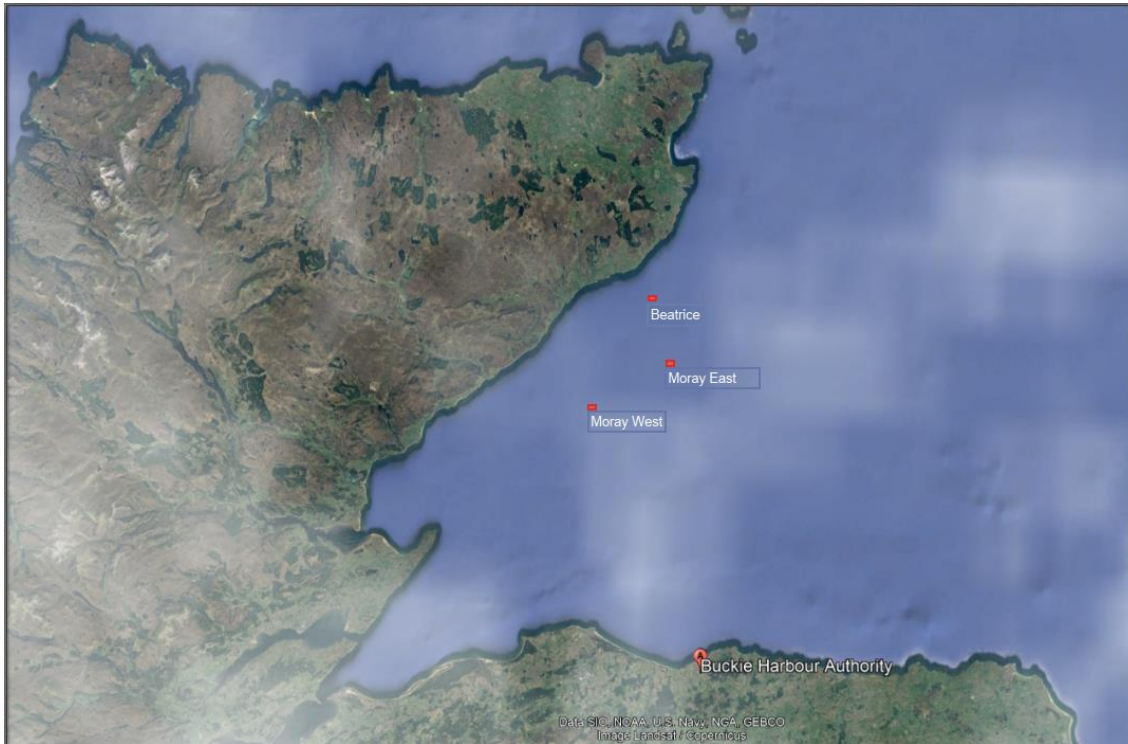
In addition, the fishing industry along with other local industries (e.g. the Boormalt Maltings) have a number of HGV movements that would potentially support an HRS at this location.

As outlined in Section 7, there are two site locations (Sites 12 and 13) currently being considered at Buckie Harbour for a Hydrogen Refuelling Station. Although these are both acceptable sites in principle, subject to the Buckie Harbour Masterplan which is currently in development, they both scored relatively low in comparison to alternatives, particularly in Elgin and Aberlour. However, Buckie Harbour has expressed an interest in an HRS located at the harbour for maritime refuelling, it is therefore recommended that the option to construction an HRS at Buckie Harbour for maritime refuelling in addition to an HRS for HGVs located in Elgin or Aberlour is explored further during the next stage. It is also recommended that this future work also explores options for hydrogen export from Buckie.

²⁰ MML

²¹ Moray Offshore Wind Farm (East) Ltd., 2020

Figure 9.1: Scotland North-East Coast



Source: Google Earth Pro

Using Google Earth Pro the distance between the harbour and the Moray Firth region was estimated to be approximately 57km or 114km for a roundtrip.

In 2022, Cramer H., et. al., has conducted a study on the hydrogen usage of a CTV fleet for offshore maintenance. Based on the data presented in this study, the average ratio of fuel to distance has been estimated to be approximately 1.7kg of H₂ per km. It is noted that weather effects have not been included in the estimation of hydrogen consumption.

Table 9.1: Average distance sailed and estimative hydrogen consumption for the year of 2020 for Vessels²²

Month	Distance (km)	Hydrogen (kg)	Ratio kg/km
January	410,000	1,250,000	1,6
February	410,000	1,250,000	1,6
March	405,000	1,250,000	1,7
April	610,000	2,550,000	2,3
May	180,000	625,000	1,9
June	410,000	1,850,000	2,4
July	350,000	1,250,000	1,9
August	400,000	1,650,000	2,2
September	190,000	625,000	1,8
October	150,000	300,000	1,1
November	160,000	300,000	1,0
December	150,000	300,000	1,1

²² Cramer et.al., 2022 & MML Analysis

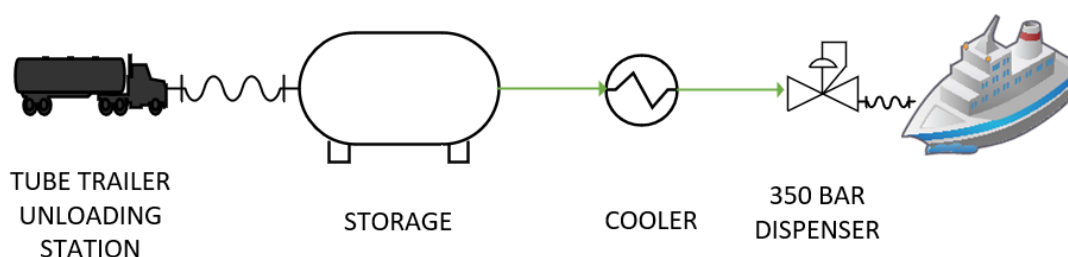
The overall roundtrip of a CTV would therefore require 194kg of H₂. An 80% for emergency purposes is assumed to be needed, 155kg of H₂ and thus the total demand per CTV is 345kg of H₂. Assuming two CTVs leave Buckie Harbour bi-weekly for maintenance and repair works, the total demand of the Moray HRS would be 1395kg of hydrogen fuel.

9.2 Infrastructure Requirements

The working assumption is that electrolytic hydrogen is going to be transported via tube trailers from a nearby green hydrogen production facility. Therefore, the main infrastructure requirements for Buckie Harbour are listed below and represented in:

- Hydrogen Unloading connection point(s)
- Hydrogen HP Storage Tank(s)
- Hydrogen Dispenser
- Supporting Equipment (Air Coolers etc.)

Figure 9.2: Hydrogen Refuelling Station Required Infrastructure



Source: Mott MacDonald

Tube trailers would transport the hydrogen to the Buckie Harbour Area, where they would unload the fuel into HP 350barg storage and then dispensed onto the CTV.

9.3 High Pressure Storage

The green hydrogen will be transported via tube trailers with operating pressures ranging from 30 to 500barg. This hydrogen would be then unloaded into storage tanks.

High-pressure storage allows for faster refuelling rates²³ as well as higher fuel energetic density²⁴. A typical high pressure storage system is made up of a tube rack storage, as seen Figure 9.3 often 0.5m in diameter and 10m long²⁵ i.e., a volume of 1.96m³ and surface area of 16m².

²³ Sadi, M., 2019 <https://doi.org/10.1016/j.ijhydene.2019.05.023>

²⁴ Xiao, J. 2016 & Liu, Y.L., 2010 <https://doi.org/10.1016/j.ijhydene.2016.06.084>

²⁵ Hyde, 2019 [feasibility-of-hydrogen-bunkering-final-080419.pdf](https://www.northsearegion.eu/feasibility-of-hydrogen-bunkering-final-080419.pdf) (northsearegion.eu)

Figure 9.3: Hydrogen Tube Rack High Pressure Storage



Source: Google Images

Gaseous hydrogen would imply storage of high-pressure flammable gas on the ship. Moreover, during the bunkering process, hydrogen is being compressed into storage cylinders. During this adiabatic compression process, heat is being released and thus increasing tank temperature. This is problematic as most storage vessels have maximum design temperature ranging from 70 to 85°C²⁶. To mitigate a possible storage tank failure, bunkering requires slow and chilled operation²⁷. The SAE J2601 Protocol for automotive appliances specifies that hydrogen gas for refuelling purposes should be cooled down to -40°C with a fuelling rate of approximately 1kg of hydrogen per minute²⁸.

9.4 Hydrogen Dispensers

As per Hyde, 2019 dispensers are critical in the case of maritime refuelling, as the vessel is non-stationary, but in continuous motion due to tides and swells. The 350barg filling nozzle should be attached to by rigid arm via a retractable hose to allow for movement and ship height differences considerations. Safety measurements, like providing the system with a "break-away coupling" are necessary should the vessel moves further the maximum hose length, to prevent the leak of hydrogen gas.

A notable mention is the heat release as a result of adiabatic compression must be monitored when refuelling, and therefore dispenser nozzles should be equipped with appropriate instruments to monitor the flow of hydrogen temperature. Conditioning and cooling of the hydrogen prior to refuelling may be required.

9.5 Bunkering

In maritime bunkering, the refuelling operation can be performed at either 350barg or 700barg depending on the necessary volumetric energy density.

Multiple factors are going to affect the bunkering system, such as the ones below:

- Type of bunkering method: pressure balancing, compression onto ship

²⁶ Bourgeois et.al., 2015 doi:10.1016/j.ijhydene.2015.01.096

²⁷ Bourgeois et.al., 2015 doi:10.1016/j.ijhydene.2015.01.096

²⁸ Reddi, K., et.al., 2017 <https://doi.org/10.1016/j.ijhydene.2017.04.233>

- Ship's target pressure
- Bunkering times
- Hydrogen Tank Capacity and Maximum Pressure

Pressure balancing implies CTV refuelling via differential pressure. This means the on-land storage operating pressure is higher than the ship's target pressure, allowing the gaseous fuel to flow through the path of least resistance. A complication of this system is, however, the scale of land-based storage necessary operating at a pressure of at least 500barg²⁹.

The second bunkering method implies compressing the hydrogen low pressure buffer storage to the target ship pressure. For the purpose of this report, the working assumption is that high pressure 350barg storage will be used, and therefore no compressors are needed. The working assumption is that the ship target pressure is also 350barg, based on the design of a hydrogen fuel cell ferry to be designed by ITM.

9.6 Footprint

Assuming ideal gas conditions, the volume required to store 1395kg of hydrogen is 49m³ or 25 HP storage tubes. Assuming hydrogen delivery times are going to be once a week the HP storage must hold approximately 49m³ of hydrogen, i.e., 25 tubes will be needed.

If grouped on a rack as in Figure 9.3 the tube storage rack would have an approximate area of 402m². Consideration of extra storage for times of low productivity due to whether to be further developed on.

A standard 18 tube hydrogen tube trailer has dimensions of 7.3m x 2.1m x 2.1m³⁰. Based on this, the tube trailer unloading bay should allow enough space for safe access. To allow for this, it is assumed the unloading bay will have dimensions of 8.3m x 3.1m or an area of 26m². As the required number of HP tubes is 25 and a standard tube trailer can load 18 an additional 7 HP tubes must be provided. It is therefore assumed that two unloading bays will be necessary.

Should the facility expand in the foreseeable future, the addition of further 2 unloading bays would imply a total area of 103m².

The dispensers are influenced by the ship movements, hose limits and connection point on ship and type of connection (automatic or manual). For the scope of this study, the working assumption is that two dispensers (1 for redundancy) will be manual and operating at 350barg. The NEL hydrogen dispenser³¹ for automotive applications has dimensions of 0.5m x 0.7m x 2.5m however as the dispenser is not going to be automatic this can act as basis for the bunkering study. Therefore, 2 dispensers would require 0.7m².

The estimated overall HRS footprint to include storage, unloading bays and dispensers and allowance for expansion is approximately 506m².

²⁹ Hyde, K., 2019 [feasibility-of-hydrogen-bunkering-final-080419.pdf \(northsearegion.eu\)](#)

³⁰ Weldship, 2013 [Standard Tube Trailers | Product Specifications | Weldship Corporation](#)

³¹ NEL,2023), [Hydrogen Dispenser | Nel Hydrogen](#)

10 Conclusion

10.1 Overview of Findings

This report has completed an extensive appraisal on the feasibility of development of a hydrogen hub in the Moray region to support a local hydrogen economy. A vast array of criteria were engaged in this assessment, such as traffic flows and patterns, stakeholder engagement and proximity, as well as social outcomes including local community benefits.

Moreover, an investigation into necessary infrastructure and footprint requirements for a HRS for both road and maritime end-users was conducted, in order to help pinpoint the location with the highest potential for Moray's first HRS.

In terms of future hydrogen demand, the locations closer to higher traffic flows and high density of whisky distilleries, such as Elgin or Aberlour have scored higher than the rest of the evaluated possible sites. There is a strong desire to implement a hydrogen economy, since some transport logistics companies, which count distilleries as clients, within Aberlour are investing in hydrogen fuelled vehicles. Therefore, Elgin and Aberlour are two key strategic sites for a future hydrogen hub based on foreseeable future demand.

Another important factor considered in the site selection analysis is the available plot lands and their proximity to utilities such as power, water and wastewater facilities. Although it scored the highest in the quantitative assessment, the Elgin A491 Culzean Avenue site was subsequently ruled out as it is not in line with the Moray Local Development Plan. The highest scoring site considered viable is therefore the Elgin: A96 Travelodge Area. However, it is recommended that alternative site options in line with the Moray Local Development Plan within Aberlour are explored during the next stage and compared before any final decision is made on site selection.

Notwithstanding the factors above, the social outcome assessment has revealed that the high need for socio-economic intervention in places such as Buckie, Aberlour and Keith could be addressed by deploying pilot hydrogen, end-use or storage projects within the area. It is noted that the highest levels of unemployment and deprivation were observed in Buckie and as such the effects of a community benefit strategy would be favourable.

Due to Buckie's strategic location on the Scottish North-East coast, it has high potential to serve as an HRS for crew transport vessels transferring technicians to nearby offshore windfarms for maintenance and technical surveillance and so benefit from a maritime hydrogen refuelling facility. However, from a purely traffic demand standpoint of view, Elgin and Aberlour provide more advantageous prospects than Buckie.

Therefore, Elgin and Aberlour should be considered as potential HRS location for road haulage end-users and Buckie should be considered as potential HRS for maritime end-users. Further stages of the project should consider the feasibility of a dual-purpose HRS for supporting fuel transition of both transport means.

To conclude, although not an exhaustive study on the qualitative and quantitative criteria set, this report has provided greater context and detail on the matter of technical feasibility of a HRS and "hydrogen hub" development in Moray but also on how to retain the benefits of hydrogen energy investment for the people and communities.

11 Recommendations

11.1 Next Steps

11.1.1 Road & Maritime Hydrogen Refuelling

There are several actions that can further analyse and highlight additional suitable sites for a hydrogen refuelling facility in Moray. It is recommended to conduct:

- Additional stakeholder engagement to understand the land ownership of each site and the process of obtaining this land.
- Workshops with local potential users in Moray to understand their priorities for the location of a refuelling site. This could also further identify where short-term demand for hydrogen refuelling may be coming from.
- Workshops with nearby offshore windfarms to pinpoint their priorities for CTV fleet fuel transition and location for a refuelling site. This could also further identify where and how much short-term demand for hydrogen refuelling may be coming from.
- Site visits to identify any issues that could not be highlighted from satellite imagery and desktop assessment.
- Economic assessment of each of the shortlisted sites. The quantitative assessment used in this study only considered distances to possible utility connections and did not take in account the cost of construction. This would provide an additional criterion to compare the sites.
- Continue to engage with suppliers to understand what each offer and the structure of each agreement. This will also aid Moray's council decision on their level of involvement during operation. Some suppliers may offer different levels involvement, for example, a supplier might wish to construct a hydrogen refuelling station, and provide the production, transportation, and maintenance.
- Further analysis on potential demand for maritime hydrogen in Buckie as it scored higher in Social Value than any of the other locations. The social value analysis highlighted the potential benefits to the area a project of this nature would have so this may be a missed opportunity.
- Qualitative and quantitative investigation of a dual end-user HRS at Buckie Harbour to support the local fuel transition of both road and maritime applications.

To support the council, maximise the leverage of a hydrogen economy in Moray, we recommend:

- Involving local communities and Stakeholder Engagement – Involve the wider community in driving community benefits through robust collaborative stakeholder mapping and engagement to fully understand the local needs, aspirations, and concerns to develop community benefit interventions that support local residents. We note this is underway through the Moray Hydrogen Stakeholder Network with several online and in-person events having taken place.
- Social Value and Community Benefit Policy and Strategy – Develop a social value and community benefit policy and strategy for each location. This will enable the council to effectively capture and integrate community benefits into the delivery of projects and associated opportunities related to a hydrogen economy. Define clear and measurable community benefit goals that align with council's mission, values, and objectives.

- Develop Social Value and Community Benefit Action Plan – Develop a Social Value Action Plan that includes targets and Key Performance Indicators (KPIs) aligned with community local need. Refer to Table 6.4 for examples of potential initiatives and metrics for measuring performance. Measure progress towards these targets on a regular basis, such as quarterly or annually. This will help ensure that the initiatives are effectively contributing to social value and achieving the desired outcomes.

A. Stakeholder List

Table A.1: List of Stakeholders Contacted as part of the Stakeholder Engagement Exercise

Organisation	Industry/Sector
Baxters	Food & Drink
Boeing	Defence
Buckie Maltings	Food & Drink
Caledonia Offshore Windfarm	Energy (Renewables)
Carntyne Transport*	Transport & Logistics
Emergency Services - Ambulance Service	Emergency Services
Emergency Services - Fire	Emergency Services
Emergency Services - Police	Emergency Services
Forestry Scotland	Forestry
Gleaner Oil & Gas	Energy (Oil & Gas)
James Jones - Timber	Forestry
Kinloss Barracks*	Defence
McPherson's of Aberlour	Transport & Logistics
Moray Council*	Public Body (Local Authority)
NHS Grampian*	Health
RAF Lossiemouth*	Defence
Scottish Water*	Utilities
Stagecoach North Scotland	Transport & Logistics
The Forsyth Group*	Transport & Logistics
Transport Scotland	Public Body (Transport Authority)
Walkers Shortbread	Food & Drink

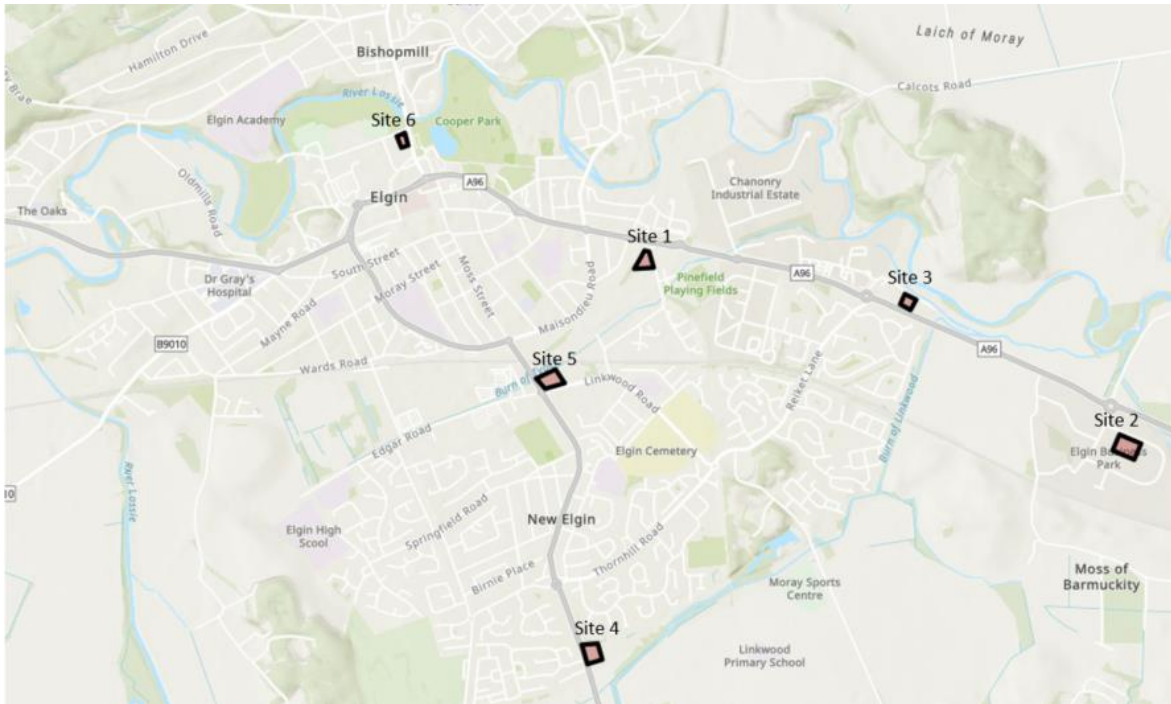
*Engaged with as part of the stakeholder engagement exercise

B. Site Selection Prospects

B.1 Elgin

The six site prospects in the Elgin location are depicted below.

Figure B.1: Elgin Site Prospects



Source: ArcGIS

B.1.1 Site 1: Ashgrove Road

The Ashgrove Road site is located in central Elgin. It was identified as it is a large plot of land near the A96 and several industrial estates and therefore potential commercial users. The A96 is main travel route between Elgin and Aberdeen, as outlined Section 3.

Figure B.2: Ashgrove Road Site



Source: ArcGIS

B.1.2 Site 2: A96 Travelodge Area

The A96 Travelodge site is located east of Elgin, off the final roundabout of the A96 before you enter the town. There are several businesses making up a service style break area and a small business park. There are multiple plots of land where a refuelling station could be built.

Figure B.3: A96 Travelodge Site



Source: ArcGIS

B.1.3 Site 3: A96 Industrial Area

Figure B.4: A96 Industrial Area Site



Source: ArcGIS

Similarly, to the previous site, this prospect is located east of Elgin close the A96 as you enter the town. It is a plot of land located on Riverside Road close to several businesses including car dealerships and food outlets.

B.1.4 Site 4: A941 adjacent to Culzean Avenue

This site is in south Elgin on the A941 as you enter the residential area, New Elgin. The site is a large plot of land on the main road connecting Elgin to south Scotland.

Figure B.5: A941 Culzean Avenue Site

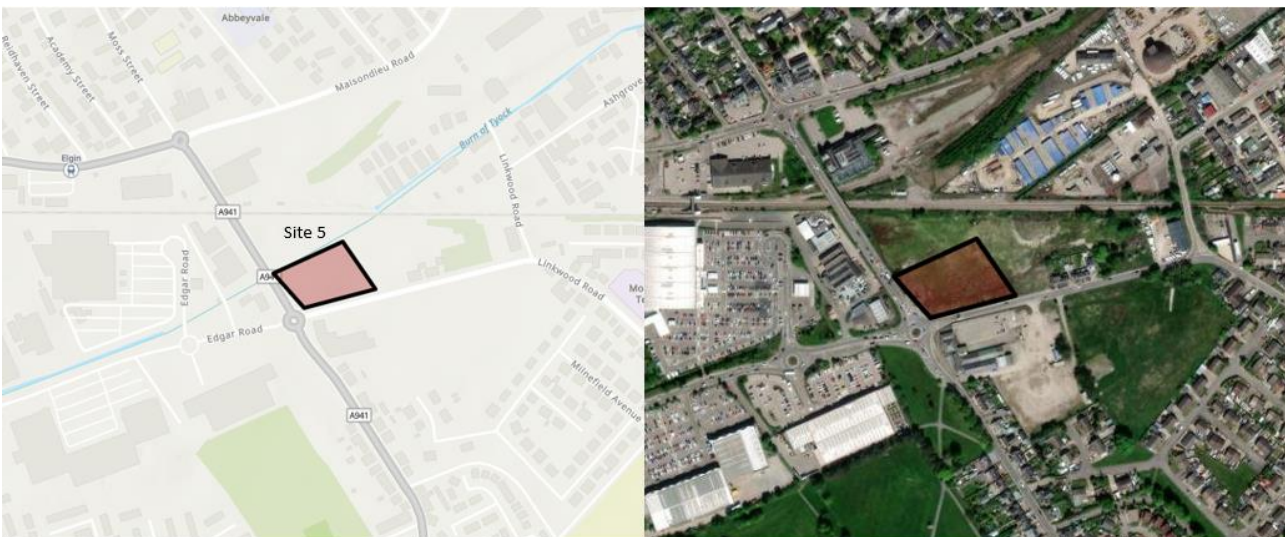


Source: ArcGIS

B.1.5 Site 5: A941 adjacent to Linkwood Road

This prospect is located along the A941 although in central Elgin. This is a large plot of land with several business and residential estates nearby, including Elgin Train Station.

Figure B.6: A941 Linkwood Road Site

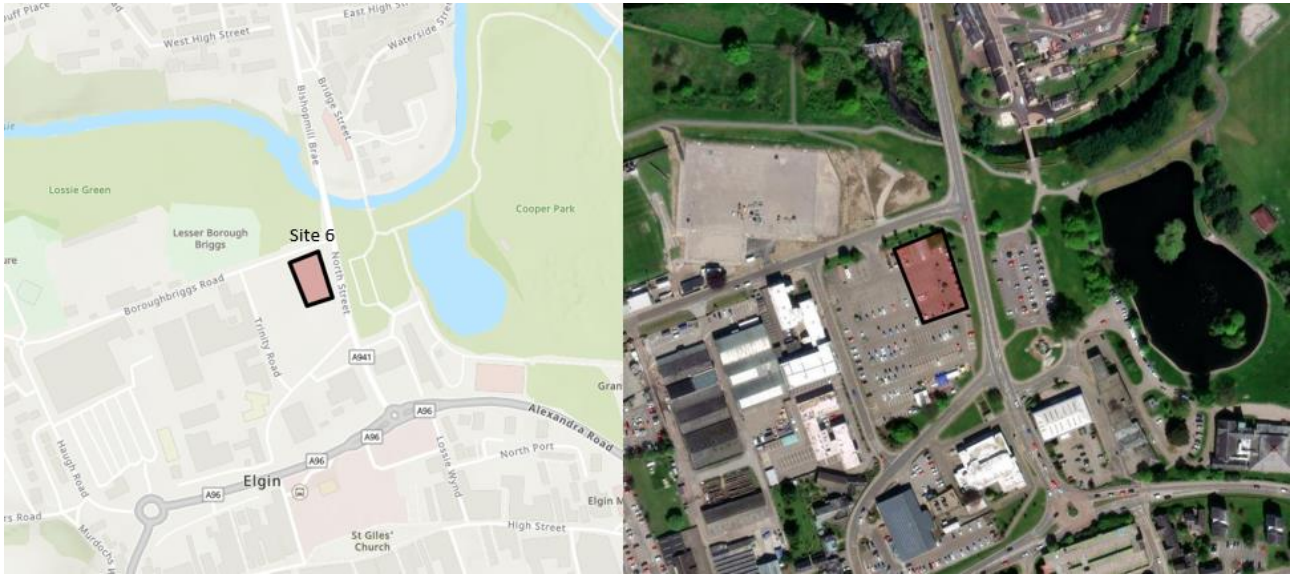


Source: ArcGIS

B.1.6 Site 6: Boroughbriggs Road/North Street Carpark

This site was identified in a call with the council during a discussion regarding potentially restructuring the carpark located in central Elgin. There are several commercial users nearby and is close to the A96.

Figure B.7: Elgin Boroughbriggs Road Carpark Site



Source: ArcGIS

B.2 Lossiemouth

The site prospect in the Lossiemouth location is depicted below.

Figure B.8: Lossiemouth Site Prospects



Source: ArcGIS

B.2.1 Site 7: RAF Lossiemouth

A potential location at RAF Lossiemouth (outside the wire) was also identified as there is likely to be a plot of land available and the MoD understood to be planning to install 6 to 8 MW of solar electricity generation at the site. There is the option to extend the size of the solar farm or for MoD to allow part of the land to be used for a hydrogen refuelling station or pilot hydrogen hub. Further discussion is required.

Figure B.9: RAF Lossiemouth Site



Source: ArcGIS

B.3 Aberlour

The site prospects in the Aberlour location are depicted below.

Figure B.10: Aberlour Site Prospects



Source: ArcGIS

B.3.1 Site 8: A95 opposite Walker's Head Office

This site is located north of Aberlour along the A95. Notably, it is opposite Walker's shortbread's head office and factory. There are also several distilleries in the vicinity of Aberlour.

Figure B.11: A95 Walker's Site



Source: ArcGIS

B.3.2 Site 9: A95 SW Aberlour

This site is a large plot of land southwest of Aberlour also along the A95. It was identified as an additional option in Aberlour as several distilleries are close by.

Figure B.12: A95 SW Aberlour Site

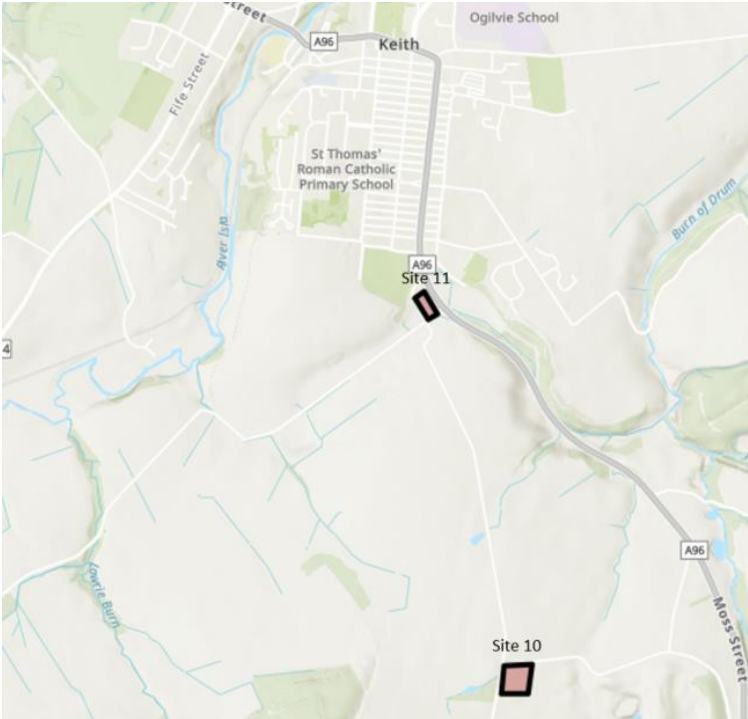


Source: ArcGIS

B.4 Blackhillock (Keith)

The site prospects in the Blackhillock Keith location are depicted below.

Figure B.13: Keith Site Prospects



Source: ArcGIS

B.4.1 Site 10: Blackhillock Substation

This site is located south of Keith near the Blackhillock substation. It was identified due to its proximity to available utilities, as the Blackhillock substation is the largest substation in the UK and is the connection point for the Beatrice and planned Moray West offshore wind farms.

Figure B.14: Blackhillock Site



Source: ArcGIS

B.4.2 Site 11: A96 South Keith

This site was selected as it is an additional site located close to the Blackhillock substation. However, this site is closer to Keith town centre and additionally it is located along the A96.

Figure B.15: A96 South Keith Site



Source: ArcGIS

B.5 Buckie Harbour

The site prospects in the Buckie Harbour location are depicted below.

Figure B.16: Buckie Site Prospects

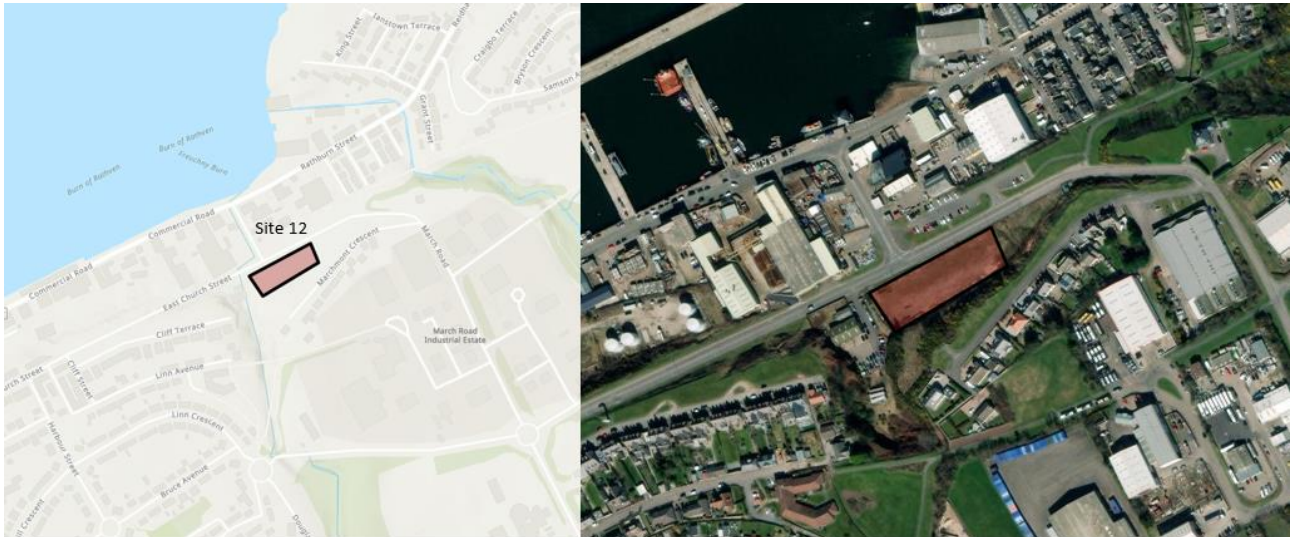


Source: ArcGIS

B.5.1 Site 12: Buckie Harbour 1

This site the first of two locations identified at Buckie Harbour. This prospect is the largest open plot of land near to the harbour businesses and jetties.

Figure B.17: Buckie Harbour 1 Site

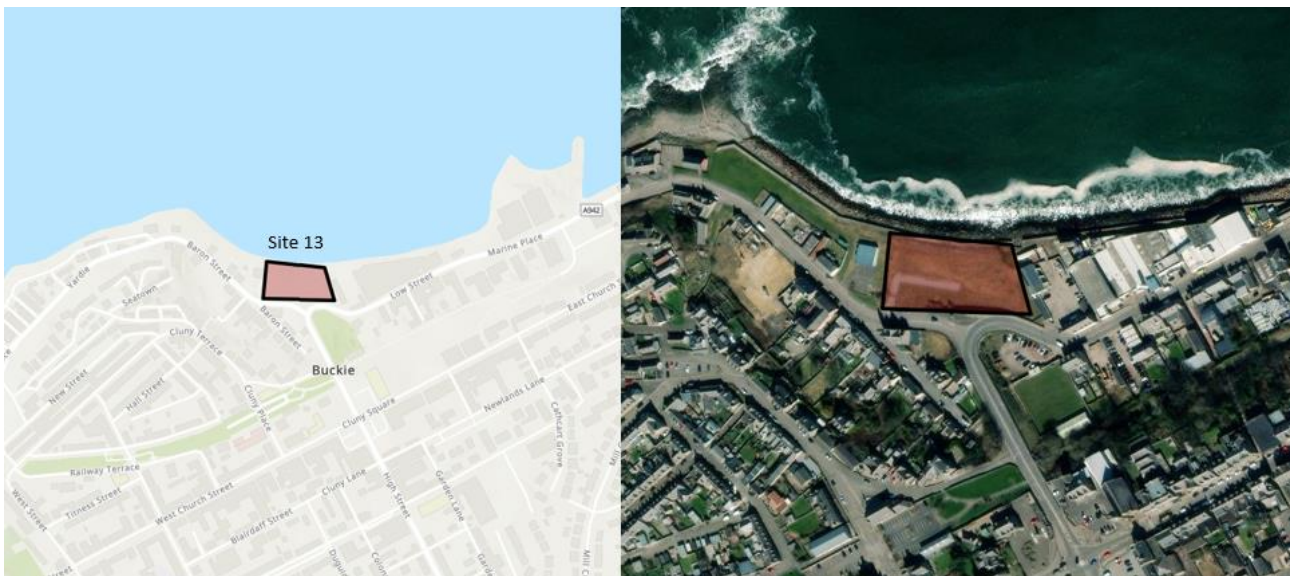


Source: ArcGIS

B.5.2 Site 13: Buckie Harbour 2

This is the second potential site in Buckie Harbour. It is a small plot of land located west of the harbour at the top of the A942.

Figure B.18: Buckie Harbour 2 Site

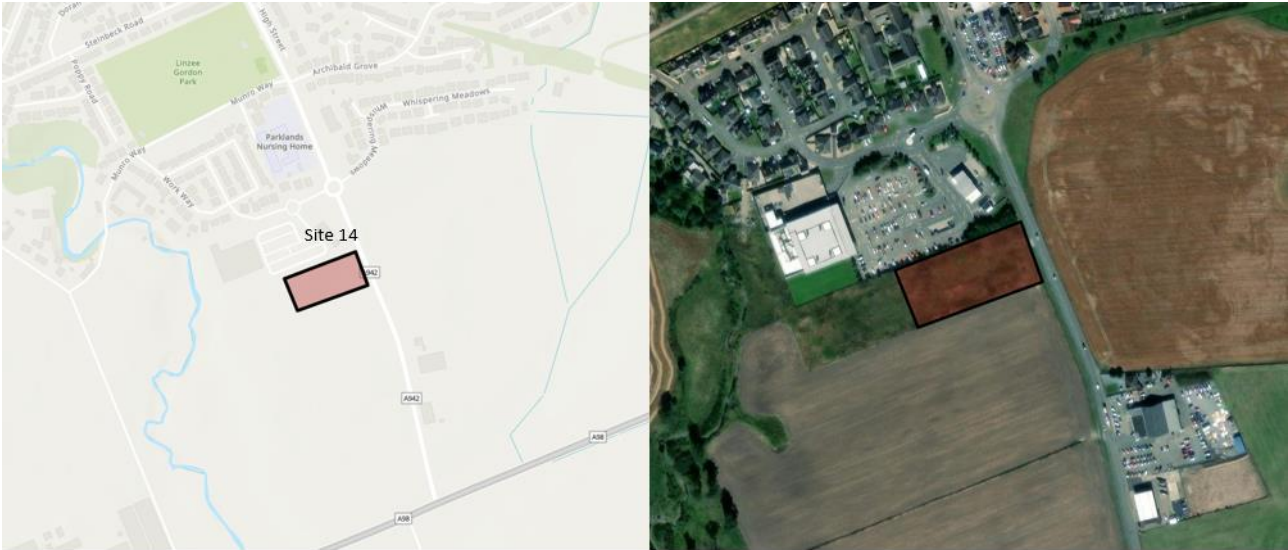


Source: ArcGIS

B.5.3 Site 14: Buckie A942

This site is located south of Buckie along the A942, the main route into Buckie. It is a large plot of land next to the Tesco Superstore and Petrol Station.

Figure B.19: Buckie A942 Site



Source: ArcGIS

C. Elgin Location Profile

C.1 Labour Market and Local Area

Elgin, the largest town, and commercial centre for Moray, has an estimated population of 23,582 (2023).³² In the 2011 census, 4% of the population was identified as unemployed, while 27.2% were economically inactive.³³ Figures from 2022 show that the unemployment rate in Elgin has increased to 6.49% (Dec 2022).³⁴

Data from the 2011 census displayed that 33.3% of the population were employed in managerial or professional occupations, lower than the Scottish average (37.8%) working within these top 3 highest income occupation groupings. There was also a higher proportion of people working in the lowest income grouping - 'Elementary occupations' – 13.8% compared to 12.8% in Moray and 11.6% in Scotland. However, the third highest income group 'Associate Professional and Technical occupations' employed 14.9% of people in Elgin compared to Moray (14.7%) and Scotland (12.6%),³⁵

As outlined in Figure C.20 the level of deprivation is varied across Elgin. In the Scottish Index of Multiple Deprivation 2020, which measures income, employment, health, education and skills, housing, geographic access and crime, large parts of West Elgin were ranked as having little or no deprivation, scoring well in income, employment, education, health, and housing. Three areas in Elgin (in dark blue) were part of the least deprived 10% of data zones.

In comparison, 3 areas in Elgin East were ranked in the 20% most deprived data zones in Scotland. Heldon West, Fogwatt to Inchberry was ranked number 560 of Scottish data zones (1 being most deprived) making it part of the most deprived 10% of Scotland. New Elgin East, ranked number 1298, and Elgin Cathedral to Ashgrove and Pinefield, ranked number 1067, were positioned in the most deprived 20%. These 3 areas scored poorly in education/skills, income, employment, and health.³⁶

As a result of such statistics, the Moray Community Partnership have identified New Elgin East as an area to focus the improvement of outcomes in factors including employment, crime, and education in the Local Outcomes Improvement Plan V.2 (released in Sept 2021).³⁷

³² [Elgin Population 2023 \(worldpopulationreview.com\)](https://worldpopulationreview.com)

³³ [Area Profile 2017 - ELGIN, CENTRAL WEST v4 \(yourmoray.org.uk\)](https://yourmoray.org.uk)

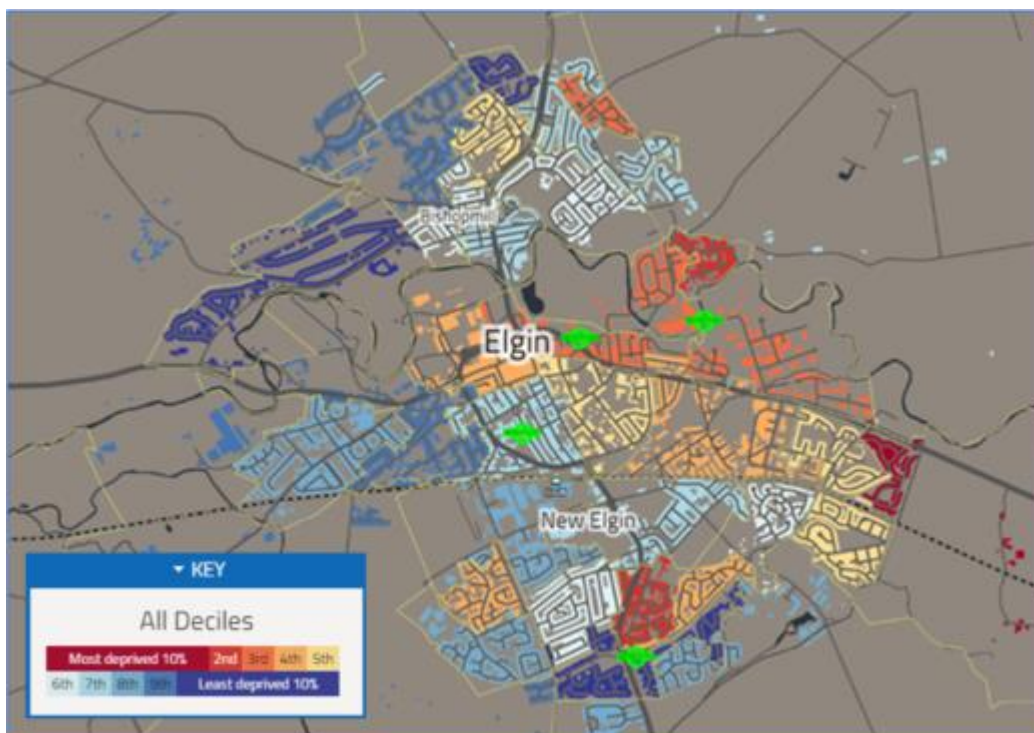
³⁴ [Elgin, IL Unemployment Rate \(ycharts.com\)](https://ycharts.com)

³⁵ [Area Profile 2017 - ELGIN, CENTRAL WEST v4 \(yourmoray.org.uk\)](https://yourmoray.org.uk)

³⁶ [SIMD \(Scottish Index of Multiple Deprivation\)](https://scotland.nhs.uk)

³⁷ [Local Outcomes Improvement Plan Sept 2021, LOIP \(yourmoray.org.uk\)](https://yourmoray.org.uk)

Figure C.20: Map outlining levels of deprivation in Elgin



Source: Scottish Index of Multiple Deprivation³⁸

C.2 Skills and Training

Elgin has a total of 8 primary schools, 2 secondary schools and 1 college, UHI Moray – the only further education college in Moray. In the 2011 census, 26.6% of Elgin’s population (aged 16 and over) reported having no qualifications, slightly lower than the proportion in Moray (26.7%) and Scotland (26.8%). 27.4% of Elgin’s population reported a standard grade or equivalent as their highest qualification attained and 14.6% a higher grade or equivalent. However, there was a lower rate of people who attained a degree or higher degree (20.9%) compared to Moray (22.7%) and Scotland (26.1%). Although Elgin reported a higher proportion of people in skilled trades occupations (14.4%) compared to Scotland (12.5%), this was lower than the Moray average of 16.6%.³⁹

C.3 Local Economy

As displayed in the 2011 census, the industry with the highest level of employment is wholesale and retail trade and motor repairs (17.6%). Health and social work are the second largest employer by industry (13.7%), followed by public administration and defence (12.6%).⁴⁰ The high proportion of workers in public administration and defence can be attributed to the proximity of RAF Lossiemouth to the town.

A significant proportion of people in Elgin are also employed in the manufacturing industry (11.8%) compared to Scotland (8%), however this is lower than the proportion of people employed in manufacturing in wider Moray (12.1%). Elgin is a key manufacturing site for consumer products - Elgin is the main site of textile manufacturers Johnstons of Elgin, the UK’s largest producer of luxury cashmere and fine woollens. Whisky is also an important component

³⁸ SIMD (Scottish Index of Multiple Deprivation)

³⁹ Area Profile 2017 - ELGIN, CENTRAL WEST v4 (yourmoray.org.uk)

⁴⁰ Area Profile 2017 - ELGIN, CENTRAL WEST v4 (yourmoray.org.uk)

of the wider local economy with Glen Moray distillery, Miltonduff distillery and BenRiach distillery all within 6 miles of Elgin.

The creation of a cultural quarter in Elgin forms a key strategic project in Moray's economic strategy 2022-2032. The cultural quarter aims to support economic growth and cultural expansion by creating a heritage attraction, rebranding of the town hall, and the provision of a new hotel. The increased activity driven by this will provide greater opportunities for small businesses and social enterprises, while attracting further tourism to the area.

C.4 Health and Wellbeing

Elgin has a range of green spaces and community facilities that can help support positive health and wellbeing for local communities. There is an estimated 31 hectares of greenspace per 1000 people, significantly higher than the national average of 24 hectares of greenspace in urban areas.⁴¹ Green spaces include 14 parks, gardens, and playing fields like Cooper Park, which have community facilities such as a tennis court and bowling green. Elgin also has a Sports and Community Centre.

In the 2011 census, 85% of Elgin's population stated that their health was either 'very good' or 'good', while 17.2% considered themselves limited by a long-term health condition or disability. In the 2011 census, 3.8% of Elgin residents reported having a mental health condition. Rates of depression significantly increased in Elgin between 2013/2014 and 2015/2016, increasing by 2.9% to 5.4 per 100 patients.⁴² Although rates of depression from the 2011 census were lower in Elgin compared to Moray (5.8) and Scotland (6.8), rates increased at a faster rate compared to Moray (1.6%) and Scotland (1.0%).⁴³

When comparing health statistics across Elgin, New Elgin East scored poorly compared to other areas in Elgin and the rest of Scotland.

⁴¹ [The Second State of Scotland's Greenspace Report - greenspace scotland - Jan 2012.pdf \(nature.scot\)](#)

⁴² [Area Profile 2017 - ELGIN, CENTRAL WEST v4 \(yourmoray.org.uk\)](#)

⁴³ [Area Profile 2017 - ELGIN, CENTRAL WEST v4 \(yourmoray.org.uk\)](#)

D. Lossiemouth Location Profile

D.1 Labour Market and Local Area

Lossiemouth has an estimated population of 6,873.⁴⁴ The last figures published regarding unemployment in Lossiemouth were in the 2011 national census, where 4.3% of the population were identified as unemployed.⁴⁵

In the 2011 census, 43.6% of people reported working in managerial or professional occupations, higher than other site areas in Moray, and the Scottish average. 29% of people employed in Lossiemouth, reported working in the 'Associate Professional and Technical' occupations grouping, nearly double the rate of Moray (14.7%). This also formed the largest occupation grouping in Lossiemouth, followed by 'Skilled trades occupations' – 12.8%.⁴⁶ Significant members of these skilled occupations are expected to be working within technical roles in the RAF Lossiemouth base, which employs an estimated 3,500 employees (further detail in Section 3). The Local Outcomes Improvement Plan V2, has identified that the population of Lossiemouth is expected to grow over the next 10 years with the potential for an additional 3,000 to 4,000 military personnel and their families relocating to Lossiemouth, driving up employment figures in the defence sector and professional technical occupation groups.⁴⁷

The Scottish Index of Multiple Deprivation 2020 highlighted that most areas in Lossiemouth were in 50% of the least deprived data zones in Scotland. Two areas in Lossiemouth (in dark blue, in Figure D.21) were part of the least deprived 10% of data zones in Scotland, ranking in the 8th to 10th decile for income, employment and health deprivation.

⁴⁴ [Lossiemouth - Wikipedia](#)

⁴⁵ [Area Profile 2016 - LOSSIEMOUTH - Draft2 \(yourmoray.org.uk\)](#)

⁴⁶ [Area Profile 2016 - LOSSIEMOUTH - Draft2 \(yourmoray.org.uk\)](#)

⁴⁷ [LOIP \(yourmoray.org.uk\)](#)

Figure D.21: Map outlining levels of deprivation in Lossiemouth



Source: Scottish Index of Multiple Deprivation ⁴⁸

D.2 Skills and Training

There are 2 primary schools, and one secondary school in Lossiemouth. In the 2011 census, 21.9% of Lossiemouth’s population (aged 16 and over) reported having no qualifications, significantly lower than Moray (26.7%) and Scotland (26.8%). 27.3% reported a standard grade or equivalent as their highest qualification attained, and 17.9% a higher grade or equivalent. 21.5% reported attaining a degree or higher degree, lower than the average rate in Moray (22.7%) and significantly lower than the Scotland average (26.1%).⁴⁹

Compared to the Scottish average (12.5%), Lossiemouth has a similar proportion of people working in skilled trades (12.8%). RAF Lossiemouth also provides significant opportunities for training and skill development in the defence sector. In September 2020, there were 223 active apprenticeships in engineering and survival equipment at the base. Recent investment in March 2023 will also create 7 new trainee positions in engineering and construction.⁵⁰

D.3 Local Economy

The industry with the highest level of employment in Lossiemouth by far is public administration and defence; compulsory social security (employing 30.7% of the local population in 2011) driven by the presence of the RAF base in Lossiemouth.⁵¹ The local economy of Lossiemouth is heavily dependent on the RAF. In a 2010 appraisal, the RAF station in Lossiemouth employed 3,370 full-time employees, equal to around 11% of jobs in Moray’s economy. In early 2022, there were around 3,500 jobs based at the site.⁵² RAF Lossiemouth is continuing to grow which

⁴⁸ SIMD (Scottish Index of Multiple Deprivation)

⁴⁹ Area Profile 2016 - LOSSIEMOUTH - Draft2 (yourmoray.org.uk)

⁵⁰ £83 million investment at RAF Lossiemouth creates more than 100 UK jobs - GOV.UK (www.gov.uk)

⁵¹ Area Profile 2016 - LOSSIEMOUTH - Draft2 (yourmoray.org.uk)

⁵² Microsoft Word - RAF EIA Exec Summary (Aug 10)[1].doc (hie.co.uk)

will further increase the number of employees employed in public administration and defence. In March 2023, the base secured a £83 million investment from the UK government to build a new facility, which has created more than 125 local jobs, and increased opportunities for involvement from the local supply chain.⁵³

The second and third industry with the highest level of employment as identified in the 2011 census is Human health and social work activities (11.9%), and Wholesale and retail trade; repair of motor vehicles and motorcycles (11.8%).⁵⁴

D.4 Health and Wellbeing

There is an estimated 44 hectares of greenspace per 1000 people, including 2 parks – Station Park Lossiemouth, Coulardbank Park Lossiemouth. This is significantly higher than the average for Scottish urban areas (24 hectares per 1000 people). There is also a sports and community centre in the town. Lossiemouth is on the Moray coast so has several beaches available to the local community. The range of outdoor spaces available to the community for recreation activities is likely to have a positive impact on community health and wellbeing. This is reflected in data from the 2011 census where 86.1% of Lossiemouth's population stated that their health was either 'very good' or 'good', while 16.1% considered themselves limited by a long-term health condition or a disability – more positive statistics compared to the other sites. This is also supported by mental health statistics, with 3% of the population reporting a mental health condition compared to the Scottish average of 4%.⁵⁵

⁵³ [£83 million investment at RAF Lossiemouth creates more than 100 UK jobs - GOV.UK \(www.gov.uk\)](https://www.gov.uk)

⁵⁴ [Area Profile 2016 - LOSSIEMOUTH - Draft2 \(yourmoray.org.uk\)](https://yourmoray.org.uk)

⁵⁵ [Area Profile 2016 - LOSSIEMOUTH - Draft2 \(yourmoray.org.uk\)](https://yourmoray.org.uk)

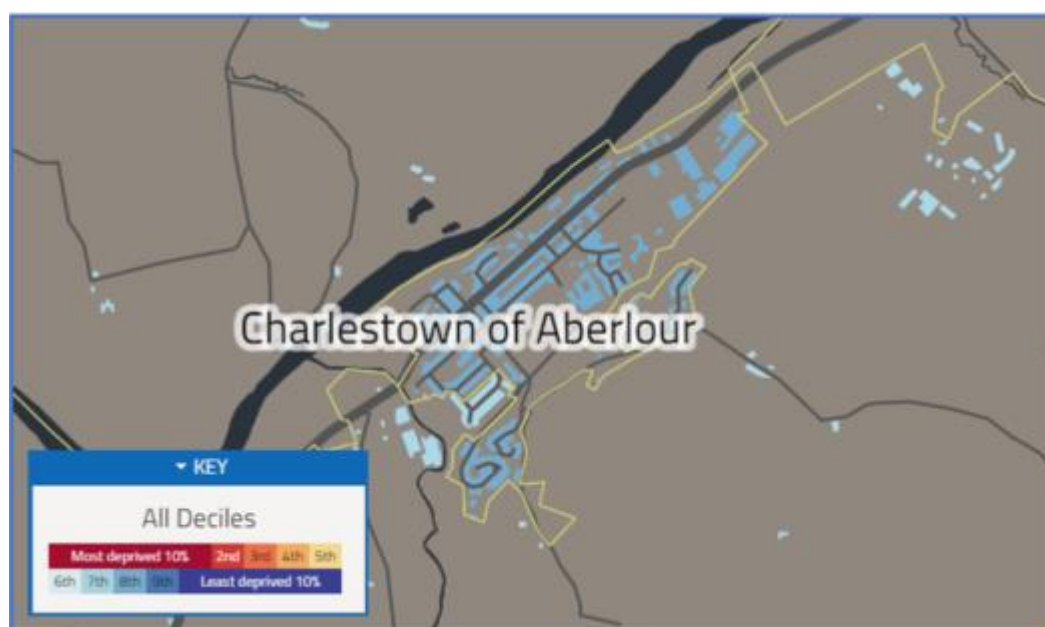
E. Aberlour Location Profile

E.1 Labour Market and Local Area

Charlestown of Aberlour (Aberlour), has an estimated population of 1,020.⁵⁶ The last figures published regarding unemployment in Aberlour was in the 2011 national census, where 2.3% of the population was identified as unemployed.

Based on data from the 2011 census, 31.9% of the population in Aberlour reported working in the managerial and professional occupation groupings, a significant figure for a town with a working age population of 423. In the Scottish Index of Multiple Deprivation 2020, all areas in the town were ranked in the least deprived 30 and 40% of data zones in Scotland.

Figure E.1. Map outlining levels of deprivation in Aberlour



Source: Scottish Index of Multiple Deprivation⁵⁷

E.2 Skills and Training

The town has 1 primary school and 1 secondary school. In the 2011 census, 35.7% of Aberlour's population (aged 16 and over) were ranked as having no qualifications, 23.5% have a standard grade or equivalent, 11.6% a higher grade or equivalent, and 21.8% a degree or higher degree. The higher proportion of people with a degree or higher degree qualification is consistent with the occupational spread, which has a high proportion of people in managerial and professional occupations, as reflected in Section 3. However, compared to the rest of Moray and Scotland, Aberlour has a lower proportion of 16–17-year-olds in education. 16.3% of Aberlour's population also reported working in skilled trades occupations.⁵⁸

⁵⁶ [Aberlour \(Moray, Scotland, United Kingdom\) - Population Statistics, Charts, Map, Location, Weather and Web Information \(citypopulation.de\)](https://citypopulation.de)

⁵⁷ [SIMD \(Scottish Index of Multiple Deprivation\)](https://www.simd.gov.scot/)

⁵⁸ [Finalised Area Profile 2015 - ABERLOUR \(yourmoray.org.uk\)](https://yourmoray.org.uk/)

E.3 Local Economy

The industry with the highest level of employment was manufacturing (35%), with the food manufacturers Walkers and the whisky distilleries employing the bulk of employees in this industry.⁵⁹ Human health and social work activities followed this (11.1%), and wholesale and retail trade (9.2%).

E.4 Health and Wellbeing

There is one park in Aberlour – Alice Littler Park – which has a putting green and some tea rooms for community use. There are also a range of community facilities including Speyside Community Centre, a rollerblade park, youth club, and Fleming Hall – which hosts a range of community activities and classes.

Data from the 2011 census suggest that there are significant health issues in Aberlour. 81.5% of the population stated that their health was ‘very good’ or ‘good’, while 32.4% of the population considered themselves limited by a disability or long-term health condition – well above the rate of the other 4 towns. The most defined conditions reported were deafness or partial hearing loss (9.7%), followed by physical disability (9.3%) and mental health conditions (3%). While higher than the Scottish baseline, the obesity rate in Aberlour is consistent with the rates across the other site areas (10.26 per 100 patients).⁶⁰

⁵⁹ Finalised Area Profile 2015 - ABERLOUR (yourmoray.org.uk)

⁶⁰ Finalised Area Profile 2015 - ABERLOUR (yourmoray.org.uk)

F. Blackhillock (Keith) Location Profile

F.1 Labour Market and Local Area

Keith, the closest town to Blackhillock has an estimated population of 4,570.⁶¹ The latest published figures published regarding unemployment in Keith were in the 2011 national census, where 3.4% of the population was identified as unemployed.⁶²

The spread of occupations in Keith's labour market displays some similarities with that of Buckie. In the 2011 census, Keith reported a lower proportion of people working in the top 3 highest paying occupation groups (managerial and professional occupations) – 20.6%, and a higher proportion of people working in elementary occupations (15.5%) compared to Moray and Scotland.

Like Buckie, skilled labour in Keith is particularly high with 20.3% of people working in skilled trades occupations compared to 12.5% in Scotland. In the Scottish Index of Multiple Deprivation 2020, Southern Keith had a higher level of deprivation with Southeast Keith being ranked number 1921 of deprived data zones – forming part of the most deprived 30% of Scotland data zones. The measures impacting this including high crime and poor education/skills.

Figure F.22: Map outlining levels of deprivation in Keith



Source: Scottish Index of Multiple Deprivation⁶³

⁶¹ Keith (Moray, Scotland, United Kingdom) - Population Statistics, Charts, Map, Location, Weather and Web Information (citypopulation.de)

⁶² FINALISED - KEITH (yourmoray.org.uk)

⁶³ SIMD (Scottish Index of Multiple Deprivation)

F.2 Skills and Training

Keith has 2 primary schools and 1 secondary school. In the 2011 census, 37.2% of Keith's population (aged 16 and over) were reported as having no qualifications, 28.1% have a standard grade or equivalent, 13.2% a higher grade or equivalent. and 14.2% a degree or higher degree. Compared to the rest of Moray and Scotland, Keith has a much higher proportion of households where no one holds a national level qualification above level 2 (SCE Higher or similar).⁶⁴ However as identified in Section 6.5 there are a large proportion of people who work in skilled trade work which is unlikely to require formal educational training but on the job training and development.

F.3 Local Economy

In the 2011 census, the industry with the highest level of employment was wholesale and retail trade, motor repairs (19.3%), followed by manufacturing (17.7%), and construction (13.2%). There is a builders' merchant in Keith; however, previous reports have suggested that majority of those employed in the construction sector here are likely to be working for large Elgin-based building companies such as Robertson Group or Springfield. The major manufacturers in Keith are the 4 whisky distilleries located there.⁶⁵

F.4 Health and Wellbeing

Keith has a high proportion of green spaces (37 hectares per 1000 people) compared to most of the site areas – beaten only by Lossiemouth. There are 4 parks in Keith, some with community facilities including football and cricket pitches, and tennis courts. In the 2011 census, 82.4% of the population stated that their health was 'very good' or 'good' while 20% of the population considered themselves limited by a disability or long-term health condition. Furthermore, 3.6% of the population reported a mental health condition.⁶⁶

F.5 Energy Masterplan

The new Energy Masterplan for the Keith/Blackhillock area is being developed by Moray Council. Consideration should be given to hydrogen as part of the masterplan. As part of Phase 2 of the Moray Hydrogen Strategy, a meeting was held with the Moray Council team developing the masterplan to provide an overview of the strategy and what would need to be considered for a hydrogen hub or hydrogen refuelling station to assist in informing the masterplan.

⁶⁴ FINALISED - KEITH (yourmoray.org.uk)

⁶⁵ FINALISED - KEITH (yourmoray.org.uk)

⁶⁶ FINALISED - KEITH (yourmoray.org.uk)

G. Buckie Harbour Location Profile

G.1 Labour Market and Local Area

Buckie has an estimated population of 8,541.⁶⁷ The latest published figures published regarding unemployment in Buckie was in the 2011 national census, where 9.7% of the population were identified as unemployed.⁶⁸

Results from the 2011 census displayed that there are significantly lower proportions (21%) of people working in the top 3 highest paying occupation groups (managerial and professional occupations) compared to Moray (33.7%) and Scotland (37.8%). There are also more low skill jobs in Buckie with 14.8% of the employed population working in elementary occupations, compared to 12.8% in Moray and 11.6% in Scotland.

Buckie however has a higher proportion of people working in skilled trades occupations (18.7%) – the largest occupation group – compared to Moray (16.6%) and Scotland (12.5%). It also has a significantly higher proportion of process, plant, and machine operatives (16.8%) against Moray (10.4%) and Scotland (7.7%). These occupation groups could be effectively upskilled to deploy their skills for utilisation in a hydrogen economy.⁶⁹

In the Scottish Index of Multiple Deprivation 2020, central Buckie was identified as having lower levels of deprivation compared with East and West Buckie. An area in Buckie Central East was ranked number 1852nd of most deprived – putting it within the 30% most deprived data zones in Scotland, particularly in terms of income, education, and employment deprivation.⁷⁰

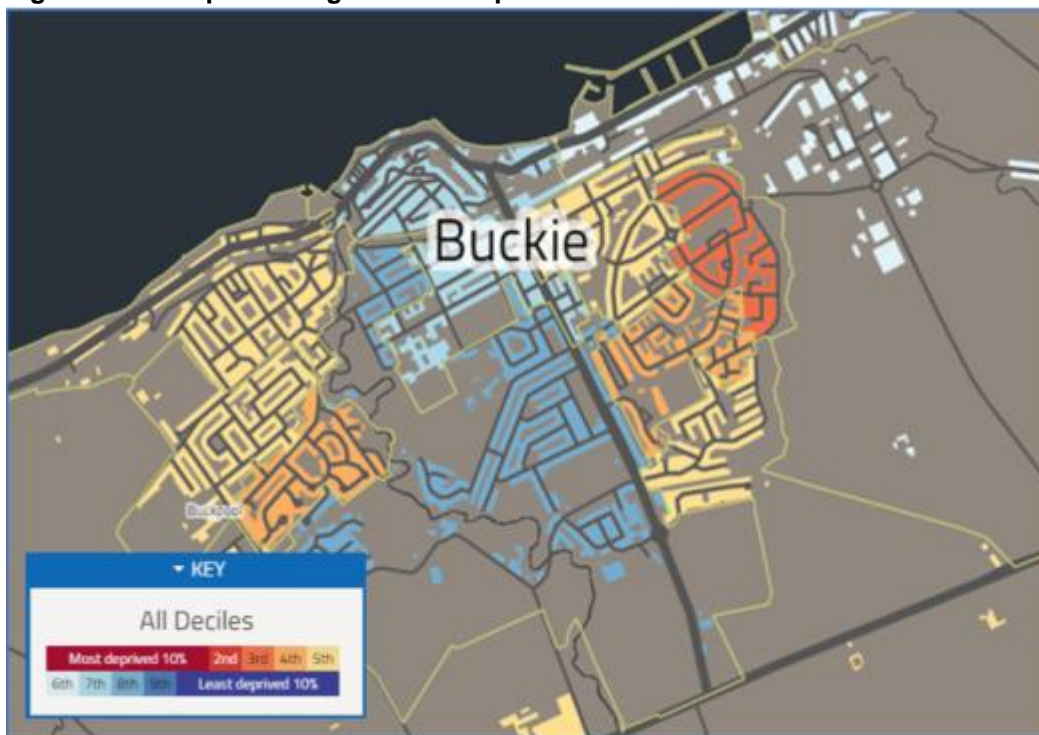
⁶⁷ [Layout 1 \(moray.gov.uk\)](https://www.moray.gov.uk)

⁶⁸ [buckieplusprofileplus2014.pdf \(hie.co.uk\)](https://www.hie.co.uk/buckieplusprofileplus2014.pdf)

⁶⁹ [Area Profile 2016 - Buckie-Draft \(yourmoray.org.uk\)](https://www.yourmoray.org.uk)

⁷⁰ [SIMD \(Scottish Index of Multiple Deprivation\)](https://www.scotland.nhs.uk)

Figure G.23: Map outlining levels of deprivation in Buckie



Source: Scottish Index of Multiple Deprivation⁷¹

Due to the high level of deprivation identified here, the Moray Community Partnership have identified Buckie Central East as an area to improve outcomes around ‘building a better future for our children and young people in Moray’ as part of Moray’s 10 Year Plan, particularly focusing on attainment, increased employability, and a greater voice in community affairs.⁷²

G.2 Skills and Training

There are 3 primary schools and 1 secondary school in Buckie (Buckie High School). In the 2011 census, 34% of Buckie’s population (aged 16 and over) reported having no qualifications, 28.9% have a standard grade or equivalent as their highest qualification, 13% a higher grade or equivalent, and 15.4% a degree or higher degree.⁷³

Through community engagement as part of the Local Outcome Improvement Plan for Buckie Central East, students at Buckie High School were concerned about teacher and subject availability. This reflects results from engagement with the wider community where only 55% of respondents said they were able to take the subjects they wanted to at school, while 65% said they needed more support at school.⁷⁴ This suggests that opportunities to better enhance education and skills for some Buckie students are lacking.

As part of Buckie’s local development plans, council has identified an area to the southwest of Buckie as a long-term growth area. This area will include community facilities and be the potential location for a new school campus, increasing venues for advancing skills and training for young people in Buckie.⁷⁵

⁷¹ [SIMD \(Scottish Index of Multiple Deprivation\)](#)

⁷² [Local Outcomes Improvement Plan Sept 2021, LOIP \(yourmoray.org.uk\)](#)

⁷³ [buckieplusprofileplus2014.pdf \(hie.co.uk\)](#)

⁷⁴ [file128000.pdf \(yourmoray.org.uk\)](#)

⁷⁵ [Layout 1 \(moray.gov.uk\)](#)

G.3 Local Economy

In the 2011 census, the industry with the highest level of employment was wholesale and retail trade, motor repairs (15.7%) followed by manufacturing (14%) and Human health and social work activities (12.3%).⁷⁶ Compared to the rest of Scotland and the Highlands and Islands, Buckie has a higher share of employment in mining, quarrying, utilities, and manufacturing (9.6%). This is driven up by the impact of the oil and gas industry, with oil and gas companies Regency Oils, Aztec Oils Northern, and Forsyths located in the local area.

In the Local Outcome Improvement Plan for Buckie Central East – an initiative of Moray’s Community Planning Partnership, several barriers to employment were identified through engagement with local communities. These were: limited transport options, childcare, lack of skills, and mental health. As part of this, respondents identified employment as a concern with many saying that there is a lack of well-paid jobs in Buckie, and a lack of transport options limits people from finding employment, accessing training opportunities, and reaching other essential opportunities.⁷⁷

Some of these existing challenges are highlighted within the Buckie Harbour Masterplan that sets out the objective to boost local business and economic growth that supports inward investment to create a more economically vibrant community across Buckie through inclusive redevelopment.⁷⁸

G.4 Health and Wellbeing

There is an estimated 29 hectares of greenspace per 1000 population, including 3 local parks with community facilities including a football pitch and pavilion. Although higher than the average in Scottish urban areas (24 hectares), this is significantly lower when compared to Elgin and Lossiemouth, limiting community outlets for recreation. The Moray Council has plans to increase greenspace in Buckie through its local development plans, which aims to ‘protect and enhance the existing network of open and green spaces’, and ‘identify a network of new play areas and parks’.

In the 2011 census, 83.6% of the population stated that their health was ‘very good’ or ‘good’ while 19.4% of the population considered themselves limited by a disability or long-term health condition.⁷⁹ Only 3% of the population reported having a mental health condition, the joint lowest with Lossiemouth compared to the other site areas. While higher than the Scottish baseline, the obesity rate in Buckie is consistent with the rates across the other site areas.

In the Local Outcome Improvement Plan for Buckie Central East, although 86% of people in the local community were interested in what goes on in their community, only a quarter felt like they had a voice.⁸⁰ Limited perception of impact on wider community affairs could potentially have an impact on wellbeing through the decreased sense of community impact and belonging.

⁷⁶ [Area Profile 2016 - Buckie-Draft \(yourmoray.org.uk\)](#)

⁷⁷ [file128000.pdf \(yourmoray.org.uk\)](#)

⁷⁸ <http://www.moray.gov.uk/downloads/file98784.pdf>

⁷⁹ [Area Profile 2016 - Buckie-Draft \(yourmoray.org.uk\)](#)

⁸⁰ [file128000.pdf \(yourmoray.org.uk\)](#)

H. Community Development Funds

There have been 2 community support funds in the UK developed in collaboration with plans to create Hydrogen Villages/Communities in Whitby and Redcar. Further examples of community development funds from renewable energy projects are also included below to serve as an example of the type of support a hydrogen related fund could provide to communities.

Table H.1: Community Development Funds

Fund	Provider	Description	Focus
1 Redcar Hydrogen Community	Northern Gas Networks	Provides financial support (between £500 - £5,000) to projects and community groups in the Redcar area. £20,000 was allocated to the Fund in 2022.	Open to projects that address issues related to individual finances, homelessness, unemployment, local social issues, local environment, community spaces, support to physically impaired, mental health, education, and training.
2 Hydrogen Village	Cadent Gas developed in collaboration with Cheshire West Voluntary Action (CWVA)	Provides financial support (up to £2,000) to initiatives that make a positive difference to communities in Whitby and surrounding areas. £20,000 was allocated to the fund in 2022.	Open to existing services or activities, and new projects that align with tackling the climate emergency, growing the local economy and new jobs, supporting young people, enabling adults to live longer happier lives.
3 Gordonbush Community Fund	SSE	Provides financial support to community and charitable projects supported by community groups, not for profits, and charities in Brora, Golspie, Helmsdale, and Rogart Council areas. £200,000 available per year.	Open to projects that support charitable activities that develop an area's assets or build the sustainability of local areas.
4 Binn Wind Turbine Community Fund	Our Community Energy (OCE) by Green Cat Renewables	Provides financial support to community projects in selected areas in Perth, Kinross, and Fife. Accepts grant applications up to £20,000.	Open to projects that enhance local communities by promoting safe, cohesive communities, developing community assets, reducing inequalities, and supporting health and wellbeing.

I. Latest Hydrogen Research

Several Scottish universities are currently undertaking research about hydrogen, to support the development of potential initiatives and rollout of a hydrogen economy, council may seek to develop partnerships with key institutions to help shape the rollout or ongoing development of Moray’s Hydrogen Economy.

Table I.1: Scottish University-led Research

University	Research Focus
1 University of Strathclyde	The Energy Systems Research Unit at Strathclyde is involved in research related to hydrogen production, storage, and transportation, as well as the development of fuel cell technologies. The university is also home to the UK’s first Hydrogen Safety Engineering and Research Centre, which aims to improve safety standards in the hydrogen industry.
2 University of Edinburgh	The University of Edinburgh’s School of Chemistry is involved in research related to the production of hydrogen from renewable sources, such as solar and wind power. The university is also involved in research related to the development of fuel cell technologies for use in transport and other applications.
3 Heriot-Watt University	Heriot-Watt University is involved in research related to the production of hydrogen from renewable sources, as well as the development of hydrogen storage technologies. The university is also involved in research related to the use of hydrogen in fuel cell vehicles and is working to develop new materials for use in fuel cell membranes.
4 University of Glasgow	The University of Glasgow’s School of Chemistry is involved in research related to the production of hydrogen from water using renewable energy sources. The university is also involved in research related to the use of hydrogen as a fuel in transport and other applications and is working to develop new catalysts for use in fuel cells.
5 Robert Gordon University	Robert Gordon University is involved in research related to the use of hydrogen in the oil and gas industry, as well as the development of hydrogen storage technologies. The university is also involved in research related to the use of hydrogen in transport and is working to develop new fuel cell technologies for use in cars and buses.

J. Subsidies and Funding

Across Scotland and more widely the UK, there are several subsidies and grant funding Moray Council could consider exploring further to support the ongoing development of a hydrogen economy.

Table J.1: Subsidies and Funding Options

Funding Scheme	Provider	Description	Application Criteria
1 Hydrogen for Transport Programme	UK Government	The Hydrogen for Transport Programme provides funding for zero-emission fuel cell electric vehicles (FCEVs) and refuelling infrastructure.	The funding is available to public and private sector organisations that are in England, Scotland, or Wales. The scheme is primarily aimed at fleet operators, vehicle manufacturers, and infrastructure providers.
2 Low Emission Bus Scheme	UK Government	The Low Emission Bus Scheme provides funding to help local authorities and bus operators switch to low or zero-emission buses.	The funding is available to local authorities, bus operators and other public transport providers in England, Scotland, and Wales. The scheme is designed to support the purchase of low or zero-emission buses and infrastructure to support them.
3 Zero Emission Fleet Accelerator (ZEFA)	UK Government	ZEFA provides funding for the deployment of zero-emission vehicles and infrastructure in the UK.	The funding is available to public and private sector organisations, including fleet operators and infrastructure providers. The scheme aims to support the uptake of zero-emission vehicles in fleets across the UK.
4 Green Distilleries Competition	Scottish Government	The Green Distilleries Competition is a funding scheme that aims to support the decarbonisation of the whisky and gin sectors in Scotland.	The funding is available to Scottish distilleries that are looking to decarbonise their operations by using hydrogen and other low-carbon technologies. The scheme aims to support the development and deployment of new technologies and infrastructure.
5 Industrial Fuel Switching Competition	UK Government	The Industrial Fuel Switching Competition is a funding scheme that aims to support the decarbonisation of industry in the UK.	The funding is available to UK-based industrial companies that are looking to switch from fossil fuels to low-carbon alternatives, such as hydrogen. The scheme aims to support the development and deployment of new technologies and infrastructure.
6 Scottish Zero Emission Bus Challenge Fund	Transport Scotland	The Scottish Zero Emission Bus Challenge Fund provides funding for the purchase of zero-emission buses and infrastructure in Scotland.	The funding is available to Scottish local authorities, bus operators, and other public transport providers. The scheme aims to support the transition to zero-emission buses across Scotland.
7 Energy Investment Fund	Scottish Government	The Energy Investment Fund (EIF) provides funding for innovative energy projects in Scotland, including those involving hydrogen.	The funding is available to Scottish businesses, communities, public sector organisations and third sector organisations. The scheme aims to support the development and deployment of innovative energy projects that will help to drive Scotland's transition to a low carbon economy.

Funding Scheme	Provider	Description	Application Criteria
8 Low Carbon Infrastructure Transition Programme	Scottish Government	The Low Carbon Infrastructure Transition Programme (LCITP) provides funding for low carbon infrastructure projects in Scotland, including those involving hydrogen.	The funding is available to Scottish businesses, communities, public sector organisations and third sector organisations. The scheme aims to support the development and deployment of low carbon infrastructure projects that will help to reduce Scotland's greenhouse gas emissions.
9 Community and Renewable Energy Scheme	Local Energy Scotland	The Community and Renewable Energy Scheme (CARES) provides funding for community-led renewable energy projects in Scotland, including those involving hydrogen.	The funding is available to Scottish communities, public sector organisations and third sector organisations. The scheme aims to support the development and deployment of community-led renewable energy projects that will help to reduce Scotland's greenhouse gas emissions and support local economic development.

