Kintore Hydrogen
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Kintore Hydrogen Plant

EIA Scoping Report

September 2023

Contents

Tables

Diagrams

Figures

Document Control

Document title	Kintore Hydrogen EIA Scoping Report
Job number	636497
Client	Kintore Hydrogen Ltd
Version no.	Rev3
Date approved	05 September 2023
Date first issued	05 September 2023

Version History

Version	Date	Author	Approved by:	Description of change
Rev0	July 2023	Tom Dearing	Kintore Hydrogen Ltd	Draft project description
Rev1	July 2023	Savills and EIA team	-	Draft for client review
Rev2	August 2023	Savills and EIA team	Tom Dearing	Response to review
Rev3	September 2023	Savills and EIA team	Kintore Hydrogen Ltd	Final for issue

1 Introduction

1.1 Request for EIA Scoping Opinion

1.1.1 Kintore Hydrogen Ltd (Kintore Hydrogen or the applicant) intends to make an application to Aberdeenshire Council for planning permission in principle for a hydrogen production plant next to Kintore Substation in Aberdeenshire. Savills has been commissioned to prepare this Environmental Impact Assessment (EIA) Scoping Report to inform the scope and content of an EIA for the proposed development. The development site and location are shown in Figures 1.1 and 1.2.

1.1.2 Kintore Hydrogen intends to voluntarily submit an EIA Report (EIAR), making the proposed development EIA development under regulation 6(2)(c) of The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (the EIA Regulations).

1.1.3 This EIA Scoping Report constitutes a request under Regulation 17(1) that the relevant planning authority, Aberdeenshire Council, adopts a Scoping Opinion within 35 days as prescribed in regulation 17(6). In accordance with regulation 17(2), this EIA Scoping Report provides:

- a description of the location of the development, including a plan sufficient to identify the land (Section 3 and Figures 1.1 and 1.2);
- a brief description of the nature and purpose of the development and of its likely significant effects on the environment (Sections 3 and 4); and
- such other information or representations as the developer may wish to provide or make (further detail of the proposed approach to the EIA, scoping of impact pathways and cumulative developments in Sections 6–17).

1.2 Consultation to date

1.2.1 Prior to submitting this scoping opinion request, Kintore Hydrogen has held discussions with planning officers at Aberdeenshire Council since November 2022. Consultation is ongoing: Kintore Hydrogen held a pre-application meeting with the council on 16 August 2023 to introduce the project to planning officers and discuss timescales for EIA scoping and the future planning application; and a meeting with the Garioch Area Committee on 22 August 2023 similarly to introduce the project. A meeting with the Kintore Community Council is scheduled for 19 September 2023.

1.2.2 Kintore Hydrogen intends to undertake further community and stakeholder consultation prior to submission of the planning application.

1.2.3 Prior to the formal environmental stakeholder consultation via this EIA Scoping Request, consultation with the Scottish Environment Protection Agency (SEPA) has been undertaken during the application for (and the subsequent grant) of a Controlled Activity Regulations (CAR) authorisation for the abstraction of water from the River Don as a potential feedstock for the proposed hydrogen facility. As part of the CAR application process consultation was also undertaken with The River Don Trust. The CAR authorisation for the abstraction for water from the River Don was granted by SEPA in June 2023 (ref.: CAR/L/5004426).

1.2.4 The River Don Trust noted the value of the Don for fish species and the potential benefits if the project could contribute to river restoration or enhancement opportunities in the Kintore area of the river catchment.

2 Site Location and Setting

2.1 Introduction

2.1.1 This section provides an overview of the existing environment within the application boundary as well as the wider setting of the application site. Environmental constraints overviews are provided in Figures 2.1 and 2.2 Further detail of the baseline environment is provided within each EIA topic in Sections 6–15.

2.1.2 The land within the application boundary can be divided into four parts:

- the main electrolysis plant site;
- the electrical connection from Kintore Substation to the electrolysis plant;
- the underground hydrogen export pipeline to the connection point at the FM10 and/or FM24 natural gas pipelines (subject to further engagement with National Gas Transmission); and
- the water abstraction and discharge point and underground water pipe lines to and from the River Don.

2.1.3 These are shown in Figure 3.1. Further details of specific activities which will be carried out in different areas within the application boundary can be found in the Project Description in Section 3.

2.2 Site location

2.2.1 The electrolysis plant site is located on land to the west of the existing Kintore Substation, approximately 2.8 km to the southwest of Kintore, Aberdeenshire, 0.3 km northwest of Leylodge and 0.5 km to the west of the B977.

2.2.2 The hydrogen export pipeline route corridor would run south and westwards from the electrolysis plant site to a connection point with the existing FM10 and/or FM24 natural gas pipelines. The connection point would be around 1 km south-west of the A96 and the Midmill Business Park.

2.2.3 The raw water pipeline route corridor between the electrolysis plant and the River Don would loop around the south of Kintore, with the abstraction and discharge point being located on the south bank of the Don off The Rushlach road, around 1.5 km south-east of the edge of Kintore or 1 km east of Midmill Business Park.

2.2.4 The main electrolysis site encompasses an area of approximately 80 ha at this stage, within which design work is ongoing on the optimal layout and siting of development buildings and equipment, which are expected to require up to around 40 ha of the available site. The overall application boundary is approximately 172 ha in total, including both water pipeline routes at this stage. The hydrogen pipeline route is around 2.7 km in length and the water abstraction and discharge pipeline route is around 7.8 km in length if crossing agricultural land or 9.7 km in length if laid under minor public roads.

2.2.5 The British National Grid coordinates are NJ7613 for the electrolysis plant site and NJ8115 for the water abstraction and discharge site at the River Don.

2.3 Local planning authority

2.3.1 The application site is located within the administrative area of Aberdeenshire Council, in the East Garioch ward.

2.4 Site description

2.4.1 The electrolysis plant site is currently agricultural land with a fringe of bog woodland and gorse scrub at the northern edge where it is crossed by Dewsford Burn. There are farm tracks, field boundaries and smaller areas of coniferous woodland and scrub in the central part of the site. It is gently undulating, with a low east-west ridge crossing the centre of the site and peaking at The Knock, a low prominence on the western boundary with a small stand of trees and high voltage electricity pylon.

2.4.2 The site is crossed by multiple 275 kV and 132 kV high-voltage overhead power lines from Kintore Substation. The substation is currently being expanded westwards by Scottish and Southern Electricity Networks (SSEN) to provide new 400 kV bays. At the time of writing, SSEN is also consulting on proposals for a new 400 kV overhead power line from Kintore Substation to Tealing via Fiddes, which is also likely to cross or be adjacent to the application site.

2.4.3 To the immediate north of the site are the Stony Hill, Harthills and Bandshed Moss coniferous plantations on gently rising ground from the burn. To the south, west and east are farm land with woodland pockets, the B977 road from Kintore, two wind turbines, and scattered residences, farm buildings and rural businesses. Further east, the A96 dual carriageway delimits the edge of Kintore.

2.4.4 Based upon the Land Capability for Agriculture Scale[1], land across the majority of the application boundary is classed as grade 3.2 with some areas of grade 4.1 or 4.2 soils, i.e. not higher quality grade 1 to grade 3.1 farm land.

2.4.5 The underground electrical connection running from the electrolysis plant to the new Kintore Substation 400 kV bays is approximately 300–400 m running from west to east through grazing land.

2.4.6 The underground hydrogen pipeline connection from the electrolysis plant to the FM10 and/or FM24 natural gas pipelines would be through farm land. The existing high-pressure natural gas pipeline run from north to south, 1.3 km to the west of the A96 and close to Broomhill Plantation.

2.4.7 Two options are under consideration for the water pipeline route. The first would be through farmland, taking a south-easterly loop around Kintore and then turning north to the River Don. Besides farm land along this route, crossings of a number of burns, the A96 and the Aberdeen–Inverness railway line (single track at this location) would be required. The abstraction and discharge point, on the south bank of a meander of the Don known as Dalweary Pot, would be on grazing land adjacent to the railway.

2.4.8 Alternatively, from the same abstraction/discharge point, the water pipeline could be laid under minor public roads and the B977 to reach the electrolysis plant site. The roads generally serve scattered residences, rural businesses and light industrial uses near the A96.

2.5 Access

2.5.1 Access to the main electrolysis site would be taken from the B977 near Leylodge via a new private road and junction to be developed.

2.5.2 Access to the hydrogen pipeline connection point to the FM10 and/or FM24 natural gas pipelines and the hydrogen pipeline construction corridor would also be taken from the B977 around 400 m from the roundabout with the B994, using an existing private farm access road.

2.5.3 Access to construct the water pipeline route corridor would be taken at a number of locations from roads along the route.

2.5.4 Access to construct the abstraction and discharge point with pumping station would be taken from The Rushlach road. There is an existing short tunnel under the railway embankment serving the adjacent residence but this is constrained in width and height. Subject to Network Rail and ScotRail agreement, a crane may therefore be used to lift larger equipment (if necessary) across the railway and a possible location for this, with access from the road, is shown in the draft application boundary.

[1] James Hutton Institute (2014): Digitised Land Capability for Agriculture of Scotland 1:50,000 maps. Published by NatureScot. [Online] https://map.environment.gov.scot/Soil_maps/?layer=6, accessed 22.06.23

2.6 Site setting

Residential areas

2.6.1 The locality of the main electrolysis plant site is a rural setting with sparse population. There are approximately 40 properties within a 1 km radius of the electrolysis plant site. The nearest are two residences at Dewsford, between the proposed electrolysis plant and the extended Kintore Substation. Further residences at Leylodge are adjacent to the south edge of the electrolysis plant site and a small estate off the B977 is around 380 m east of the site.

2.6.2 There is a single residence at north edge of the area being considered for the gas pipeline connection point.

2.6.3 The more densely populated residential area of Kintore, which has a population of 4,700 (mid-2020 estimate)[2], is approximately 2.3 km from the electrolysis plant site and 1.4 km from the gas pipeline connection point.

2.6.4 The water pipeline route corridor through farm land is generally away from residential areas but passes a number of individual rural residences; and a greater number are located along the route of minor roads should that option be followed. The abstraction and discharge point has three residences within around 300 m, depending on the location selected within the area identified at this stage.

Nature conservation setting

2.6.5 There are no internationally-, nationally- or locally-designated nature conservation sites within a 5 km radius of the application boundary. Looking further afield, the nearest designated sites are:

- 'Paradise Wood – 1271' Site of Special Scientific Interest (SSSI) approximately 9 km southwest of the electrolysis plant site;
- 'Tilliefoure Wood – 1538' SSSI approximately 10 km southwest of the electrolysis plant site;
- 'The Loch of Skene – 1038' SSSI approximately 4.3 km south of a water pipeline corridor option; and
- 'Arnhall Moss – 8128' Local Nature Reserve approximately 6.2 km south of a water pipeline corridor option.

2.6.6 The 'Ythan Estuary, Sands of Forvie and Meikle Loch' SPA is located more than 16 km from the application boundary but is mentioned as the River Don estuary discharges into the SPA area.

Landscape or townscape and cultural heritage setting

2.6.7 The landscape context is generally a mixture of relatively flat farm land with frequent drainage channels and burns, occasional deciduous and coniferous plantation woodland, farm buildings and rural residences. The A96 dual carriageway is a key transport corridor and defines the edge of the more built-up area of Kintore, which includes a business park and industrial estate.

2.6.8 Existing energy uses are clearly apparent in the landscape, with eight high-voltage overhead powerlines and their towers radiating in all directions from Kintore Substation[3], and two wind turbines also developed south of the substation.

[2] National Records of Scotland (2023): Mid-2020 Population Estimates for Settlements and Localities in Scotland. [Online] https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-estimates/settlements-and-localities/mid-2020, accessed 21/06/23

[3] Mapped by SSEN at https://www.ssen-transmission.co.uk/projects/project-planned-areas/?projectId={2f6d092a-1169-4744-836d-68b4faea24df}, accessed 22/06/23

2.6.9 The whole application boundary lies within the Scottish Natural Heritage (SNH) National Landscape Character Type 26: Wooded Estates – Aberdeenshire. Low hills and wide valleys with dense woodland are consistent features within this character type which covers a large area between the Don and Dee valleys[4].

2.6.10 The Stony Hill and Hartshill plantations to the north of the electrolysis plant development site (outside its boundary) are designated as Ancient Woodland and there are other pockets of Ancient Woodland at locations adjacent to the water and hydrogen pipeline routes.

2.6.11 Designated heritage assets within 500 m of the application boundary are as follows. Further potential undesignated heritage assets are discussed in Section 7.

Scheduled monuments

- stone circle 110m W of South Leylodge Steading (SM 12350): lies within the proposed development redline boundary defined for the scoping stage, just southwest of Kintore Substation
- remains of Aberdeenshire Canal, south of Dalwearie (SM7675) (100 m south of the water abstraction/ discharge point, on the south side of the Aberdeen to Inverness line, and crossed by the water pipeline corridor and potential access route to the abstraction/discharge point)
- standing stone 480 m W of Cairntradlin Cottage (SM 12328)
- standing stone 75 m WNW of Ferneybrae Croft (SM 12415)
- enclosure 480 m S of The Hedges (SM 12438)
- palisaded enclosure 555 m S of Kilm Cottage (SM 12463)

Listed structures

- Aquherton Farmhouse, category B (approx. 2.6 km east of the electrolysis site, approx. 200 m north of the gas connection site boundary, and adjacent to the route of a water pipeline corridor option);
- Boghead Farmhouse, category B (approx. 400 m north of a water pipeline corridor option, north of the A96 near Kinellar);
- Kinellar House, category B (approx. 200 m southeast of a water pipeline corridor option, north of the A96 near Kinellar);
- Old Manse of Kinellar, including walled garden, category B (on the route of a water pipeline corridor option, Kingsfield Road near Kirkton);
- Manse of Kinellar (on the route of a water pipeline corridor option, Kingsfield Road near Kirkton); and
- Parish church of Kinellar, including churchyard walls, category B (on the route of a water pipeline corridor option, Kingsfield Road near Kirkton).

2.7 Hydrological, hydrogeological and geological environment

2.7.1 The electrolysis development site is underlain by bedrock comprising the Aberdeen Formation (psammite and semipelite) to the east and the Kemnay Pluton (granite and foliated-muscovite-biotite) to the west.

2.7.2 The bedrock is overlain by superficial deposits of Banchory Till (glacial till). An area of lacustrine deposits (clay, silt and sand) is located within the centre of the site, whilst alluvium and glaciofluvial deposits (clay, silt, sand and gravel) are recorded within the northern extent of the site and adjacent to the main watercourses. The hilltops locally are shown to be absent of any superficial deposits.

[4] Scottish Natural Heritage (2019) LCT 026 – Wooded Estates – Aberdeenshire. [Online] https://www.nature.scot/sites/default/files/LCA/LCT%20026%20-%20Wooded%20Estates%20-%20Aberdeenshire%20-%20Final%20pdf.pdf, accessed 21/06/23

2.7.3 The majority of the superficial deposits as well as the bedrock beneath the site are unlikely to contain significant amounts of groundwater. The bedrock has been classified by BGS as a low productivity aquifer whereby small amounts of groundwater may be present within the near surface weathered zone and fractures. The alluvium and glaciofluvial deposits have the potential to contain shallow groundwater and this may be in hydraulic continuity with adjacent surface water.

2.7.4 The proposed development is located within the surface water catchment of the River Don, which flows generally eastwards to the north east of the site. The western and central extent of the site is drained by the Tuach Burn, a tributary of the River Don, which flows eastwards to the north of the site before discharging into the River Don. Several tributaries of the Tuach Burn cross the site including the Dewsford Burn, Park Burn, Tillakae Burn and Sheriff Burn.

2.7.5 The south east of the site is drained by the Black Burn which is located approximately 1.3 km east of the site and flows generally northwards before discharging into the River Don.

2.7.6 There are no drinking Water Protected Areas (Surface Water) or Scotland River Basin District Boundary within 5 km of the Application boundary. Notwithstanding this, it is recognised that watercourses and groundwater may support local private water supplies or be used as irrigation water by farms locally.

2.7.7 SEPA flood mapping confirms flood extents are typically confined to the watercourse corridors with the exception of the centre of the site near the confluence of the Park Burn and Tillakae Burn where a wider floodplain is noted.

3 Project Description

3.1 Purpose

3.1.1 The proposed development would be a facility for production of hydrogen from water by electrolysis using renewable electricity. This is sometimes called 'green hydrogen'. Hydrogen is a zero carbon fuel at the point of combustion.

3.1.2 The hydrogen would initially be supplied for blending with natural gas in the existing high-pressure gas network in order to aid in decarbonising industrial uses that rely on gas fuel in the UK. By the early 2030s, a new hydrogen transmission backbone is expected to have been developed under National Grid Gas's 'Project Union'[5], enabling a pure hydrogen supply to industrial clusters across the UK as well as for long duration energy storage. The proposed development would then become a major source of hydrogen for supply via the Project Union pipeline.

3.1.3 The electricity would be supplied from SSEN's new 400 kV bays at Kintore Substation, which provides transmission capacity for the increasing wind power generation in Scotland among other renewable sources. However, notwithstanding SSEN's proposed East Coast 400 kV Phase 2 Project to provide a new backbone electricity transmission line, capacity to transmit Scottish renewable power to the areas of high UK demand south of the border is a key constraint. This is leading to renewable generation being curtailed[6], and ultimately could limit the benefits that can be realised from Scotland's wind, wave and tidal power resources.

3.1.4 Producing hydrogen using excess renewable power generation (which might otherwise be curtailed or have capacity not fully realised) provides a solution to storing and transmitting this energy, in a form that can readily be used for industry and heating, making best use of existing natural-gas-adapted infrastructure.

3.1.5 The raw water would be supplied from the River Don, which has sufficient capacity under a range of flow conditions to support the water demand of Kintore Hydrogen. Kintore Hydrogen has been issued an abstraction licence by SEPA under the Controlled Activity Regulations for this water supply.

3.1.6 The location of the proposed development has therefore been chosen due to being adjacent to the newly expanded capacity of Kintore Substation (not requiring a new overhead transmission line), close proximity to the FM10 and FM24 gas pipelines (requiring a connection pipe of less than 3 km) and proximity to a more than sufficient raw water supply.

3.1.7 There is a limit to the rate of hydrogen blending with natural gas in the existing transmission network, dictated by the compatibility of gas users' equipment to accept the hydrogen blend. This is likely to change over time as the UK's hydrogen transition progresses, and ultimately pure hydrogen transmission is anticipated under Project Union. Kintore Hydrogen therefore intends to develop the facility and introduce its hydrogen supply in phases, starting with production capacity from 500 megawatts of electricity (MWe) and then developing further phases to reach a planned 3,000 MWe capacity in total.

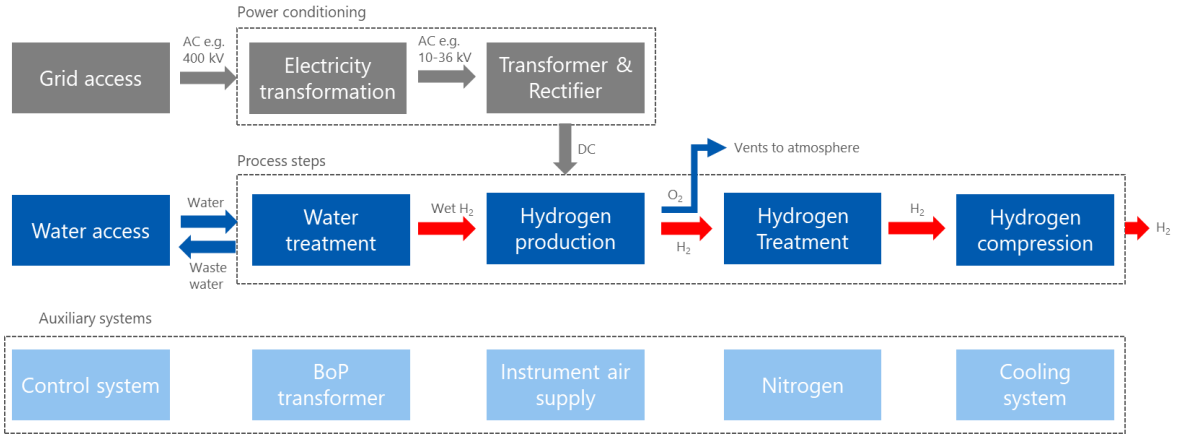
3.2 Electrolysis process

3.2.1 The electrolysis process uses electricity to split water (2 H_2O) into hydrogen (2 H_2) and oxygen (O_2). A simple process diagram is illustrated in Diagram 3.1.

[5] National Grid Gas (2022): Project Union Launch Report. [Online] https://www.nationalgas.com/document/139641/download, accessed 22/06/23

[6] a temporary deliberate reduction in generation below the available capacity, due to factors such as low power demand or insufficient transmission capacity

Diagram 3.1: Electrolysis process diagram



3.2.2 The key steps of the hydrogen production would be as follows.

1. The incoming high-voltage alternating current (AC) power is converted to into lower voltage direct current (DC) power and distributed to the electrolyser modules.
2. An inlet water supply to a water treatment plant is used to produce demineralised water.
3. The electrolyser modules use the water and electricity to generate hydrogen and oxygen.
4. Hydrogen is treated to ensure its quality requirements for export are met. This can include cooling, drying and oxygen removal.
5. Hydrogen is compressed to reach the pressure level allowing it to be injected into the high-pressure gas transmission network.
6. Oxygen is safely vented to atmosphere.
7. Auxiliary systems, such as the control system, cooling system, instrument air system, and an inert gas (nitrogen) system are in place to enable the plant to operate.

3.2.3 Kintore Hydrogen may use either proton exchange membrane (PEM, also known as polymer electrolyte membrane) electrolysis or alkaline electrolysis technology for the electrolyser modules, or a combination of both technologies. Innovation continues apace in the electrolysis industry so further advancements are expected. Later phases may deploy variants to this technology. All technologies involve enclosed hydrogen production in a series of electrolysis cells housed within a building. The inputs to the electrolysis cells are fresh water and electricity and the outputs are separate streams of hydrogen and oxygen at the cathode and anode of the cell respectively.

3.2.4 Both systems require similar electricity and water inputs together with other ancillary systems, which are comprise a series of modular electrolysis stacks to provide the desired capacity. From the perspective of EIA scoping, the main difference between PEM and alkaline systems lies in the alkaline system requiring an additional potassium hydroxide system (supply, separator stage for the gas and potassium hydroxide, and scrubber) and an additional low-pressure compressor with buffer storage as the pressure at the output of the alkaline electrolysis cells is lower than the PEM cells. Overall, this can lead to a somewhat greater space requirement for the alkaline system, though this varies depending on the technology supplier.

3.2.5 An alkaline system has been assumed at this stage to inform EIA scoping, as it is likely to have a greater space requirement. PEM and alkaline electrolysis cells are both modular systems that are well suited to scaling up production over time in phases, initially for blending into the gas grid and then to supply the Project Union pipeline in due course.

3.3 Electrolysis plant

Structures and equipment

3.3.1 In overview, the buildings, structures and equipment of the electrolysis plant would comprise:

- buildings housing the electrolyser cells;
- hydrogen buffer storage and scrubber (only applicable for the alkaline technology);
- electrical switchyard;
- pipeline compressor building and auxiliaries;
- nitrogen generation and storage,
- compressed air generation and storage;
- external cooling system;
- water treatment building and tanks;
- control room;
- workshop and stores;
- gatehouse;
- internal access roads and parking;
- site drainage and underground services;
- perimeter security fencing, lighting and CCTV.

3.3.2 The electrolyser buildings would be steel-framed and steel-clad structures of up to around 20 m height to the ridgeline, each with around a 30 m by 250 m footprint. The height of 20 m has been set as a maximum parameter for scoping stage, to enable a maximum-case zone of theoretical visibility (ZTV) to be modelled at this stage, but is expected to be reduced in further design work. Each building would contain a series of electrolyser modules with around 200 MWe capacity, partitioned internally for fire safety. The initial 500 MWe phase of development could therefore require two such buildings, and the full 3 GWe capacity could require around 12 buildings with a footprint of up to around 9.4 ha.

3.3.3 Oxygen from the electrolysis process would be exhausted from the buildings via a series of vent pipes on the roof or walls of the building, assumed to have a clear height of up to around 5 m above the roof at this stage. Separate vents would also be used to discharge a small amount of hydrogen during start-up and shut-down of the plant, when the production level is too low for compression and export to the gas grid, and from purging of pipe sections or equipment with nitrogen to replace hydrogen for safety during more extended shut-downs.

3.3.4 The high pressure compressors would also be housed inside two similar buildings with a combined footprint of around 0.3 ha. Enclosing the compressors in buildings provides sound attenuation and the opportunity to further mitigate sound levels through acoustic treatment of the building structure should that be necessary.

3.3.5 Other buildings such as the workshop, stores, control room and gatehouse would typically be single storey structures that are lower in height, typically no more than 10 m and usually lower.

3.3.6 A water treatment plant would filter and demineralise raw water supplied from the River Don to produce very pure deionised water for use in the electrolysis. The treatment plant would have three stages: initial settlement and filtering to remove suspended solids; a reverse osmosis filtering plant to remove salts and other dissolved minerals; and finally an electro-deionisation plant. The water treatment plant would have a discharge water stream post-treatment that would be returned to the River Don. This is discussed further below. The treatment plant would be a building of up to around 6 m height.

3.3.7 A cooling water system is required to keep the electrolysis cells at a stable temperature for efficient operation and also to cool the hydrogen between various stages of compression for export to the gas grid. A hybrid water and air cooling system would be used. This would be a series of cooling towers with internal fans, which draw air in through louvres at the base, through a water mist system and then through a heat exchanger with coolant circulated from the electrolyser and compressor systems. Cooling water would use the waste water stream from the water treatment plant and then be

discharged to the River Don. Hybrid cooling towers of up to 20 m in height are expected to be required, arranged in banks. A hybrid system offers better cooling efficiency and lower fan noise than a purely air cooling system, but does not require the very substantial towers of a purely wet evaporative cooling system.

3.3.8 An external electrical switchyard would have six or seven 400/132 kV transformers, busbars and associated switchgear to supply high voltage AC power from the 400 kV underground cable grid connection to the electrolyser buildings. The switchyard would also contain further 33 kV and 6.6 kV transformers to supply other power loads on and off the site including the compressors, cooling system and abstraction water pumps. The electrical switchgear is expected to be primarily in the open for an air-insulated system, but may include a building if a gas-insulated system is chosen. The typical height of the equipment (and building if applicable) would be up to around 15 m at the tallest points, with most infrastructure significantly below this. Power distribution within the site would be by underground cable and an underground cable along the water pipeline route would also supply the abstraction pump. Alongside the electrolyser buildings, further transformers and rectifiers would be used to step down the voltage and provide DC power to the electrolysis cells.

3.3.9 Other freestanding equipment within the electrolysis plant site would comprise hydrogen dryer and chiller systems, nitrogen generators and storage tanks, compressed air generators and storage tanks, potassium chloride storage tanks and a firewater tanks, all with associated pipework. These would be located externally and typically around 5 m to 15 m in height.

3.3.10 Due to the weight and in some cases dynamic load of equipment, the main electrolyser buildings, compressor buildings and certain other items of plant such as the hydrogen dryer are expected to require piled foundations. Concrete raft foundations would typically be used for the remaining buildings and pads for other freestanding equipment.

Operating hours and staff

3.3.11 The proposed development would be capable of operating on up to a 24/7/365 basis (with periods of downtime for planned maintenance) to enable flexibility in hydrogen production. In practice actual operation of the site would likely be around 30-40% of that time over the course of a year, to respond to intermittency of renewable energy generation peaks.

3.3.12 The main electrolysis site would be staffed in a shift pattern with employees holding a variety of skillsets for operating the control room, undertaking maintenance and providing site security and administration.

3.3.13 At intervals a larger temporary contractor workforce would be required during planned maintenance and overhaul of various equipment.

3.3.14 The above-ground installation for the gas network connection and the water abstraction pumping station (discussed below) would not typically be staffed but would require occasional access for inspection and maintenance.

Access and parking

3.3.15 Access to the electrolysis plant would be from the B977. A new temporary junction and private access road are proposed from a point north of Leylodge for the construction phase. Permanent operational access would be from an existing junction on the B977 at the south of the electrolysis plant development area, with upgrades to the junction and private access road if required. The B977 is a two-lane road providing ready access to the A96 via the B994 and B987.

3.3.16 Within the electrolysis plant site, internal circulation roads would be provided for staff and access during maintenance. A staff car park with appropriate spaces for the workforce and visitors, bays for people with mobility impairments, cycle storage and electric vehicle charging would be provided.

3.3.17 As the proposed development would be a COMAH facility, access would be strictly controlled. A perimeter security fence with CCTV and motion-activated security lighting would be employed. The private access road would be gated and have a security office and turnstile.

Landscaping and habitat creation

3.3.18 A landscaping design for the site would be developed, to include areas of planting, screening of views and habitat creation within the site.

3.3.19 Kintore Hydrogen intends to provide biodiversity net gain as part of the proposed development, which may be via a mixture of on- and off-site habitat creation areas.

Drainage

3.3.20 There would be three aspects to the site drainage system:

- clean surface runoff;
- potentially contaminated drainage (from process areas); and
- foul drainage from sanitation.

3.3.21 Clean surface runoff would be managed via an attenuation pond sized to ensure no increase in the greenfield runoff rate or flood risk. Subject to further drainage design, this may be discharged into Park Burn or Dewsford Burn or could be discharged to the River Don using the return water pipeline.

3.3.22 Subject to engagement with Scottish Water, a foul sewer connection along the site access road to the local sewer network could be provided for the sanitation and staff welfare drainage or if this is not possible, a package water treatment plant on the site could also potentially be used.

3.3.23 Under the requirements of the PPC Permit, a separate sealed drainage system would be provided for all process and storage areas where there is potential for spills or leakage to cause contamination. Drainage from these areas would ordinarily discharge to the foul sewer connection but would have isolation valves enabling it to be closed off should any spillage occur.

3.4 Electricity supply

3.4.1 Electricity supply would be via underground cable from Kintore Substation. The expansion of Kintore Substation currently under construction by SSE will provide the necessary capacity and electrical equipment for the connection, with no further expansion of the substation required for the proposed development.

3.4.2 The underground cables would supply 400 kV AC power. These would be routed from the west side of the expanded substation to the electrolysis plant, a distance of around 300-400 m, avoiding residential properties. The cables would be buried in a trench or conduit typically at around 1.1–1.5 m depth with soil cover of around 1.1 m reinstated above the cables.

3.5 Hydrogen export

Pipeline

3.5.1 Hydrogen export would be via a number of stainless steel pipelines laid in a common trench or parallel trenches at around 1.1–1.5 m depth with soil cover of around 1.1 m reinstated above the pipes. Kintore Hydrogen would require a wayleave to access the pipe route for potential inspection or maintenance but land above the pipelines can be farmed, including ploughing. During construction, a typical working corridor width of around 25 m would be required for machinery access and temporary spoil piles when installing the pipelines.

3.5.2 The pipeline will enable export of up to 360 megawatt hours (MWh) of hydrogen[7] in the first 500 MWe development phase at up to around 74 bar gauge pressure to match the existing high-pressure gas transmission network. The

[7] measured on a gross calorific value or higher heating value basis

hydrogen export rate in future phases would depend on the electrolyser technology efficiencies (which continue to advance) and National Grid Transmission's requirements at the time.

3.5.3 The pipeline would connect the electrolysis plant site to the above-ground installation where the tee-in to the FM10 and/or FM24 natural gas pipelines would be located. At that installation the export pipeline would be split to provide the connection initially for hydrogen blending into both natural gas pipelines and in future to enable full export capacity the UK's pure hydrogen transmission backbone as anticipated under Project Union.

3.5.4 Crossings of watercourses and minor roads along the pipeline route may use trenchless techniques such as horizontal directional drilling (HDD) where required. This involves drilling and casing a tunnel for the pipelines under the obstacle to be crossed, following which the pipe sections can be inserted, without disturbing features at the surface.

3.5.5 Temporary access points, hedgerow removal, working compounds, pipeline laydown areas and drilling machinery compounds if HDD is employed are likely to be required along the pipeline route during construction.

Above-ground installation

3.5.6 At the connection point where the hydrogen pipeline tees into FM10 and/or FM24, equipment above ground will be required. This would be located in a fenced and hedged compound of up to around 50 m by 50 m square. Within this would be sections of pipeline above ground to enable access for maintenance and inspection, together with monitoring equipment. The monitoring and maintenance equipment would require a small stores room and instrumentation kiosks. These would be single-storey structures or containers of around 5 m height. A buried power supply and fibre-optic cable for telemetry would be provided along the pipeline route back to the electrolysis plant control room.

3.5.7 Access to the above-ground installation for inspection and maintenance visits will be via an existing private farm road off the B977.

3.6 Water supply and discharge

Pipelines

3.6.1 The raw water supply from the River Don would be via one or two parallel pipes each of around 600 mm diameter which can supply up to around 2,800 m^3 of water per hour in total. The return for water discharge will be via a similar single 600 mm diameter pipe laid in parallel with the supply. The return pipeline capacity will be up to around 970 m^3 per hour.

3.6.2 If taking the route across farm land, the pipelines would be laid in a trench of around 3 m width at around 1.1–1.5 m depth with soil cover around 1.1 m reinstated above the pipes. Kintore Hydrogen would require a wayleave to access the pipe route for potential inspection or maintenance but land above the pipelines can be farmed, including ploughing. During construction, a typical working corridor width of around 25 m would be required for machinery access and temporary spoil piles.

3.6.3 If taking the route under minor public roads, the pipelines would similarly be laid in trenches and the road surface reinstated.

3.6.4 In both cases, crossings of watercourses, minor roads, the A96 and the railway may use trenchless techniques such as horizontal directional drilling (HDD) where required, as described above. Temporary access points, hedgerow removal, working compounds, pipeline laydown areas and drilling machinery compounds if HDD is employed are likely to be required along the pipeline route during construction.

3.6.5 The elevation difference between the River Don and the electrolysis plant site is around 85 m, requiring a pumped supply but allowing gravity return.

3.6.6 The 2,800 m^3 supply capacity is the upper end of the potential water demand of the electrolysis plant (depending on technology choice) and the upper end of the abstraction approved by SEPA under the Controlled Activity Regulations

(CAR) license that has been granted for this water supply, which is up to 67,392 m^3 per day (subject to a minimum flow rate in the River Don of 4.86 m^3 per second).

3.6.7 Under the CAR licence, a minimum of just over a third (34.6%) of the water abstracted from the River Don must be returned to the river through the discharge pipeline. This will be from the discharge output of the water treatment plant and hybrid cooling system. This is necessary because the filtering and reverse osmosis stages of the water treatment plant remove sediment, suspended solids and dissolved minerals in the river water from the cleaned water sent for electrolysis. The filtering stage requires backwash to carry the filtered-out sediments away. The reverse osmosis stage also leaves an increasingly high concentration of minerals in the remaining water as it is recirculated through the treatment plant. After around three cycles, the water cannot be treated further and requires discharge.

3.6.8 The approximately one-third flow volume is based on the number of water treatment plant cycles, temperature of water discharged from the cooling system, and a sufficient volume of flow to ensure that the river water sediments, salts and minerals concentration that are retuned to the Don in the discharged water are within acceptable limits for the CAR licence and PPC Permit to ensure no detrimental effects on river water quality or aquatic life. This will be assessed further in the EIA and river water quality monitoring to inform the assessment is ongoing.

Abstraction and discharge point

3.6.9 The intake and discharge point would be located on the south bank of the River Don. The buried pipelines would exit the river bank below the normal river water level through a self-cleaning fish and debris screen. No weir or bankside structure impinging on the river is required.

3.6.10 From the intake point, the two intake pipelines would run to a buried pumphouse located between the river and railway, outside the flood plain area (1 in 200 year flood extent). The pumphouse would be a vertical shaft from ground level with the pumps at its base. Above ground, a low concrete cap and access hatch to the shaft will be around 0.5 m above ground level.

3.6.11 This is illustrated schematically in Figure 3.2.

3.6.12 The pipeline will cross the railway through a tunnel bored under the track. Access across the railway into this site to construct the intake / outfall and pumphouse is available via an existing tunnel under the railway, but its constrained dimensions would not allow HGVs or larger construction plant to pass. Subject to agreement with Network Rail and ScotRail, a crane may therefore be used to lift plant and equipment across the railway. A potential location for this, with access from the road, is shown in the western part of the abstraction and discharge point site.

3.7 Development phasing and construction programme

3.7.1 Kintore Hydrogen intends to develop the facility in at least two phases. The initial phase would provide 500 MWe of electrolysis capacity. Subsequently the remaining planned 2,500 MWe capacity could be built in a single second phase or a series of further 500 MWe phases, subject to market conditions, electricity supply agreement with SSEN, progression of hydrogen blending in the UK gas network and progression of Project Union.

3.7.2 Subject to planning permission and a final investment decision, construction start is intended in 2026. The construction programme for the first phase is anticipated to be around 18–24 months, enabling commissioning by 2027-28. In this phase the following aspects of the development are expected to be constructed:

- one or electrolysis buildings with external transformer and rectifier skids;
- one compressor building;
- control room, stores and workshop sized for the full development;
- pads and external plant sized for the first phase;
- bank of hybrid cooling towers sized for the first phase;
- water treatment plant building sized for the full capacity;
- electrical switchyard equipment and underground 400 kV cable sized for the first phase;

- B977 junction, access road and gatehouse;
- internal roads and car park sized for the first phase;
- all three water supply and return pipelines and pumping station for the full development;
- hydrogen export pipelines, FM10 and/or FM24 connection and above-ground installation;
- foul drainage connection sized for the full development; and
- clean surface runoff attenuation and discharge sized for the whole development (subject to drainage design).

3.7.3 In subsequent phase(s), the following further development would be constructed:

- remaining electrolysis buildings;
- remaining compressor building(s);
- remaining electrical switchyard equipment and further 400 kV underground cables
- remaining hydrogen export pipelines;
- remaining pads and external plant;
- remaining connections and drainage required for the whole development not constructed in the first phase; and
- remaining internal access roads and car parking capacity.

3.7.4 Depending on the number of subsequent construction phases, these may each be of a shorter duration (around 12–18 months per additional 500 MWe of capacity) or a single further construction phase of around 18–24 months' duration to deliver all the remaining capacity.

3.7.5 Overall, completion of all construction is anticipated by the early 2030s. As set out above, construction would be intermittent in phases during the 2026 to early 2030s period.

3.8 Decommissioning

3.8.1 Kintore Hydrogen does not intend to seek a time-limited planning permission. The proposed development has an initial design lifetime of around 35 years. Further operation beyond this timescale will be dependent on prevailing market conditions. The assets, if in continuing use, would be refurbished and upgraded as required, and would follow any necessary approvals process in place at that time.

3.8.2 The facility will be developed in a modular fashion over several phases and would be capable of being decommissioned and deconstructed non-intrusively in future. Should the facility be decommissioned, above ground structures would be removed from the site, with the maximum value being recovered from materials and equipment via re-use or recycling at the time. The decision on how much of the below ground infrastructure (including pipelines, foundations and concrete pads) would be removed or retained in situ would be agreed with the subsequent landowner and any other interested parties, accounting for decommissioning methods and timescales at the time.

3.8.3 Decommissioning activities are therefore expected to give rise to types of potential impact that are similar to construction and which would be no greater in terms of magnitude or duration.

3.9 Summary of project parameters to inform scoping

3.9.1 Kintore Hydrogen intends to apply for planning permission in principle, with some aspects of design subject to requisite approval of matters specified in conditions. To manage uncertainty in the EIA process and ensure that likely significant environmental effects are assessed on a reasonable 'maximum case' basis, a Rochdale envelope of development parameters will be defined for the EIA.

3.9.2 Table 3.1 summarises the working-draft development parameters that have been defined for the EIA scoping stage. It is subject to change during the course of the EIA, as assessments and consultation inform the development design; further parameters may be added, if needed, or the existing parameters refined or removed if no longer relevant.

Table 3.1: Initial design envelope parameters

Parameter	Maximum or minimum for EIA topics
Electrolysis plant (main site) and grid connection	
Total site area developed	Maximum area (all topics)
Total impermeable area on site	Maximum impermeable area (soils, geology and water environment)
Electrolyser building(s) footprint	Maximum footprint (all topics)
Compressor building(s) footprint	Maximum footprint (all topics)
Building and equipment locations	Closest to sensitive ecological and hydrological receptors (ecology, water environment) – primarily northern edge of the electrolysis plant site More visible, south of the central ridge and The Knock (landscape and visual, cultural heritage) – primarily southern side of the electrolysis plant site Closest to sensitive residential and ecological receptors (noise, air quality) – primarily east and southern side of the electrolysis plant site No development other than access, boundary fence and landscaping/habitat creation anticipated at southern edge of the electrolysis plant site
Electrolyser building(s) height	Maximum height (landscape and visual, cultural heritage)
Compressor building(s) height	Maximum height (landscape and visual, cultural heritage)
Substation and transformer equipment maximum height	Maximum height (landscape and visual, cultural heritage)
Hybrid cooling tower numbers and height	Maximum number and height (landscape and visual, cultural heritage, noise and vibration)
Storage tank(s) diameter and height	Maximum size (landscape and visual, cultural heritage, soils, geology and water environment)
Other equipment height	Maximum height (landscape and visual, cultural heritage)
Need and method for piling	Piling required and uses percussive techniques (not currently expected)
Oxygen and hydrogen vent stacks number and height	Maximum number and height (landscape and visual, cultural heritage)
Boundary treatment	Security fence with lighting and clear zone required (landscape and visual, cultural heritage)
Grid connection working corridor width	Maximum working width (all topics)
Grid connection depth	Maximum depth (soils, geology and water environment, cultural heritage and archaeology) Minimum depth (population and health – EMF)
Construction programme and phasing	Minimum programme (concentrating traffic levels – transport and access) Maximum programme (greatest duration of impact – all other topics)
Construction workforce peak and average	Minimum workforce (to not overstate potential benefits – socio-economic, population and health) Maximum workforce (all other topics)
Operational workforce and shift pattern	Minimum workforce (to not overstate potential benefits – socio-economic, population and health) Maximum workforce (all other topics) Two-shift pattern (concentrating traffic levels – transport and access)
Electricity consumption (annual)	Maximum consumption (climate change)

Parameter	Maximum or minimum for EIA topics
Hydrogen production (annual)	Minimum production (to not overstate benefits – climate change)
Operating hours	Maximum daily and annual hours, with planned maintenance intervals (all topics)
Noise levels of internal and external plant	Maximum levels (noise and vibration, population and health)
Hydrogen export pipeline and above ground installation (AGI)	
Trench depth	Maximum depth (soils, geology and water environment, cultural heritage and archaeology)
Trenchless crossing options	Available where required (all topics)
Working corridor width for trenching and trenchless crossing compounds	Maximum corridor and compound areas (all topics)
Construction programme and phasing	Minimum programme (concentrating traffic levels – transport and access) Maximum programme, multi-phase (greatest duration or repetition of impacts – all other topics)
Restrictions on subsequent land use above pipe	Restricted to agriculture (soils, geology and water environment, socio-economics)
AGI total footprint	Maximum area (all topics)
AGI impermeable footprint	Maximum impermeable area (soils, geology and water environment)
AGI building height	Maximum height (landscape and visual, cultural heritage)
AGI perimeter treatment	Security fence with lighting and clear zone required (landscape and visual, cultural heritage)
AGI equipment noise levels	Maximum levels (noise and vibration, population and health)
Water abstraction and discharge pipelines, intake, outfall, pumping station	
Trench depth	Maximum depth (soils, geology and water environment, cultural heritage and archaeology)
Trenchless crossing options	Available where required (all topics)
Working corridor width for trenching and trenchless crossing compounds	Maximum corridor and compound areas (all topics)
Construction programme and phasing	Maximum programme, multi-phase (greatest duration or repetition of impacts – all other topics)
Access across the railway	Temporary road, pads and cranes required (all topics)
Restrictions on subsequent land use above pipe	Restricted to agriculture (soils, geology and water environment, socio-economics)
Intake volume (m^3/hr, day or year)	Maximum permitted by CAR licence (soils, geology and water environment, ecology and biodiversity)
Discharge volume (m^3/hr, day or year)	Minimum permitted by CAR licence (soils, geology and water environment, ecology and biodiversity)
Discharge temperature and quality parameters	Maximum permitted by CAR licence (soils, geology and water environment, ecology and biodiversity)
Pumping station size and depth	Maximum depth (soils, geology and water environment, cultural heritage and archaeology)

4 Summary of the Proposed EIA Scope

4.1 Impacts proposed to be scoped in to the EIA

4.1.1 Table 4.1 summarises the impact pathways that are proposed to be scoped in to the EIA for further assessment. More detail and an explanation of the proposed approach to the assessment of each is given in the subsequent sections of this report on each topic area.

Table 4.1: Summary of impacts proposed to be scoped in to the EIA

Topic area	Impact pathway	Justification
Landscape and Visual	**Construction**	
	Visual Assessment	A visual assessment of building-based, route-based and other outdoor receptors will be scoped in
	Landscape Assessment	A landscape assessment of LCTs and Bennachie SLA will be scoped in
	Operation	
	Visual Assessment	A visual assessment of building-based, route-based and other outdoor receptors will be scoped in
	Landscape Assessment	A landscape assessment of LCTs and Bennachie SLA will be scoped in
	Cumulative Assessment	A cumulative assessment of operational effects will be scoped in
Archaeology and Cultural Heritage	**Construction**	
	Direct impacts on known and recorded heritage assets and buried remains (cropmark sites)	The proposed development could have adverse effects on the archaeological resource
	Direct impacts on hitherto unknown archaeological deposits and buried remains	The proposed development could have adverse effects on the archaeological resource
	Operation	
	Impacts on the settings of designated heritage assets in the wider landscape	The proposed development could have adverse effects on the settings of designated heritage assets
	Inter-related on designated heritage assets in the wider landscape	The proposed development could have adverse effects on the settings of designated heritage assets through landscape character change and/or change in ambient noise levels
	Cumulative impacts on the settings of designated heritage assets in the wider landscape	The proposed development could have adverse effects on the settings of designated heritage assets cumulatively with other proposed developments in the locality
Ecology and Biodiversity	**Construction**	
	Habitat/ biodiversity loss	Removal of important or priority habitats as a result of clearance for the construction phase. Removal and/ or fragmentation of suitable habitat for a range of protected and notable species (bats, otter, badger, red squirrel, pine marten, brown hare, hedgehog, amphibians, reptiles and birds).

Topic area	Impact pathway	Justification
	Destruction/ disturbance of protected species rest sites	Removal of badger setts, red squirrel dreys, otter rest sites and bat roosts during construction to facilitate the development. Disturbance to badger setts, red squirrel dreys, otter rest sites and bat roosts during construction.
	Pollution risk	Direct and indirect pollution impacts to a range of species within watercourses and standing water as a result of pollution from fuel, oil, concrete or other hazardous substances, as well as sedimentation.
	Infrastructure and man-made drainage	Potential degradation of areas of GWDTE within the site and 250 m ZoI.
	Noise, vibration and lighting	Construction activities which create loud noises or vibration have the ability to disturb species such as bats, otter, red squirrel, pine marten, badger, brown hare, hedgehog and fish, through avoidance of the area. Temporary lighting during the construction phase has the ability to disturb crepuscular and nocturnal species such as bats, otter, pine marten, badger and hedgehog through avoidance of the area.
	Vehicle movements	Construction activities could result in death or injury of individuals through collision with plant and vehicles.
	Operation	
	Noise, vibration and lighting	During operation permanent lighting has the ability to disturb crepuscular and nocturnal species such as bats, otter, pine marten, badger and hedgehog.
	Vehicle movements	During operation there will be increased activity associated with the development, which could result in death or injury of individuals through collision with plant and vehicles
	Pollution risk	During operation, direct and indirect pollution impacts to a range of species within watercourses and standing water as a result of pollution from fuel, oil or other hazardous substances
Transport and Access	**Construction**	
	Users of the A96, B987, B994 and B977	Increased traffic flows during construction phase.
	Residents living alongside the B987, B994 and B977	Increased traffic flows during construction phase.
	Residents of Kintore	Increased traffic flows during construction phase.
	Operation	
	Users of the A96, B987, B994 and B977	Increased traffic flows during operational phase.
	Residents living alongside the B987, B994 and B977	Increased traffic flows during operational phase.
	Residents of Kintore	Increased traffic flows during operational phase.
Noise and Vibration	**Construction**	
	Site activity noise	Potential for high levels of construction activity noise to affect medium or high sensitivity NSRs.
	Road traffic noise	If construction flows greater than 10% of baseline road traffic flows, potential for high levels of noise to affect medium or high sensitivity NSRs.
	Operation	
	Site activity noise	Potential for high levels of operational activity noise to affect medium or high sensitivity NSRs.

Topic area	Impact pathway	Justification
Air Quality	**Construction**	
	Dust emissions from construction activities and site/delivery traffic movements	Scale of development is such that there is potential for nuisance dust impacts and mitigation measures should be identified.
	Operation	
	Vented hydrogen	Potential controlled release of minor quantities of hydrogen is not an air quality impact but will be described qualitatively to explain its dispersion and conversion to water.
Climate Change	**Construction**	
	Embodied carbon of construction materials	Likely to be minimal compared to operational emissions, but will be estimated and screened for significance, and will inform construction-stage mitigation proposals.
	Operation	
	GHG emissions from plant operation, including electricity use and hydrogen export	The carbon intensity of producing electricity consumed by the proposed development, and the avoided GHG emissions from natural gas use displaced by exported hydrogen, are the primary sources of GHG impact.
	Climate change interaction with flood risk	Appropriate climate change allowances in line with SEPA guidance should be included in the flood risk assessment and conceptual drainage design. This will be assessed in the Water Environment chapter and its appendices.
	Inter-related climate change effects	Climate change may affect receptor sensitivity (vulnerability and resilience) for several EIA topics; this will be included in the future baseline section of topic chapters using UKCP18 projections.
Soils, Geology and the Water Environment	**Construction**	
	Pollution risk	Impacts on surface water and groundwater quality from pollution from fuel, oil, concrete or other hazardous substances Discharge of sediment-laden runoff to drainage systems and watercourses Disturbance and or pollution resulting from construction of foundations Potential pollution impacts to public and private water supplies (licensed and unlicensed)
	Erosion and sedimentation	Disturbance of watercourse bed and banks from the construction of culverts and pipeline crossings
	Fluvial flood risk	Increased flood risk to areas downstream of the site during construction through increased surface runoff from areas of temporary and permanent hardstanding
	Infrastructure and man-made drainage	Changes in groundwater levels from dewatering excavations Potential degradation of public and private water supplies (licensed and unlicensed) and areas of GWDTE
	Loss or impairment of valuable / carbon rich soils	As a consequence of inappropriate handling, storage or use
	Operation	
	Pollution risk	Pollution impacts on surface water and groundwater quality from maintenance work and routine operation
	Fluvial flood risk	Increased flood risk to areas downstream of the site as a result of increased surface runoff from areas of permanent hardstanding

Topic area	Impact pathway	Justification
Population and Health	**Construction**	
	Air quality	Earthworks, on-site construction activities, traffic movements and trackout would result in temporary changes in air quality, with the potential to impact health and wellbeing.
	Noise exposure	On-site construction activities and traffic movements would result in temporary changes in noise, with the potential to impact health and wellbeing.
	Transport nature and flow rate	Changes in transport nature and flow rate during the construction phase due to deliveries and from staff movements have the potential to impact health and wellbeing.
	Socio-economic factors (employment)	Job opportunities would be provided during the construction phase. Employment is one of the most important wider determinants of health, and therefore there is potential for beneficial health and wellbeing impacts.
	Operation	
	Noise exposure	Long-term and permanent changes in noise during operation are expected, with the potential to impact health and wellbeing.
	Transport nature and flow rate	Changes in transport nature and flow rate during the construction phase due to staff movements, the delivery of chemicals and standard consumables have the potential to impact health and wellbeing.
	Socio-economic factors (employment)	Job opportunities would be provided during the operation phase. Employment is one of the most important wider determinants of health, and therefore there is potential for beneficial health and wellbeing impacts.
	EMF exposure	Underground cables operating at 400 kV AC would supply electricity from Kintore substation.
	Hydrogen safety (risk perception)	There is potential for community concern surrounding the flammable nature of hydrogen and associated risk of fire and explosion. The population and health chapter will address these concerns to reduce the potential for adverse risk perceptions to manifest within the local community.
Socio-Economics	**Construction**	
	Employment	Construction of the proposed development will support jobs in the local economy directly and indirectly.
	Operation	
	Employment	The proposed development is anticipated to generate a number of direct and indirect jobs.
	Local authority revenues	The proposed development will also contribute to local revenue generation for Aberdeenshire County Council.

4.2 Impacts proposed to be scoped out of the EIA

4.2.1 Table 4.2 summarises the impact pathways that are proposed to be scoped in to the EIA for further assessment. A more detailed explanation of why no significant effects through these impact pathways is given in the subsequent sections of this report on each topic area.

Table 4.2: Summary of impacts proposed to be scoped out of the EIA

Topic area	Impact pathway	Justification
	Construction	

Topic area	Impact pathway	Justification
Landscape and Visual	Cumulative assessment	A cumulative assessment of construction effects will be scoped out given uncertainty of overlapping construction phases of cumulative developments
	Landscape assessment of Castle Fraser GDL, Dunecht House GDL and Keith Hall GDL	An assessment of these GDLs will be scoped out given lack or limited ZTV cover and potential significant construction and operational effects are considered unlikely
	Operation	
	Landscape assessment of Castle Fraser GDL, Dunecht House GDL and Keith Hall GDL	An assessment of these GDLs will be scoped out given lack or limited ZTV cover and potential significant construction and operational effects are considered unlikely
Archaeology and Cultural Heritage	**Construction**	
	Indirect impacts on standing archaeological remains or structures	The proposed development is unlikely to give rise to significant adverse effects through hydrological changes or from vibration and seismic events (e.g. blasting, which is not required)
	Indirect impacts buried archaeological remains or deposits	The proposed development is unlikely to give rise to significant adverse effects through hydrological changes or from vibration and seismic events (e.g. blasting, which is not required)
	Operation	
	None	Not applicable
Ecology and Biodiversity	**Construction and operation**	
	Designated sites – Loch of Skene SSSI/ RAMSAR/ SPA	The designated site is located approximately 5 km south of site at its nearest point to the development. The ZoI is considered to be within the development area and up to 750 m from the boundary (furthest disturbance distance of bird species) and so this site is outside of the ZoI.
	Designated sites – Ythan Estuary, Sands of Forvie and Meikle Loch SPA	The designated site is located more than 16 km east of the site at its nearest point to the development but linked via the River Don. Due to the controls provided by the CAR and PPC Permit regulations on abstraction and discharges, in addition to the distance, there is also considered to be no pathway for potential significant impacts on the Ythan Estuary, Sands of Forvie and Meikle Loch SPA via water abstraction or discharge impacts on the River Don.
Transport and Access	**Construction and operation**	
	None	Not applicable
Noise and Vibration	**Construction**	
	Site activity vibration	No significantly high vibration levels at source and relatively large distance between vibration activity and NSRs; low risk for adverse vibration impact.
	Operation	
	Site activity vibration	No significantly high vibration levels at source and relatively large distance between vibration activity and NSRs; low risk for adverse vibration impact.
	Road traffic noise	Low operational road traffic flows, expected to be less than 10% of baseline.
Air Quality	**Construction**	
	Complex air quality dispersion modelling of traffic-source air pollutants	Traffic movements are expected to fall below thresholds for assessment set out in the applicable guidance.
	Operation	

Topic area	Impact pathway	Justification
	Complex air quality modelling of traffic-source, point-source or other air pollutants from combustion	Traffic movements are expected to fall below thresholds for assessment set out in the applicable guidance. The proposed development will have no point-source air pollutant emissions or combustion processes in operation.
Climate Change	**Construction**	
	Transport and site plant use	Expected to make non-material contribution to the overall lifecycle impacts of the facility.
	Climate risks	No significant change in baseline risks from variable weather conditions (to which construction processes and contractors' working methods are adapted) are expected during the likely construction phasing in the 2020s.
	Operation	
	Non-flooding climate risks	Based on a review of potential development vulnerabilities to potential climatic changes, including greater intensity or frequency of summer heatwave/drought events, soil conditions, and severe winter weather, no significant risks other than flooding are anticipated.
Soils, Geology and the Water Environment	**Construction and operation**	
	Geology	No sensitive geological features have been identified
	Water Framework Directive Assessment	The rate and quality, and controls for the abstraction of water from the River Don have been agreed with SEPA and are regulated by an existing CAR authorisation. The discharge of effluent from the hydrogen facility would be agreed with SEPA via a PPC Permit application.
Population and Health	**Construction**	
	None	Not applicable
	Operation	
	Air quality	No significant sources of emissions have been identified.
	Groundwater quality	No discharge of contaminated runoff would occur, as regulated by the PPC Permit and as will be assessed in the Soils, Geology and the Water Environment chapter.
Socio-Economics	**Construction**	
	Disruption to local businesses and residents (not elsewhere assessed)	Disruption during construction will be controlled and managed through implementation of the CEMP and CTMP, and assessed in the Transport & Access and Population & Health chapters where impact pathways are applicable.
	Operation	
	Tourism attractions and accommodation	Due to the location and scale of the proposed development and there being no identified tourist attractions near the site.
Heat, light and radiation	**Construction and operation**	
	Heat	Cooling system impacts and discharge water temperature will be assessed where applicable in the Climate Change, Noise & Vibration, Soils, Geology and the Water Environment, Ecology & Biodiversity and Landscape & Visual chapters.
	Light	Lighting impacts will be assessed where applicable in the Landscape & Visual, Ecology & Biodiversity and Archaeology & Cultural Heritage chapters.
	Radiation	The proposed development will not be a source of ionising radiation nor have tall structures or radio infrastructure that could cause electromagnetic

Topic area	Impact pathway	Justification
		interference. It will comply with guidelines set to protect public health from power-frequency electric and magnetic fields, which will be assessed in the Population and Health chapter.
Transboundary effects	Construction and operation	
	All pathways	No potential for effects on any EEA state.
All topics	Decommissioning effects	Kintore Hydrogen does not intend to seek a time-limited planning permission. Any future decommissioning activities are expected to give rise to types of potential impact that are similar to construction and which would be no greater in terms of magnitude or duration, and are sufficiently represented by the assessment of construction impacts.

4.3 Proposed EIAR structure

4.3.1 The following structure is proposed for the EIAR.

Table 4.3: Proposed EIA structure

Volume	Chapter no.	Chapter title
Volume 1	n/a	Non-Technical Summary
	n/a	Glossary, acronyms and units
Volume 2	1	Introduction
	2	Project Description and Site Setting
	3	Consideration of Alternatives
	4	Environmental Impact Assessment Methodology
	5	Scoping and Consultation
	6	Landscape and Visual
	7	Archaeology and Cultural Heritage
	8	Ecology and Biodiversity
	9	Transport and Access
	10	Noise and Vibration
	11	Air Quality
	12	Climate Change
	13	Soils, Geology and the Water Environment
	14	Population and Health
	15	Socio-Economics
	16	Summary of Inter-related Effects
	17	Summary of Cumulative Effects
	18	Summary of Mitigation, Monitoring and Residual Effects
Volume 3	n/a	Appendices
	n/a	Figures

5 Approach to the EIA

5.1 Overview and guidance

5.1.1 EIA is a process through which the likely significant environmental effects of a development proposal can be identified and, where possible, adverse effects avoided or mitigated and beneficial effects enhanced. This process is reported in an EIA Report (EIAR), which is submitted with a planning application.

5.1.2 EIARs are required to identify those aspects of the environment likely to be 'significantly affected' both directly and indirectly by the development proposed. An EIAR should then describe the nature of those significant effects, taking account of the magnitude of the impact and sensitivity of the receiving environment. These assessments will identify mitigation or enhancement where appropriate and evaluate residual effects with this in place.

5.1.3 The environmental effects of the proposed development during the construction and operational phases will be considered. Assessment of decommissioning effects is proposed to be scoped out on the basis that Kintore Hydrogen does not intend to seek a time-limited planning permission and that any future decommissioning effects would be no greater than construction, and are sufficiently represented by the construction assessment.

5.1.4 The findings of the EIA will be presented in a main written EIAR document, supported by figures and appendices. A non-technical summary of the EIAR will be provided as a separate document.

5.1.5 The EIA process will be undertaken with regard to the requirements of the EIA Regulations and good practice guidance. The overarching EIA methodology is set out below. Further details of the topic-specific methodologies based on professional practice guidance for those topics are provided in the following Sections 6–15.

5.1.6 The impact assessment methodology will draw on legislation, policy and guidance including:

- Council Directive 2011/92/EU of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (the EIA Directive), as amended by Council Directive 2014/52/EU;
- The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (the EIA Regulations) as amended;
- Scottish Natural Heritage (2013) A Handbook on Environmental Impact Assessment[8]
- Scottish Government (2013) Planning Advice Note 1/2013: Environmental Impact Assessment[9]
- Planning Inspectorate (2017, 2018 and 2019) Advice Notes Seven: Environmental Impact Assessment: Preliminary Environmental Information, Screening and Scoping; Nine: Rochdale Envelope; and Seventeen: Cumulative Effects Assessment[10];
- Highways England et al. (2020) Design Manual for Roads and Bridges, LA 104 Environmental assessment and monitoring, revision 1[11];
- Institute of Environmental Management and Assessment (IEMA) (2004) Guidelines for Environmental Impact Assessment;
- IEMA (2015) Environmental Impact Assessment Guide to Shaping Quality Development[12];
- IEMA (2016) Guide to Delivering Quality Development[13];

[8] https://digital.nls.uk/pubs/e-monographs/2020/216527997.23.pdf, accessed19/07/23
[9] https://www.gov.scot/publications/planning-advice-note-1-2013-environmental-impact-assessment/pages/1/, accessed19/07/23
[10] https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/, accessed 20/07/23
[11] https://www.standardsforhighways.co.uk/tses/attachments/0f6e0b6a-d08e-4673-8691-cab564d4a60a?inline=true, accessed 20/07/23
[12] https://www.iema.net/document-download/7018, accessed 20/07/23
[13] https://www.iema.net/download-document/7014, accessed 20/07/23

- Mitchell, A. (ed) (2020) Demystifying Cumulative Effects, in IEMA Impact Assessment Outlook Journal Vol 7[14] and
- IEMA (2023) Effective Non-Technical Summaries for Environmental Impact Assessment[15].

5.2 Impact assessment methodology

Assessment structure

5.2.1 The assessment for each environmental impact pathway will form a separate topic chapter of the EIAR. For each topic chapter, the following components will be set out:

- identification of the study area for the topic specific assessments;
- description of the legislation, policy and guidance for that topic assessment;
- summary of consultation activity undertaken, including comments received in the Scoping Opinion;
- description of the approach to assessment, including details of the methodologies used;
- description of the baseline environmental conditions; and
- presentation of the impact assessment undertaken, which includes:
  - identification of the maximum design scenario for each impact assessment;
  - a description of the measures adopted as part of the design of the proposed development, including mitigation and design measures which seek to prevent, reduce or offset environmental effects or enhance beneficial effects;
  - an assessment of the likely impacts and effects associated with the proposed development;
  - identification of any further mitigation measures required in respect of likely significant effects (in addition to those measures adopted as part of the project design); and
  - identification of residual effects and any future monitoring required.

5.2.2 For each topic, an assessment of any cumulative effects with other major developments and any inter-related effects with other impact pathways will be provided. These will be summarised in separate EIAR chapters.

Spatial and temporal scope

5.2.3 Each assessment topic will define its study area geographically and indicate the timescales over which the environmental effects will be considered. The temporal scope will consider the construction phases and the operation of the proposed development. Where future construction may overlap with operation of completed development phases, the combined construction and operational effects will be assessed.

Environmental baseline conditions

5.2.4 The existing and likely future environmental conditions in the absence of the proposed development are known as ‘baseline conditions’. Each topic chapter in the EIAR will include a description of the current baseline environmental conditions, which will be drawn from surveys and desk-based assessments.

5.2.5 A summary of existing knowledge of the baseline is provided in each topic section of this Scoping Report. The need for and proposed scope of any further baseline surveys or desk-based research is identified in the topic sections.

5.2.6 The baseline for the assessment should represent the conditions that will exist in the absence of the proposed development at the time that the development is likely to be implemented, i.e. from around 2026 onwards. Consideration will be given to any likely changes between the time of surveys or desk-based assessments and the future baseline at the time of construction and operation of the proposed development. The characterisation of future baseline conditions in the EIAR will take into account the likely effects of climate change, as far as these are known at the time of

[14] https://www.iema.net/download-document/43125, accessed 18/07/23

[15] https://s3.eu-west-2.amazonaws.com/iema.net/documents/J46585_IEMA_AdviceNoteGuide_V6.pdf, accessed 20/07/23

undertaking the EIA. This will be based on information available from the Met Office Hadley Centre's UK Climate Projections project (UKCP18), which provides information on plausible changes in climate for the UK and on published documents such as the UK Climate Change Risk Assessment published by the Climate Change Committee.

5.2.7 In some cases, future baseline these changes may include the construction or operation of other planned or consented developments in the area. Where such developments are built and operational at the time of writing and data collection, these will be considered to form part of the baseline environment. In other cases, planned future developments will be considered within the assessment of cumulative effects, discussed further in Section 5.5 and Section 17.

Determining significance of effects

5.2.8 A standard approach based on the guidance cited above will be used for describing impacts and forming a judgement as to the significance of effects, as follows. However, this approach may be modified or different definitions of terms used for particular topic chapters where required by professional guidance for that topic.

Sensitivity or importance of receptors

5.2.9 Receptors are defined as the physical or biological resource or user group that would be affected by a project. For each topic, the baseline studies will inform the identification of potential environmental receptors. Some receptors will be more sensitive to certain environmental effects than others. The sensitivity or value of a receptor may depend, for example, on its frequency, extent of occurrence or conservation status at an international, national, regional or local level.

5.2.10 Each EIAR chapter will identify those receptors relevant to the topic and they will be assessed to determine their sensitivity to change as a result of the project from the baseline. Receptor sensitivity will take into account factors including the:

- vulnerability of the receptor;
- recoverability of the receptor; and
- value/importance of the receptor.

5.2.11 Sensitivity will normally be described using the following scale:

- high;
- medium;
- low;
- negligible.

5.2.12 For some topics, a further category of very high may be used where applicable.

5.2.13 An example of the definitions for each of these categories is set out in Table 5.1. These definitions have been adapted from the DMRB[11]. Topic-specific definitions for each of these categories, where different, will be provided in each of the EIAR topic chapters. The value of a receptor for each topic will draw upon relevant topic specific guidance and material, including specialist knowledge, which is relevant to that topic.

Table 5.1: Receptor sensitivity

Sensitivity	Description
Very high	Very high importance and rarity, international scale and very limited potential for substitution.
High	Receptors of high importance with a high susceptibility to change and limited potential for substitution or replacement.
Medium	Receptors with some sensitivity to change and medium importance. Often have relevance at a regional scale with some opportunity for substitution or replacement.
Low	Receptors with low importance and sensitivity to change, often of relevance at a local scale.

Sensitivity	Description
Negligible	The receptor has very low importance / is not sensitive to change.

Magnitude of impact

5.2.14 The magnitude of impact affecting each receptor will then be considered. Impacts are defined as the physical changes to the environment attributable to the project. For each topic, the likely environmental impact pathways will be identified. For each impact pathway, the likely environmental change arising from the proposed development compared with the baseline (the situation without the proposed development) will be predicted. The categorisation of the magnitude of impact is topic-specific but will generally take into account factors such as:

- extent;
- duration;
- frequency; and
- reversibility.

5.2.15 With respect to the duration of impacts, the following will be used as a guide within the EIA, unless defined otherwise within the topic assessments:

- short term: a period of months, up to one year;
- medium term: a period of more than one year, up to five years; and
- long term: a period of greater than five years.

5.2.16 The magnitude of an impact will generally be defined used the following scale:

- major;
- moderate;
- minor; or
- negligible.

5.2.17 Where applicable in some cases, a further category of 'neutral' or 'no change' may be used.

5.2.18 An example of the definitions for each of these categories is set out in Table 5.2 below. The table describes both adverse and beneficial magnitudes of impact. These definitions have been adapted from the DMRB[11]. Topic-specific definitions for each of these categories, where different, will be provided in each of the EIAR topic chapters. The definition of these topic specific scales will draw upon relevant external policy, guidance, standards and other material, including specialist knowledge, as relevant to that topic.

Table 5.2: Impact magnitude

Magnitude	Description
Major	Adverse: loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.
	Beneficial: large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.
Moderate	Adverse: loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.
	Beneficial: benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Minor	Adverse: some measurable change in attributes, quality or vulnerability, minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.

Magnitude	Description
	Beneficial: minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	Adverse: very minor loss or detrimental alteration to one or more characteristics, features or elements.
	Beneficial: very minor benefit to, or positive addition of one or more characteristics, features or elements.
No change	No loss or alternation of characteristics, features or elements; no observable impact in either direction.

Significance of effects

5.2.19 Effect is the term used to express the consequence of an impact (expressed as the 'significance of effect'). This is identified by considering the magnitude of the impact and the sensitivity or value of the receptor. Having identified the sensitivity of the receptor and the magnitude of the impact, a matrix approach as depicted in Table 5.3 will be used to evaluate the predicted level of effect, ranging from neutral to substantial. This has been adapted from the DMRB[11].

5.2.20 The magnitude of an impact does not directly translate into significance of effect. For example, a significant effect may arise as a result of a relatively modest impact on a receptor of national value, or a large impact on a receptor of local value. In broad terms, therefore, the significance of the effect can depend on both the impact magnitude and the sensitivity or importance of the receptor.

5.2.21 In order to ensure a transparent and consistent approach throughout the assessment, the matrix approach will be adopted as a guide. There is, however, latitude for professional judgement where deemed appropriate in the application of the matrix. Where the matrix offers a choice of significance levels, professional judgement will be used to determine the most likely outcome.

Table 5.3: Effects matrix

		Magnitude of impact				
Sensitivity of receptor		No change	Negligible	Minor	Moderate	Major
	Negligible	Negligible	Negligible	Negligible or minor	Negligible or minor	Minor
	Low	Negligible	Negligible or minor	Negligible or minor	Minor	Minor or moderate
	Medium	Negligible	Negligible or minor	Minor	Moderate	Moderate or major
	High	Negligible	Minor	Minor or moderate	Moderate or major	Major or substantial
	Very high	Negligible	Minor	Moderate or major	Major or substantial	Substantial

5.2.22 The definitions for each of the significance levels are shown in Table 5.4. Unless specifically defined otherwise in an EIAR chapter, effects of moderate and higher will be defined as significant effects.

Table 5.4: Significance of effect

Significance	Description
Substantial	Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of

Significance	Description
	resource integrity. However, a major change in a site or feature of local importance may also enter this category. Effects upon human receptors may also be attributed this level of significance.
Major	These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
Moderate	These beneficial or adverse effects have the potential to be important and may influence the decision-making process. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse or beneficial effect on a particular resource or receptor.
Minor	These beneficial or adverse effects are generally, but not exclusively, raised as local factors. They are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project.
Negligible	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

5.2.23 The definitions of significance follow the latest edition of the DMRB[11] but also retain some detail of the previous edition where that offered more descriptive clarity and is considered to remain useful.

5.2.24 The likely effects will be described, where applicable, as:

- adverse / beneficial;
- direct / indirect;
- temporary / permanent; and/or
- reversible / irreversible.

Measures envisaged to prevent, reduce and where possible offset significant adverse effects

5.2.25 Regulation 5(2)(c) of the EIA Regulations requires an EIAR to include *"a description of the features of the development and any measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment"*. In line with good practice for EIA, measures to enhance any beneficial effects will also be considered.

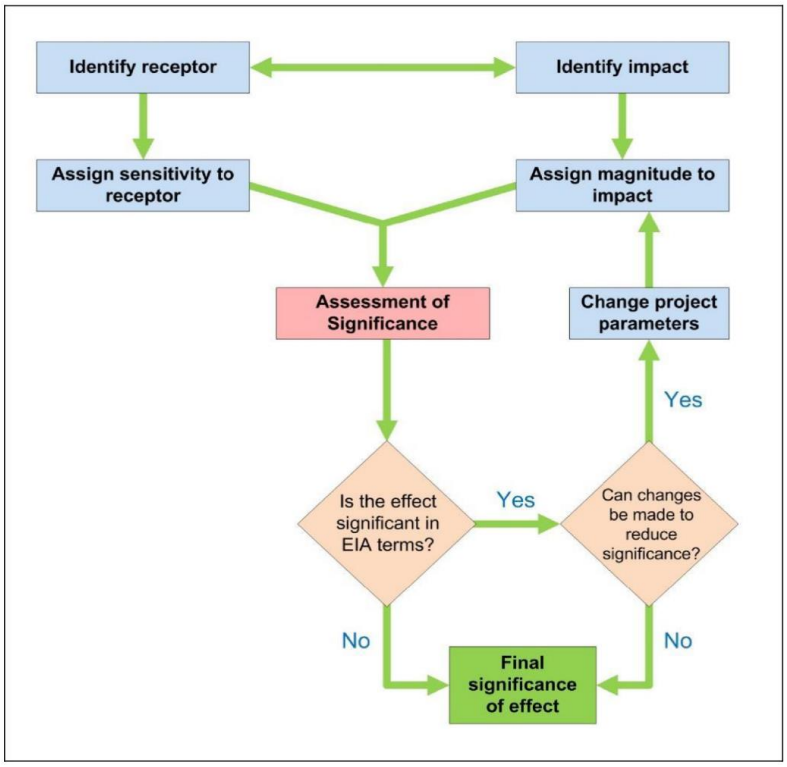
5.2.26 An iterative approach will be taken to mitigation and enhancement in the EIA process. This involves a feedback loop during the design and impact assessment process, depicted in Diagram 5.1, below. A specific impact and the significance of the resulting effect will be initially assessed and, if this is predicted to be a significant adverse effect, changes will be made (where practicable) to relevant parameters or design of the proposed development in order to avoid, reduce or offset the impact. The assessment will then be repeated and the process continues until the EIA practitioner is satisfied that:

- the effect has been reduced to a level that is not likely to be significant; or
- having regard to other constraints, no further changes can reasonably be made to design parameters in order to reduce the magnitude of impact (and hence significance of effect). In such cases, an overall effect that is still significant would be reported as the residual effect in the EIAR.

5.2.27 Where there are beneficial effects, these will also be iterated with a view to enhancement where possible.

5.2.28 A register of enhancement, mitigation and monitoring commitments will be provided in the EIAR.

Diagram 5.1: Iterative approach to mitigation



Limitations and uncertainties

5.2.29 Each topic chapter will identify any limitations identified in the available baseline data and whether there were any difficulties encountered in compiling the information required to predict environmental effects. Uncertainty in assessments will be discussed, and a conservative (reasonable maximum case) approach will be taken to reporting effects where there is uncertainty. The approach to an envelope of design parameters for the proposed development is discussed further below.

5.3 Design envelope

5.3.1 Kintore Hydrogen intends to apply for planning permission in principle, with some aspects of design subject to requisite approval of matters specified in conditions. To manage uncertainty in the EIA process and ensure that likely significant environmental effects are assessed on a reasonable 'maximum case', a Rochdale envelope of development parameters will be defined for the EIA. This approach allows for a proposed development to be assessed on the basis of maximum project design parameters in order to provide flexibility, while ensuring all potentially significant effects (adverse or beneficial) are reported.

5.3.2 For each of the topic chapters in the EIAR, the maximum design scenario for each impact pathway will be identified from the range of potential options for each parameter to be set out in the EIAR Project Description chapter. The maximum design scenario assessed is therefore the scenario which would give rise to the greatest potential impact for that specific pathway. This may vary from topic to topic: for example, a minimum-length construction programme and minimum daily working hours might be the maximum impact scenario for traffic effects (concentrating the HGV numbers required into the highest number per day or hour) whereas a maximum-length construction programme might be the maximum impact scenario for noise effects, due to the greater duration of impacts.

5.3.3 Table 3.1 summarises the working-draft development parameters that have been defined for the EIA scoping stage. It is subject to change during the course of the EIA, as assessments and consultation inform the development design.

5.4 Alternatives

5.4.1 Regulation 5(2)(d) of the EIA Regulations requires an EIAR to include *"a description of the reasonable alternatives studied by the developer, which are relevant to the development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment"*.

5.4.2 This will be set out in the a specific EIAR chapter, drawing from the iterative design, assessment and mitigation process as described above. A key aspect is expected to be consideration of alternative site layouts, optimising the design based on the site's environmental constraints, topography, and sensitivities in the area around the site.

5.5 Cumulative effects assessment

5.5.1 Schedule 4, paragraph 5(d) of the EIA Regulations requires the EIAR to include a description of the likely significant effects of the development on environment resulting from *"the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources"*.

5.5.2 A cumulative effects assessment (CEA) will be undertaken for each topic area in the EIAR and these will be brought together in a CEA summary chapter. The assessment will consider the effects of the proposed development in combination with other developments, and the effects of the proposed development on any new sensitive receptors (likely to experience greater effects than existing receptors) introduced by other developments.

5.5.3 The following categories of other developments will be considered:

- approved developments that have not yet been implemented;
- applications for development that are under consideration;
- those for which an EIA scoping request has been made; and
- development plan allocations.

5.5.4 The other developments will be categorised according to the level of detail that is available and therefore the certainty that can be attributed to potential effects. For other developments where less detail is available to make a judgement, the consideration of cumulative effects in the ES will be of a qualitative nature. Where this is the case, it is not proposed to attribute levels of effect or significance in the assessment.

5.5.5 Consideration of the potential for cumulative effects will have regard to specific environmental receptors. This requires a judgement to be made on which other developments have the potential for cumulative effects with the proposed development via each relevant impact pathway, and where there are sensitive receptors common to both developments within a defined geographical area described as the Zone of Influence (ZoI).

5.5.6 The approach taken for the CEA will have two stages. The first stage is search exercise to create a longlist of developments with the possibility of cumulative effects in the largest ZoI and then to screen this to a shortlist, removing developments where on review of the available information, no cumulative effects in any EIA topic area are considered likely.

5.5.7 In the second stage, the short-list is refined on a topic by topic basis with consideration to the topic-specific ZoI, impact pathways, and the nature of the other development, to identify whether potential cumulative effects are considered likely for that topic. The predicted cumulative effects on the applicable sensitive receptors are then assessed for all cumulative developments (where sufficient information is available) relevant to that topic area.

5.5.8 An initial desk-based search has been undertaken for other developments that may be relevant to include in the CEA. This has been based on initial EIA topic ZoIs, with the overall search area defined by the current largest ZoI of 5 km. Further detail and a shortlist of the other developments provisionally identified for inclusion in the CEA is given at Section 17. They are mapped in Figure 5.1.

5.6 Inter-related effects assessment

5.6.1 It is good practice to consider the inter-relationships between impact pathways and phases of development that could lead to greater environmental effects. For example, the separate impacts of noise disturbance and habitat loss may have a combined effect on a sensitive ecological receptor.

5.6.2 The inter-related effects assessment will consider the following two types of effect.

- Project lifetime effects: where impacts from the construction and operational phases of the proposed development overlap or where the extended duration of an impact (from construction into operation) potentially creates a more significant effect upon a receptor than if assessed in isolation for a single phase.
- Receptor-led effects: those where multiple different types of impact interact spatially and/or temporally to potentially result in greater combined effects upon a particular sensitive receptor then if considered in isolation. Receptor-led effects might be short term, temporary or transient effects, or incorporate longer term effects.

5.6.3 This will be via a qualitative assessment which does not assign significance levels. The assessment will be used to identify where there is the potential for inter-related effects, and then to comment on whether the inter-related effects would be greater or lesser than the effects considered alone, and if so, whether this would be combined effect would be adverse or beneficial. Receptor groups (e.g. watercourses, heritage assets, residents, road users) will be used for the assessment rather than specific individual receptors.

5.6.4 The potential for receptor-led effects will be scoped initially through consideration of the ZoIs for each topic area. Outside of areas where these overlap, there would be no potential for inter-related effects. In some cases, inter-related effects may already have been fully assessed through the topic area methodology. For example, effects on each sensitive ecological receptor arising from pathways such as noise, visual/lighting disturbance, air quality impacts and water quality impacts (as applicable) would typically already be considered within the ecology assessment. Where this is the case, further inter-related effects assessment will be not required; the focus will be on identifying any potential additional inter-related effects not already reported in each topic chapter.

6 Landscape and Visual

6.1 Introduction

6.1.1 This part of the Scoping Report discusses the proposed scope of the Landscape and Visual Impact Assessment (LVIA) which would be undertaken for the proposed development. The LVIA would be carried out by Chartered Landscape Professionals from ASH design + assessment Ltd (ASH), a registered practise with the Landscape Institute (LI).

6.1.2 The LVIA would include the consideration of potential effects to the fabric and character of the landscape resource and the visual amenity of residents, travellers and visitors present within the study area.

6.2 Consultation to date

6.2.1 Consultation with respect to the LVIA has not been undertaken prior to submission of this EIA Scoping Report. As stated in this Scoping Report, further consultation will be conducted, for example to agree locations of Visualisation Locations (VLs).

6.3 Baseline

6.3.1 The following section sets out the baseline conditions of the proposed development and the surrounding area, describing the landscape designations, other protected landscapes, landscape character and key visual receptors present. Reference should also be made to Figures 6.1 and 6.2.

Landscape designations

6.3.2 The proposed development is not located within any designated or protected landscapes. The following designated landscapes fall within the vicinity of the proposed development (see Figure 6.1):

- Bennachie Special Landscape Area (SLA), situated approximately 2.5 km to the north-west of the proposed development (at its closest point).;
- Castle Fraser Garden and Designed Landscape (GDL), situated approximately 3.0 km to the west of the proposed development (at its closest point);
- Dunecht House GDL, situated approximately 4.0 km to the south of the proposed development (at its closest point);
- Keith Hall GDL, situated approximately 4.7 km to the north of the proposed development (at its closest point);
- Straloch GDL, situated approximately 6.5 km to the north-east of the proposed development (at its closest point);
- Monymusk GDL, situated approximately 6.0 km to the west of the proposed development (at its closest point); and
- Cluny Castle GDL, situated approximately 6.3 km; to the west of the proposed development (at its closest point).

Landscape character

6.3.3 The landscape within the vicinity of the proposed development is broadly characterised by predominantly farmland and agricultural land consisting of open, gently sloping fields. There is an area of woodland to the north-west and an urbanised area to the north which is the town of Kintore.

6.3.4 NatureScot has undertaken detailed review and classification of the various landscape areas and types of Scotland in their National Landscape Character Assessment (2019)[16]. The proposed development would fall entirely within Landscape Character Type (LCT) 26: Wooded Estates – Aberdeenshire (see Figure 6.1), which also covers a large part of the local landscape.

6.3.5 The wider landscape setting also includes LCT 17 (Coastal Agricultural Plain – Aberdeenshire to the north-east of the proposed development and LCT 28 (Outlying Hills and Ridges) to its west and south-west. To the east of the proposed development, there are a number of smaller LCTs including LCT 4 (River Valley – Aberdeen), LCT 5 (Low Hills – Aberdeen), LCT 6 (Undulating Open Farmland), LCT 9 (Wooded-Estates – Aberdeen) and LCT 30 (Narrow Winding Farmed Valley).

Visual amenity

6.3.6 Potential visual receptors within the surrounding area (as illustrated on Figure 6.2) include residents, travellers and recreational users who may be present in and around nearby buildings and using roads and recreational resources.

6.3.7 These would include building-based receptors in scattered properties in the surrounding landscape, many of which are situated along minor roads and B-roads; and receptors in the nearby settlement of Kintore. Woodlands and undulating landform contain views for many building-based receptors, so visual receptors in other settlements are not anticipated to be considered in the LVIA, since they would not experience views of the proposed development.

6.3.8 Route-based receptors are likely to include users of minor roads, A-roads (such as the A90 and A96), B-roads (such as the B977 and B994), core paths and the railway line.

6.3.9 Outdoor receptors may also include receptors on / near local hill summits such as around Kirkhill Forest, Tyrebagger Hill, and Elrick Hill.

6.4 Potential effects

6.4.1 The potential landscape and visual effects associated with the construction and operation of the proposed development comprise:

- temporary or long-term physical effects on landscape fabric, including potential tree removal, changes to vegetation cover, introduction of new features or removal of existing features;
- temporary or long-term effects on landscape character, where changes to the landscape fabric may lead to changes in the landscape patterns with intrinsic experiential qualities of the landscape;
- temporary or long-term effects on views obtained by residents, travellers, and recreational users of the landscape; and
- cumulative effects with other similar types of proposed development within the area.

6.5 Embedded mitigation and enhancement measures

6.5.1 Through the EIA process, where technically feasible, the LVIA will seek to inform any refinements to the layout and masterplanning of the proposed development. It is anticipated that landscape mitigation measures in the form of planting and mounding will form part of the proposed development, to help mitigate views of the proposed development and assimilate it into the surrounding landscape, and to provide habitat diversity.

6.5.2 The implementation of a successful restoration plan will also be important to ensure long term effects of construction are minimised.

[16] NatureScot (2019) *Landscape Character Types Map and Descriptions.* Available at: https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/scottish-landscape-character-types-map-and-descriptions. Accessed on 27 July 2023.

6.6 Proposed scope and assessment methodology

6.6.1 An LVIA will be carried out in accordance with the 3rd Edition of the *Guidelines for Landscape and Visual Impact Assessment* (LI and IEMA, 2013)[17] (GLVIA3) and *Landscape Character Assessment: Guidance for England and Scotland*[18]. The assessment would consider the potential landscape and visual effects of the proposed development during construction and operation.

6.6.2 The landscape assessment would describe the key components, features and characteristics that make up the character of the landscape within the study area. It would consider the extent to which the loss of features and the introduction of the proposed development would influence the local landscape character and the broader, National LCTs.

6.6.3 The visual assessment would give consideration to views obtained by those living, working, travelling and undertaking recreation within the study area including all settlement areas, transport and recreational routes and other identified valued viewing locations.

6.6.4 As part of the LVIA assessment methodology based on GLVIA3, a strong emphasis is placed on the importance of professional judgement in identifying and defining the significance of landscape and visual effects. As part of the LVIA, professional judgement would be used in combination with structured methods and criteria to evaluate landscape value and landscape and visual sensitivity, magnitude, and significance of effect. The LVIA will outline where significant effects are likely, in line with EIA Regulations.

Study area

6.6.5 The study area for the LVIA would be determined prior to the start of the detailed assessment, and would be informed by site survey, desk study, review of a Zone of Theoretical Visibility (ZTV), professional judgement and best practice. Based on the review of a preliminary ZTV, it is anticipated that a 5 km study area from the proposed development planning boundary would be suitable to identify any potential significant landscape and visual effects.

Scope of LVIA

6.6.6 The LVIA will be presented in two parts discussing the anticipated effects on the separate aspects of landscape character and visual amenity during both the construction and operational phases of the proposed development. The assessment of operational effects will assume the implementation of any mitigation measures proposed with planting assumed to have been established for around 10 years.

6.6.7 The key aspects of the LVIA are set out below.

Zone of Theoretical Visibility

6.6.8 The LVIA will be informed by a ZTV. The ZTV is a computer-generated diagram which uses a terrain model to indicate areas from which elements of the proposed development would theoretically be visible. It is proposed that a ZTV would be produced of the main constructed elements of the proposal to give an idea of where these individual elements may form a feature within views. A preliminary ZTV of the main over-ground elements, based on early concept design proposals, is included in Figures 6.1 and 6.2.

[17] Landscape Institute (LI) and Institute of Environmental Management and Assessment (2013) *Guidelines for Landscape and Visual Impact Assessment*. 3rd edition. Published by Routledge.

[18] Scottish Natural Heritage, The Countryside Agency. (2002). *Landscape Character Assessment: Guidance for England and Scotland.*

Landscape Assessment

6.6.9 The Landscape Character Assessment will include assessment of the proposed development in relation to the LCTs within the study area considering potential for effects on the fabric and character of the landscape. This will include the direct effect of potential change to the landscape elements, experiential effects on the character of the proposed development site and surrounding areas, and potential indirect effects on the broader landscape resource.

6.6.10 The assessment effects on designated and protected landscapes will also consider the potential for effects on the special qualities of the Bennachie SLA.

Visual assessment

6.6.11 The visual assessment will be a receptor-based assessment, considering the potential for effects on visual amenity within the study area. This will take into consideration building-based receptors (for instance located in residential properties and workplaces); route-based receptors (for instance users of roads, railways, and recreational routes); and other outdoor viewing receptors.

6.7 Cumulative effects

6.7.1 The potential for cumulative effects of the proposed development with other proposed developments of a similar nature would also be given consideration within the assessment, during their operational stage. Construction effects will be scoped out of the cumulative assessment since it is not possible to accurately predict the timing and overlap of different construction stages. Based on the initial cumulative developments search detailed in Section 17, the cumulative assessment for landscape and visual effects would consider a cumulative scenario including:

Under-construction

- APP/2020/1437 – the under-construction Kintore 400 kV Substation Extension, for which the cumulative baseline would assume this has been constructed and is operational;
- APP/2022/0651 – the under-construction Kintore 132 kV Substation Extension, for which the cumulative baseline would assume this has been constructed and is operational;

Consented

- APP/2022/2022 – approved 49.9 MW Battery Energy Storage System (BESS) at South Leylodge Farmhouse.
- APP/2021/2903 – approved erection of Workshop (Class 5) and Office (Class 4) and formation of Bus/Taxi Depot on Land at Hill of Cottown Kintore.
- APP/2020/1673 – approved formation of Battery Energy Storage Compound (including siting of substation, erection of boundary fencing, 6 security cameras and, access track and landscaping) to the east of Leylodge.

Proposed (with planning application submitted)

- APP/2023/1234 – proposed 49.9 MW Battery Storage Facility at Kintore Substation
- APP/2022/0249 – proposed formation of battery energy storage compound (up to 49 MW) and associated infrastructure at Land South of A96 East of West Broomhill.
- APP/2023/1017 and ECU00004756 – proposed construction of 300 MW Battery Energy Storage System at Site South of Midmill Business Park Kintore.

6.7.2 A search of other relevant developments would be conducted at the time of assessment to identify further proposed developments for inclusion.

6.7.3 As noted in Table 17.1, a number of other developments are proposed within the vicinity of the proposed development. However, in line with best practice, the cumulative LVIA would only consider sites within the study area, which are consented or the subject of a current valid planning application or appeal. Sites at scoping stage or earlier (such as areas proposed within the Aberdeenshire Council Local Development Plan or Housing Land Audit) would not be included due to uncertainty as to whether these sites would progress, and their likely nature, scale and design.

Figures and visualisations

6.7.4 The assessment will be supported by various LVIA figures, as required, in addition to visualisations.

6.7.5 Visualisations will be prepared to inform and support the LVIA, and will be produced to NatureScot (2017)[19] guidance and Landscape Institute (2019) guidance[20]. These would illustrate views from a series of Visualisation Locations (VLs) of the proposed development during operation (after 10 years). These would be at selected locations within the study area where members of the public would be most likely to obtain views of the proposed development, illustrating the appearance of the proposed development and mitigation measures in the landscape, from a range of receptor locations. The exact location for visualisations would be identified following more detailed desk and site survey and would be agreed with Aberdeenshire Council and other statutory consultees.

6.7.6 Visualisations will inform and support the LVIA but these VLs will not comprise viewpoints for a viewpoint-based visual assessment as the visual assessment will consider all likely visual receptors within the study area. The visualisations will show the proposed development during its operational phase, with any proposed mitigation planting assumed to have been established after around 10 years.

Potential issues to be scoped out

6.7.7 It is proposed that the following issues are scoped out of the EIA assessment for landscape and visual considerations:

- Castle Fraser GDL and Dunecht House GDL are proposed to be scoped out of the LVIA, since these areas are not within the preliminary ZTV, and potential significant construction and operational effects are considered unlikely.
- Keith Hall GDL is proposed to be scoped out of the LVIA, since although partially covered by the preliminary ZTV, this GDL is on the periphery of the study area and potential significant construction and operational effects are considered unlikely.
- Assessment of decommissioning effects are scoped out, since these are likely to be similar to construction effects.

6.8 Limitations and uncertainties

6.8.1 The LVIA would be subject to the following assumptions, limitations and uncertainties.

- The prominence of the proposed development in the landscape and views will vary according to the prevailing weather conditions. The LVIA would be carried out, as is best practise, by assuming the 'worst case' scenario i.e. on a clear, bright day in winter, when neither foreground deciduous foliage nor haze interfere with the clarity of the view obtained.
- The assessment of operational effects would assume that disturbed areas not required for operation of the proposed development (e.g., laydown and working areas) would be successfully reinstated to reflect, as far as possible, similar vegetation types and appearance to that present prior to construction. It is noted that these vegetation types may not necessarily comprise identical habitat types and value to those previously present.
- ZTVs are computer generated diagrams used to inform the landscape, visual and cumulative assessment. Whilst the ZTV is a useful tool for the identification of potential effects, it is not indicative of an effect in itself. The ZTV does not take into account the potential screening effects of woodland and other localised features such as buildings, trees, or local landform, which are not captured by the OS Terrain 5 data. Nor does it give indication of the way in which a development may relate to its broader landscape context and the receding

[19] Scottish Natural Heritage (2017) *Visual Representation of Wind Farms. Guidance. Version 2.2.* Available at: https://www.nature.scot/doc/visual-representation-wind-farms-guidance. Accessed on 27 July 2023.

[20] Landscape Institute (2019) *Visual Representation of Development Proposals. Technical Guidance Note 06/19.* Available at: https://www.landscapeinstitute.org/visualisation/. Accessed on 27 July 2023.

scale and visibility of features with distance therefore, consideration of these aspects would be taken into account during the assessment and professional judgement used.

- The field assessment of visual effects would be undertaken from public roads, footpaths, or open spaces. For residential receptors, assumptions would be made about the types of rooms in the buildings and about the types and importance of views from these rooms. For there to be a visual effect, there is the need for a viewer and therefore only buildings that are in use would be including in the visual assessment.
- The assessment of effects on visual receptors occupying buildings such as residences and public buildings would include consideration of potential for views from exterior areas such as gardens, where appropriate.
- The assessment would reflect the baseline situation at the time of site work and therefore would not take into account any changes to the landscape fabric which could have taken place after that date.
- Due to the uncertainty of construction activity timing for the proposed development and cumulative developments, activity relating to construction would not been considered within the cumulative assessment. The cumulative assessment therefore focuses on the potential effects during operation.
- Due to uncertainty of cumulative sites which are not the subject of current valid planning applications or appeals (such as proposals at scoping or earlier), the cumulative assessment is limited to a cumulative baseline of consented and application stage proposals, as well as those that are operational /under construction (and which would also be in the LVIA baseline).

6.9 Inter-related effects

6.9.1 Inter-related environmental effects may be a consideration for LVIA, whereby experiences of the landscape and visual context would also occur in combination with other 'topic areas'. For example, for landscape and visual receptors, there is likely to be some cross-over, and potential for combined spatial and temporal effects, with archaeology and cultural heritage (whereby the historic landscape character relates to landscape character); noise (whereby receptors' experiences of the landscape and visual context may interact with experiences of noise levels, particularly for residents); and ecology (whereby landscape character relates to habitats, for example). Similarly, potential combined effects could also related to LVIA and transport, socio-economics and soils, geology and water.

6.10 Summary of proposed EIA scope

Table 6.1: Summary of landscape and visual impacts proposed to be scoped in to the EIA

Impact pathway	Justification
Construction	
Visual assessment	A visual assessment of building-based, route-based and other outdoor receptors will be scoped in
Landscape assessment	A landscape assessment of LCTs and Bennachie SLA will be scoped in
Operation	
Visual assessment	A visual assessment of building-based, route-based and other outdoor receptors will be scoped in
Landscape assessment	A landscape assessment of LCTs and Bennachie SLA will be scoped in
Cumulative assessment	A cumulative assessment of operational effects will be scoped in

Table 6.2: Summary of landscape and visual impacts proposed to be scoped out of the EIA

Impact pathway	Justification
Construction	

Impact pathway	Justification
Cumulative assessment	A cumulative assessment of construction effects will be scoped out given uncertainty of overlapping construction phases of cumulative developments
Landscape assessment of Castle Fraser GDL, Dunecht House GDL and Keith Hall GDL	An assessment of these GDLs will be scoped out given lack or limited ZTV cover and potential significant construction and operational effects are considered unlikely
Operation	
Landscape assessment of Castle Fraser GDL, Dunecht House GDL and Keith Hall GDL	An assessment of these GDLs will be scoped out given lack or limited ZTV cover and potential significant construction and operational effects are considered unlikely

7 Archaeology and Cultural Heritage

7.1 Introduction

7.1.1 This section provides an overview of the Archaeology and Cultural Heritage context for the proposed development. It sets out the proposed study areas for the EIA, an initial appraisal of the baseline within those study areas and identifies additional surveys or studies required to confirm the baseline. The proposed approach to the desk-based assessment and field surveys required is set out and the methodology to be adopted for the assessment of effects is described. An initial appraisal of potential significant effects is provided along with an assessment of which receptors and/or impacts can be scoped out of the EIA.

7.1.2 The assessment has been carried out by George Mudie MA (Hons) FSA Scot MCIfA, of CFA Archaeology Ltd (CFA) based in Musselburgh, East Lothian, a Registered Organisation (RO) of the Chartered Institute for Archaeologists (CIfA). Mr Mudie is Principal Consultant with CFA and is a Member of the Chartered Institute for Archaeologists (MCIfA). He has over 20 years' full-time experience of producing Environmental Impact Assessment Reports (EIARs) for renewable energy developments, and for other industrial and commercial developments across the UK.

7.2 Consultation to date

7.2.1 Consultation with respect to Archaeology and Cultural Heritage has not been undertaken prior to submission of this EIA Scoping Report.

7.3 Legislative or policy requirements and technical guidance

Guidance and legislation

7.3.1 The assessment will be prepared following the advice and guidance in the following documents:

Legislation

7.3.2 Ancient Monuments and Archaeological Areas Act 1979.

- Planning (Listed Buildings and Conservation Areas (Scotland) Act 1997 (as amended by Historic Environment (Amendment) (Scotland) Act 2011).
- Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2013.
- Town and Country Planning (Environmental Impact Assessment) Regulations 2017.

Planning Policies

- National Planning Framework (NPF 4).
- Historic Environment Policy for Scotland (HEPS) (2019).
- Aberdeenshire Local Development Plan 2023, including appendices.

Guidance

- Environmental Impact Assessment Handbook (SNH and HES 2018).
- Principles of Cultural Heritage Impact Assessment (IEMA, CIfA, IHBC 2021).
- Standard and Guidance for Historic Environment Desk-Based Assessment (Chartered Institute for Archaeologists 2014, Updated October 2020).
- Designation Policy and Selection Guidance (HES 2019).
- Managing Change in the Historic Environment: Setting (HES 2016).
- Planning Advice Note 1/2013: Environmental Impact Assessment (PAN 1/2013).
- Planning Advice Note 2/2011: Planning and Archaeology (PAN 2/2011).

7.4 Baseline

Geographical scope

7.4.1 Two study areas will be used for the assessment:

- The Inner Study Area: the proposed development site, defined by the site red line boundary, within which the proposed development, and associated infrastructure, is proposed, will form the study area for the identification of heritage assets that could receive direct or indirect effects arising from the construction of the proposed development. A buffer zone extending to 500 m around the proposed development site boundary will be used to further inform the archaeological potential of the proposed development site.
- The Outer Study Area: a wider study area extending 5 km (aligned with the LVIA Study Area) around the electrolysis plant element of the proposed development will be used for the identification of cultural heritage assets (including those within the Inner Study Area) whose settings may be affected by the proposed development (including cumulative effects). The wider ZTV will also be assessed to identify any designated assets beyond 5 km that have settings that may be especially sensitive to the proposed development.

Temporal scope

7.4.2 The assessment will cover impacts occurring during the construction phase (direct and indirect effects) and those persisting through the operational phase (setting effects).

Baseline environment

Inner Study Area

Designations

7.4.3 There are two scheduled monuments that either lie wholly within or are intersected by the proposed development:

- stone circle 110 m W of South Leylodge Steading (SM 12350): lies within the redline area of the proposed development just southwest of Kintore Substation but is intended to be avoided through the site design process.
- remains of Aberdeenshire Canal, S of Dalwearie (SM 7675): is crossed by the proposed intake water pipeline just south of the Aberdeen to Inverness Railway, south of the River Don.

7.4.4 There are no other designated heritage assets within or intersected by the proposed development footprint.

7.4.5 Within 500 m of the proposed development there are a further four scheduled monuments, additional to those within the proposed development footprint. These are:

- standing stone 480 m W of Cairntradlin Cottage (SM 12328)
- standing stone 75 m WNW of Ferneybrae Croft (SM 12415)
- enclosure 480 m S of The Hedges (SM 12438)
- palisaded enclosure 555 m S of Kilm Cottage (SM 12463)

7.4.6 There are six listed buildings within 500 m of the proposed development:

- Parish Church of Kinellar, including Churchyard Walls (LB 9115)
- Old Manse of Kinellar, including Walled Garden (LB 9116)
- Manse of Kinellar (LB 9117)
- Kinellar House (LB 9118)
- Boghead Farmhouse (LB 9125)
- Aquherton Farmhouse (LB 9155)

7.4.7 There are no other designated heritage assets within 500 m of the proposed development footprint.

Non-designated Heritage Assets

7.4.8 The HER contains **37** entries for known non-designated heritage assets that fall within the proposed development site. **Two** of these are recorded as being of regional significance; the remainder are standard entries, of heritage value at a local level.

7.4.9 Within 500 m of the proposed development there are **98** HER entries for non-designated heritage assets: **nine** are of regional significance and **89** are standard entries, of heritage value at a local level. Seven of the standard entries are for artefact finds: five are axe finds (two bronze axe heads and five stone axe heads) and two are of flint arrowheads.

7.4.10 These records cover later prehistoric periods (Neolithic, Bronze Age and Iron Age), Pictish, and medieval/post-medieval and modern period. There are no recorded sites from the Mesolithic or Roman period within 500 m of the proposed development. Six records are for cropmark sites, which, taken together with the artefact finds, demonstrate that there is strong likelihood of buried archaeological remains within and around the proposed development site.

Outer Study Area

Scheduled Monuments

7.4.11 Within 5 km of the proposed electrolysis plant element of the proposed development west of Kintore Substation, initial appraisal shows that there are 15 scheduled monuments (including those six that are within, or within 500 m of, the proposed development footprint). Three of these are stones circles, of Neolithic/Early Bronze Age date, where views across the surrounding landscape and visibility within the landscape are important aspects of their settings. Intervisibility between these monuments may also be important aspects of their settings. Two sites are standing stones, of broadly similar date to the stone circles and potentially also having had views to and from, and intervisibility between them, as important aspects of their settings. Two other sites are burial cairns (one of Neolithic date and one of Bronze Age date) which are likely to have views to and from them and intervisibility with monuments contemporary to their period of use as important aspects of their settings.

7.4.12 Four of the scheduled monuments are later prehistoric settlement sites, one of which (SM 6448) include a possible henge of earlier (Neolithic) date. One other is a symbol stone of Pictish date and one a 14th century tower house.

7.4.13 Collectively, these monuments show occupation in this locality from the Neolithic period through to the medieval period and corroborate the evidence from the Inner Study Area of a long history of occupation and settlement.

Listed Buildings

7.4.14 There are 90 listed buildings within 5 km of the proposed electrolysis plant element of the proposed development. Seven of these are Category A Listed, 35 are Category B Listed and 48 are Category C Listed. Many of the listed buildings are in urban settings, in Kintore, Dunecht and Kemnay. Others are components of Inventory Gardens and Designated Landscapes (GDLs) or in small, non-inventory designed landscape settings.

7.4.15 One of the Category A Listed Buildings is within the urban setting of Kintore, three are within the Castle Fraser GDL setting, and three others are in two small, non-inventory designed landscape settings: Kemnay House and Skene House.

Gardens and Designed Landscapes

7.4.16 There are two Inventory GDLs within 5 km of the proposed electrolysis plant element of the proposed development:

- Castle Fraser, which forms the setting for Category A Listed Castle Fraser and associated listed buildings.
- Dunecht, which forms the setting for Category A Listed Dunecht House and associated listed buildings.

Proposed approach to surveys and further baseline data collection

Desk-based Assessment Method

7.4.17 A desk-based assessment will be conducted covering the Inner Study Area. The purpose will be to identify all known heritage assets, designated or otherwise, that could be directly affected by the proposed development, and to inform an assessment of the archaeological potential of the proposed development site.

7.4.18 Sources to be consulted for the collation of data will include:

- Aberdeenshire Council's (AC) Historic Environment Record (HER)
- Historic Environment Scotland's (HES) on-line GIS Spatial Data Warehouse
- National Record of the Historic Environment (NRHE)
- Historic maps held by National Library of Scotland
- Modern aerial photographic imagery available online
- Historic Land-Use Assessment Data for Scotland (HLAmap)
- Lidar data available through Scottish Remote Sensing Portal (where available)
- Any existing geotechnical data, including peat survey data if available
- Other readily accessible published sources, including any reports referenced in HER/NRHE records

7.4.19 Data will be gathered for the Outer Study Area to identify designated heritage assets that may be subject to effects on their settings and to provide baseline information for the assessment of setting effects.

Field Survey Method

7.4.20 A walk-over field survey of the proposed development site will be carried out with the following aims:

- to assess the present baseline condition of the heritage assets identified through the desk-based assessment;
- to identify any further features of cultural heritage interest not detected from the desk-based assessment; and
- to assess the Inner Study Area for its potential to contain currently unrecorded, buried archaeological remains.

7.4.21 Identified sites will be recorded on pro-forma monument recording forms and by digital photography, and their positions (and where appropriate their extents) logged using a Global Positioning System (GPS). The survey data will be compiled in a GIS and used during the design iteration work. The results of the survey work will be provided to Aberdeenshire Council's Archaeology Service (ACAS), for inclusion in the HER following completion of the project.

7.4.22 Site visits to key heritage assets in the Outer Study Area will be carried out, where necessary and in as far as access is possible, to assess the predicted effect of the proposed development on their settings. Site visits will include any assets specifically identified by consultees as requiring assessment and those identified through analysis of the proposed development's Zone of Theoretical Visibility (ZTV), where it is considered, on the basis of professional judgement, that the effect on their settings could be significant.

7.5 Approach to assessment

Assessment criteria

7.5.1 The effects of the proposed development on heritage assets will be assessed on the basis of their type (direct effects, indirect impacts, setting impacts, and cumulative impacts) and nature (adverse or beneficial), following an approach recommended in the 'Environmental Impact Assessment Handbook' (SNH and HES 2018). The assessment will take into account the value/sensitivity of the heritage asset, and its setting, and the magnitude of the predicted impact.

- Direct impacts: occur where the physical fabric of the asset is removed or damaged, or where it is preserved or conserved, as a direct result of the proposal. Such impacts are most likely to occur during the construction phase and are most likely to be permanent.

- Indirect impacts: occur where the fabric of an asset, or buried archaeological remains, is removed or damaged, or where it is preserved or conserved, as an indirect result of the proposal even though the asset may lie some distance from the proposal. Such impacts are most likely to occur during the construction phase and are most likely to be permanent.
- Setting impacts: these are generally direct and result from the proposal causing change within the setting of a heritage asset that affects its cultural significance or the way in which it is understood, appreciated, and experienced. Such impacts are generally, but not exclusively, visual, occurring directly as a result of the appearance of the proposal in the surroundings of the asset. However, they may relate to other senses or factors, such as noise, odour or emissions, or historical relationships that do not relate entirely to intervisibility, such as historic patterns of land-use and related historic features. Such impacts may occur at any stage of a proposal's lifespan and may be permanent, reversible, or temporary.
- Cumulative impacts: can relate to the physical fabric or setting of assets. They may arise as a result of impact interactions, either of different impacts of the proposal itself, or additive impacts resulting from incremental changes caused by the proposal together with other projects already in the planning system or allocated in a Local Development Plan.
- Adverse effects: are those that detract from or reduce cultural significance or special interest of heritage assets or their settings.
- Beneficial effects: are those that preserve, enhance or better reveal the cultural significance or special interest of heritage assets or their settings.

Assessment of Effects on Setting

7.5.2 The SNH/HES EIA Handbook (2018) Appendix 1, paragraph 42 advises that:

"In the context of cultural heritage impact assessment, the receptors are the heritage assets and impacts will be considered in terms of the change in their cultural significance".

7.5.3 Historic Environment Scotland's guidance document, 'Managing Change in the Historic Environment: Setting' (HES 2016), notes that:

"Setting can be important to the way in which historic structures or places are understood, appreciated and experienced. It can often be integral to a historic asset's cultural significance."
"Setting often extends beyond the property boundary or 'curtilage' of an individual historic asset into a broader landscape context".

7.5.4 The guidance also advises that:

"If proposed development is likely to affect the setting of a key historic asset, an objective written assessment should be prepared by the applicant to inform the decision-making process. The conclusions should take into account the significance of the asset and its setting and attempt to quantify the extent of any impact. The methodology and level of information should be tailored to the circumstances of each case".

7.5.5 The guidance recommends that there are three stages in assessing the impact of a development on the setting of a historic asset or place:

- Stage 1: identify the historic assets that might be affected by the proposed development;
- Stage 2: define and analyse the setting by establishing how the surroundings contribute to the ways in which the historic asset or place is understood, appreciated and experienced; and,
- Stage 3: evaluate the potential impact of the proposed changes on the setting, and the extent to which any negative impacts can be mitigated.

7.5.6 The SNH/HES EIA Handbook (2018) Appendix 1, paragraph 43 advises that:

"When considering setting impacts, visual change should not be equated directly with adverse impact. Rather the impact should be assessed with reference to the degree that the proposal affects those aspects of setting that contribute to the asset's cultural significance".

7.5.7 Following these recommendations, the proposed development ZTV will be used to identify those heritage assets from which there would be theoretical visibility of the proposed development, and the degree of theoretical visibility:

7.5.8 Scheduled Monuments, where long-distance views and intervisibility are an important aspect of their settings, Listed Buildings, and Inventory Gardens and Designed Landscapes within the Outer Study Area will be included in the assessment. There are no Conservation Areas and no Historic Battlefield Sites within the Outer Study Area.

7.5.9 Consideration will also be given to designated heritage assets beyond 5 km where long-distance views and intervisibility between monuments are considered to be an important aspect of their settings.

7.5.10 Consideration will be given to designated heritage assets where there is no predicted visibility from the asset but where views of or across the asset are important factors contributing to its cultural significance. In such cases, consideration will be given to whether the proposed development could appear in the background to those views.

Sensitivity of receptors

7.5.11 Cultural heritage assets are assigned value/importance through the designation process. Designation ensures that sites and places are recognised and protected by law through the planning system and other regulatory processes. The level of protection and how a site or place is managed varies depending on the type of designation and the laws and policies that apply to it (HES, 2019).

7.5.12 Table 7.1 summarises the relative sensitivity of heritage assets (including their settings) relevant to the proposed development, based on the guidance set out in the SNH/HES EIA Handbook (version 5; 2018).

Table 7.1: Sensitivity of heritage assets

Sensitivity of asset	Definition / criteria
High	Assets valued at an international or national level, including: ● Scheduled Monuments ● Category A Listed Buildings ● Inventory Gardens and Designed Landscapes ● Inventory Historic Battlefields ● Non-designated assets that meet the relevant criteria for designation (including sites recorded in HERs as non-statutory register (NSR) sites of presumed national importance)
Medium	Assets valued at a regional level, including: ● Archaeological sites and areas that have regional value (contributing to the aims of regional research frameworks) ● Archaeologically Sensitive Areas (ASA) (where these are identified in Local Authority records) ● Non-Inventory Designed Landscapes (NIDL) (where these are identified in Local Authority records) ● Category B Listed Buildings ● Conservation Areas
Low	Assets valued at a local level, including: ● Archaeological sites that have local heritage value ● Category C Listed buildings ● Unlisted historic buildings and townscapes with local (vernacular) characteristics
Negligible	Assets of little or no intrinsic heritage value, including: ● Artefact find-spots (where the artefacts are no longer in situ and where their provenance is uncertain)

Sensitivity of asset	Definition / criteria
	● Poorly preserved examples of particular types of features (e.g. quarries and gravel pits, dilapidated sheepfolds, etc)

Magnitude of impact

7.5.13 The magnitude of impact (adverse or beneficial) will be assessed in the categories, high, medium, low, and negligible and described in Table 7.2.

Table 7.2: Magnitudes of impact

Magnitude	Criteria	
	Adverse	Beneficial
High	Changes to the fabric or setting of a heritage asset resulting in the complete or near complete loss of the asset's cultural significance. Changes that substantially detract from how a heritage asset is understood, appreciated, and experienced.	Preservation of a heritage asset in situ where it would otherwise be completely or almost completely lost. Changes that appreciably enhance the cultural significance of a heritage asset and how it is understood, appreciated, and experienced.
Medium	Changes to those elements of the fabric or setting of a heritage asset that contribute to its cultural significance such that this quality is appreciably altered. Changes that appreciably detract from how a heritage asset is understood, appreciated, and experienced.	Changes to important elements of a heritage asset's fabric or setting, resulting in its cultural significance being preserved (where this would otherwise be lost) or restored. Changes that improve the way in which the heritage asset is understood, appreciated, and experienced.
Low	Changes to those elements of the fabric or setting of a heritage asset that contribute to its cultural significance such that this quality is slightly altered. Changes that slightly detract from how a heritage asset is understood, appreciated, and experienced.	Changes that result in elements of a heritage asset's fabric or setting detracting from its cultural significance being removed. Changes that result in a slight improvement in the way a heritage asset is understood, appreciated, and experienced.
Negligible	Changes to fabric or setting of a heritage asset that leave its cultural significance unchanged and do not affect how it is understood, appreciated, and experienced.	

Significance of effect

7.5.14 The sensitivity of the asset (Table 7.1) and the magnitude of the predicted impact (Table 7.2) are used to inform an assessment of the significance of the effect (direct effect or effect on setting), summarised using the matrix set out in the matrix in Table 7.3. The matrix employs a graduated scale of significance (from Negligible to Major effects) and where two outcomes are possible through application of the matrix, professional judgment supported by reasoned justification, will be used to determine the level of significance.

Table 7.3: Significance of effect

Magnitude of impact	Sensitivity of asset			
	High	Medium	Low	Negligible
High	Major	Major / Moderate	Moderate / Minor	Minor / Negligible
Medium	Major / Moderate	Moderate	Moderate / Minor	Minor / Negligible
Low	Moderate / Minor	Moderate / Minor	Minor	Negligible

Magnitude of impact	Sensitivity of asset			
Negligible	Minor / Negligible	Minor / Negligible	Negligible	Negligible

7.5.15 Major and Moderate effects are considered to be 'significant' in the context of the EIA Regulations. Minor and Negligible effects are considered to be 'not significant'.

7.5.16 Where a significant effect on the setting of an asset is predicted as a result of change within its surroundings, using the approach outlined above, an assessment will be made as to whether that effect would result in a significant adverse effect on the integrity of its setting (NPF4 Policy 7(h)(ii)). For the purposes of the assessment, the integrity of the setting will be considered to be maintained if the setting's contribution to the cultural significance of the monument, and its capacity to convey that significance to visitors, would not be compromised by the proposed development either alone or cumulatively with other developments.

7.6 Embedded mitigation and enhancement measures

Design Mitigation

- Avoidance of identified areas of constraint located within the proposed development site where feasible during the design of the electrolysis plant layout and the other on-site infrastructure.
- Application of a stand-off buffer around the stone circle 110 m W of South Leylodge Steading (SM 12350) to exclude the scheduled monument from the proposed electrolysis plant footprint.

Pre-Construction Phase Mitigation

- Preparation of a Written Scheme of Investigation (WSI), developed in consultation with Aberdeenshire Council's Archaeology Service (ACAS).
- Archaeological investigation post-consent through trial trench evaluation within the proposed development footprint to a scope of work and strategy to be agreed with ACAS.
- Archaeological evaluations or set piece excavations post-consent where heritage assets cannot be avoided.

Construction Phase Mitigation

- Fencing off/marking out areas of constraint within the proposed development site for avoidance during the construction phase.
- Watching briefs/archaeological monitoring in archaeologically sensitive areas.
- Implementation of a working protocol should unrecorded archaeological features be discovered.

Post Construction Monitoring

- Post construction site visits would be carried out to verify the effectiveness of the marking-out/avoidance mitigation, to ensure that all markers have been removed and that no damage has occurred to demarcated heritage assets.

7.7 Scope of environmental impacts and effects

Construction

<u>Direct Impacts</u>

7.7.1 Construction of the proposed development could potentially directly affect the previously recorded designated or non-designated heritage assets within the Inner Study Area. However, the nature and locations of the known heritage assets is such that they can most likely be avoided by design, so significant adverse direct effects from construction are unlikely to arise.

7.7.2 It is possible that there could be other, as yet unrecorded or unknown and buried remains of archaeological interest within the proposed development footprint and any such remains could be directly affected by construction activities. It

is not currently possible to predict where any such buried remains may be located, and other mitigation measures will need to be considered to address the possibility direct impacts on buried archaeological deposits.

Indirect Impacts

7.7.3 Construction of the proposed development could potentially indirectly affect previously recorded designated or non-designated heritage assets within the Inner Study Area. However, the nature and locations of the known heritage assets is such that they can most likely be avoided by design, so significant adverse indirect effects are unlikely to occur.

7.7.4 It is possible that there could be other, as yet unrecorded or unknown buried remains of archaeological interest within the site and any such remains could also be indirectly affected by construction of the proposed development.

Operation

Setting Impacts

7.7.5 The proposed development could give rise to potentially adverse impacts on the settings of designated heritage assets within the Outer Study Area.

7.7.6 The electrolysis plant element of the proposed development west of Kintore Substation are likely be visible from some of the scheduled monuments, Listed Buildings in rural, unenclosed settings, and from parts of the GDLs within the Outer Study Area. Woodland and the built environment would afford some long-term screening and commercial forestry may afford short/medium term screening, at certain times during the cyclical felling and replanting regime. The natural topography of the landscape would also afford screening in some cases.

7.7.7 Based on the current understanding of the proposed development, those designated heritage assets most likely to receive an adverse impact on their settings are:

- stone circle 110 m W of South Leylodge Steading (SM 12350), which lies within the are to be occupied by built elements of the proposed development.
- stone circle 250 m NW of South Fornet (SM 12353), which may share intervisibility with SM 12350.

7.7.8 Other designated assets within the Outer Study Area are likely to be screened by a combination of typography and intervening woodland. A full assessment will be undertaken once the ZTV for the proposed development is available.

7.8 Limitations and uncertainties

7.8.1 The scoping baseline for the Inner Study Area, described above, relies on records provided from the Aberdeenshire HER and HES datasets obtained in June 2023. It is assumed that the data was accurate and up to date at the time of acquisition. No other desk-based sources have been consulted and no field survey has yet been undertaken to verify or augment the existing records. Given the predominantly agricultural character of the landscape, it is unlikely that further proposed desk-based research and field survey will add substantially to the baseline, but that work will be carried out prior to consolidation of the project design to further inform the design of the proposed development.

7.8.2 The extents of sites of archaeological interest shown on the figures accompanying this section of the scoping report are taken for the HER and HES datasets and are indicative of identified, known extents of the site represented. It is possible that some, but not necessarily all, of the recorded sites may be of greater extent, especially where sites are recorded as cropmarks. Mitigation measures will be put in place to address the possibility that the proposed development could directly impact upon hitherto unrecorded buried archaeological remains.

7.9 Inter-related effects

7.9.1 Inter-related environmental effects are unlikely to be a consideration for archaeology and cultural heritage. There may be some cross-over with the Landscape and Visual Impact assessment (LVIA), where landscape character impacts affect the historic landscape character. However, the proposed development site lies adjacent to an existing large-scale electricity substation and to numerous existing overhead electricity transmission lines. There may also be some

cross-over with the noise assessment, specifically in regard to the setting of the stone circle 110 m W of South Leylodge Steading (SM 12350).

7.10 Cumulative effects

7.10.1 The assessment of cumulative effects on heritage assets will be based upon consideration of the effects of the proposed development on the settings of assets with statutory designations and non-statutory designations within the Outer Study Area of the proposed development together with the likely effects of other developments that are under construction, those that are consented but not yet built and those that are currently at the application stage (and for which sufficient detail is available upon which to develop an assessment). Proposed developments at the scoping pre-application stage will not be included in the assessment, as such proposals are not fully formed and may be subject to changes that cannot be foreseen.

7.10.2 The assessment of cumulative effects on the settings of heritage assets from the proposed development in combination with pre-existing developments will be addressed in the course of the assessment of effects of the proposed development alone, as pre-existing developments are part of the baseline environment.

7.10.3 The assessment will take into account the relative scale of the identified developments, their distance from the affected assets, and the potential degree of visibility of the various developments from the assets under consideration.

7.11 Summary of proposed EIA scope

Table 7.4: Summary of Archaeology and Cultural Heritage impacts proposed to be scoped in to the EIA

Impact pathway	Justification
Construction	
Direct impacts on known and recorded heritage assets and buried remains (cropmark sites)	The proposed development could have adverse effects on the archaeological resource
Direct impacts on hitherto unknown archaeological deposits and buried remains	The proposed development could have adverse effects on the archaeological resource
Operation	
Impacts on the settings of designated heritage assets in the wider landscape	The proposed development could have adverse effects on the settings of designated heritage assets
Inter-related on designated heritage assets in the wider landscape	The proposed development could have adverse effects on the settings of designated heritage assets through landscape character change and/or change in ambient noise levels
Cumulative impacts on the settings of designated heritage assets in the wider landscape	The proposed development could have adverse effects on the settings of designated heritage assets cumulatively with other proposed developments in the locality

Table 7.5: Summary of Archaeology and Cultural Heritage impacts proposed to be scoped out of the EIA

Impact pathway	Justification
Construction	
Indirect impacts on standing archaeological remains or structures	The proposed development is unlikely to give rise to significant adverse effects through hydrological changes or from vibration and seismic events (e.g. blasting, which is not required)

Impact pathway	Justification
Indirect impacts buried archaeological remains or deposits	The proposed development is unlikely to give rise to significant adverse effects through hydrological changes or from vibration and seismic events (e.g. blasting, which is not required)
Operation	
None	Not applicable

8 Ecology and Biodiversity

8.1 Introduction

8.1.1 The ecology chapter of the scoping report has been prepared by EnviroCentre Limited and aims to provide an overview of the ecology on and within influence of the site, and aims to describe any likely significant impacts to ecology as a result of the associated with the construction and operation of the proposed development and a summary of proposed assessment methodology.

8.2 Consultation to date

8.2.1 Consultation specific to ecology has not been undertaken prior to submission of this EIA Scoping Report. However, in initial discussion with the River Don Trust (in the course of the Controlled Activity Regulations (CAR) application for the abstraction of water from the River Don), the Trust noted the value of the Don for fish species and the potential benefits if the project could contribute to river restoration or enhancement opportunities in the Kintore area of the river catchment.

8.3 Legislative or policy requirements and technical guidance

8.3.1 The compilation of the EcIA will take cognisance of the legislation, planning policies, conservation initiatives and general guidance, including but not limited to:

- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna (The Habitats Directive)
- Environmental Impact Assessment (EIA) Directive (2014/52/EU) on assessing the potential effects of projects on the environment
- Water Framework Directive 2000/60/EC of the European Parliament
- The Wildlife and Countryside Act 1981 (as amended) (WCA)
- The Nature Conservation (Scotland) Act 2004 (NCA)
- The Wildlife and Natural Environment (Scotland) Act 2011 (WANE)
- The Scottish Biodiversity Strategy
- Chartered Institute of Ecology and Environmental Management (CIEEM) (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester
- National Planning Framework 4 (NPF4)
- Aberdeenshire Council Local Development Plan.

8.4 Baseline

Baseline environment

8.4.1 A Preliminary Ecological Appraisal (PEA) was carried out by EnviroCentre Limited in May 2023 which included a desk study, UKHab Habitat Survey and Protected and Notable Species Survey. The full PEA will be enclosed separately.

Designated Sites

8.4.2 No statutory designated sites are present within the site. Loch of Skene Site of Special Scientific Interest (SSSI) / RAMSAR / Special Protection Area (SPA) is located approximately 5 km south of site. The designated features of this area refer to the presence of wintering wildfowl populations, namely Greylag Goose (*Anser anser*), Pink-footed Goose (*Anser brachyrhynchus*), Common Gull (*Larus canus*) and Goldeneye (*Bucephala clangula*). The 'Ythan Estuary, Sands of Forvie and Meikle Loch' SPA is located more than 16 km from the application boundary but is mentioned as the River Don estuary discharges into the SPA area.

Habitats

8.4.3 24 UKHab habitats and boundary features were identified within the site boundary. Those which are Annex 1 habitats, priority Scottish Biodiversity List (SBL) habitats and potential Ground Water Dependent Terrestrial Ecosystems (GWDTEs) are identified:

- c1a Arable field margins – SBL priority habitat
- c1b Temporary grass and clover leys
- c1c Cereal crops
- f2a Lowland fens – SBL priority habitat / potential GWDTE
- f2b Purple moor-grass and rush pasture – SBL priority habitat / potential GWDTE
- g1a Lowland acid grassland - SBL priority habitat
- g3c Other neutral grassland
- g3c7 Deschampsia neutral grassland – potential GWDTE
- g3c8 Holcus-juncus neutral grassland – potential GWDTE
- g3c8 / g1d Holcus-juncus neutral grassland / Other lowland acid grassland
- g4 Modified grassland
- h3e Gorse scrub
- h3e / g1d Gorse scrub / other lowland acid grassland
- h3h Mixed scrub
- r2a Rivers (priority habitat) – Annex 1
- r2b Other rivers and streams
- r1g Other standing water
- u1b5 Buildings
- u1e Built linear features
- w1d Wet woodland – SBL priority habitat / potential GWDTE
- w1f Lowland mixed deciduous woodland – SBL priority habitat
- w1g Other broadleaved woodland
- w2a Native pine woodlands – SBL priority habitat
- w2c Other coniferous woodland

8.4.4 Invasive non-native species (INNS) were identified during the PEA, including giant hogweed (*Heracleum mantegazzianum*), Japanese knotweed (*Reynoutria japonica*), monkeyflower (*Mimulus guttatus*), white butterbur (*Petasites albus*) and Himalayan balsam (*Impatiens* glandulifera). American mink (*Neovision vision*) evidence was also recorded along the bank of the River Don.

Faunal Species

8.4.5 Biological records of bats, otter, red squirrel (Sciurus vulgaris), pine marten, badger, hedgehog and bird species were returned during the desk study. The habitats on site offer commuting and foraging habitat for bats, otter (*Lutra lutra*), water vole (Arvicola amphibius), red squirrel, pine marten (*Martes martes)*, badger (*Meles meles*), hedgehog, brown hare (*Lepus europaeus*), amphibians, reptiles, invertebrates, a range of bird species, the fish species Atlantic salmon (*Salmo salar*), river lamprey (*Lampetra fluviatilils*), brook lamprey (*Lampetra planeri*), sea lamprey (*Petromyzon marinus*) and eel (*Anguilla anguilla*), and freshwater pearl mussel (*Margaritifera margaritifera*).

8.4.6 The following faunal evidence was identified during the survey relevant to the site during the PEA:

- buildings and structures with Potential Roost Features (PRFs) assessed as low-moderate for roosting bats;
- trees with PRFs assessed as low-high for roosting bats;
- badger latrines, dung, foraging, snuffling and setts (main, annexe, subsidiary and outliers);
- otter (spraint, footprints and multiple layup/ couch features assessed as low-moderate resting site status;
- pine marten scat;
- red squirrel dreys;

- bird nests, Sand Martin (*Riparia riparia*) colony, raptor foraging remains (pellets and prey), Barn Owl (*Tyto alba*) sightings and bird boxes;
- brown hare sightings; and
- fish sightings.

Proposed approach to surveys and further baseline data collection

8.4.7 The EcIA will scope in relevant ecological receptors, habitat or sites identified in preliminary studies and from consultation responses from appropriate regulators (where necessary). The assessment will aim to include all direct and indirect, lethal and non-lethal impacts on ecology that could reasonably occur during construction work and in operation of the development. Further survey work required to gain information on the Important Ecological Features (IEFs) and to undertake an impact assess on them have been scheduled, including:

- walkover survey of additional areas not within the current PEA survey (habitats and ecological constraints);
- National Vegetation Classification (NVC) survey / (GWDTEs);
- otter and water vole surveys;
- pine marten and red squirrel surveys;
- bat activity surveys of buildings;
- bat transect surveys;
- PRF inspections of trees;
- fish habitat assessment;
- freshwater pearl mussel survey; and
- tree and woodland survey.

8.5 Approach to assessment

Assessment criteria

8.5.1 The assessment of impacts describes how the baseline conditions would change as a result of the project and its associated activities and from other developments. The term 'impact' is used commonly throughout the EIA process and is usually defined as a change experienced by a receptor (this can be positive, neutral or negative). The term 'effect' is commonly used at the conclusion of the EIA process and is usually defined as the consequences for the receptor of an impact after mitigation measures have been taken into account. The EIA Regulations specifically require all likely significant effects to be considered. Therefore, impacts and effects will be described separately and the effects for IEFs will be assessed as being either significant or not according to the importance and sensitivity of the IEF.

8.5.2 Significant cumulative effects can result from the individually insignificant but collectively significant effects of actions taking place over a period of time or concentrated in a location.

8.5.3 The assessment criteria will follow CIEEM guidance, which states that when describing changes/activities and positive or negative impacts, reference should be made to the following parameters where relevant:

- magnitude;
- extent;
- duration;
- reversibility; and
- timing and frequency.

8.5.4 All these parameters will be considered during the assessment.

Magnitude of impact

8.5.5 Magnitude refers to the size, amount, intensity and volume of an impact, determined on a quantitative basis if possible, but typically expressed in terms of relative severity, such as major, moderate, low or negligible. Extent, duration,

reversibility, timing and frequency of the impact can be assessed separately but they tie in to determine the overall magnitude. CIEEM guidance and criteria for describing and assessing magnitude will be utilised.

8.5.6 Criteria for describing the magnitude of an impact are presented in Table 8.1 below:

Table 8.1: Criteria for describing magnitude of impact

Magnitude	Description
Major	Total or major loss or alteration to the IEF, such that it will be fundamentally changed and may be lost from the site altogether; and/or loss of a very high or high proportion of the known population or range of the IEF
Moderate	Loss or alteration to the IEF, such that it will be partially changed; and/or loss of a moderate proportion of the known population or range of the IEF
Low	Minor shift away from the existing or predicted future baseline conditions. Change arising from the loss or alteration will be discernible but the condition of the IEF will be similar to the pre-development conditions; and/or having a minor impact on the known population or range of the IEF
Negligible	Very slight change from the existing or predicted future baseline conditions. Change barely discernible, approximating to the 'no change' situation; and/or having a negligible impact on the known population or range of the IEF

Significance of effect and sensitivity of receptors

8.5.7 Significance is a concept related to the weight that is attached to effects when decisions are made. For the purposes of EcIA, a 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for IEFs. In broad terms, significant effects encompass effects on the structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution).

8.5.8 Significant effects are quantified with reference to an appropriate geographic scale, shown in Table 8.2. The CIEEM guidance has one 'level of importance' and a geographical 'scale of significance'. This is to deal with the fact that the geographical scale at which the effect is significant is not necessarily the same as the geographic level of importance of the IEF.

Table 8.2: Geographic level of importance of ecological features

Level of Importance	Sites	Habitats	Species
International	Designated, candidate or proposed Special Areas of Conservation, Special Protection Areas and Ramsar sites; UNESCO (Ecological) World Heritage Sites; UNESCO Biosphere Reserves; Biogenetic Reserves	Designated, candidate or proposed Special Areas of Conservation, Special Protection Areas and Ramsar sites; UNESCO (Ecological) World Heritage Sites; UNESCO Biosphere Reserves; Biogenetic Reserves	Designated, candidate or proposed Special Areas of Conservation, Special Protection Areas and Ramsar sites; UNESCO (Ecological) World Heritage Sites; UNESCO Biosphere Reserves; Biogenetic Reserves
National (UK)	Sites of Special Scientific Interest; National Nature Reserve; Marine Conservation Zones (UK offshore)	An area of habitat fulfilling the criteria for designation as an SSSI or MCZ; a habitat area that is critical for a part of the life cycle of a nationally important species	An IUCN Red Data Book species that is Vulnerable, Endangered or Critically Endangered in the UK; a species that is Rare in the UK (<15 10km grid squares); a Schedule 5 (animal) or Schedule 8 (plant) species included in the Wildlife and Countryside Act (WCA) 1981; any species protected under national (UK) legislation where there is the

Level of Importance	Sites	Habitats	Species
			potential for a breach of the legislation; a species that is Vulnerable, Endangered or Critically Endangered in The Vascular Plant Red Data List for Great Britain[21]
National (Scotland)	National Parks; Marine Protected Areas; Marine Consultation Areas.	Scottish Biodiversity List (SBL) Priority Habitats and Priority Marine Features (PMFs)[22] (Scotland)	Species of principal importance for biodiversity in the relevant countries[23], including; SBL Priority Species and PMFs (Scotland). Species protected under the Marine Scotland Act 2010
Regional	Regional Parks (Scotland)	Regional Local Biodiversity Action Plan habitats noted as requiring protection	A species that is Nationally Scarce in the UK (present in 16-100 10km grid squares); a species that is included in the Regional LBAP; an assemblage of regionally scarce species
County / Metropolitan	Woodland Trust Sites; Royal Society for the Protection of Birds Sites; Scottish Wildlife Sites.	County LBAP habitats noted as requiring protection; semi-natural, ancient woodland >0.25ha in extent.	A species that is included in the County LBAP; an assemblage of species that are scarce at the county level.
Local	n/a	Semi-natural, ancient woodland <0.25ha in extent; semi-natural habitats that are unique or important in the local area	Species as defined by Local Authority lists (if available)
Site	n/a	Common and widespread habitats not covered above	Common and widespread species not covered above.
Negative	n/a	n/a	An Invasive Non-Native Species (INNS) as defined by the GB Non-Native Species Secretariat (NNSS) and supported by the GB Invasive Non-native Species Strategy (2015).or listed within OICHA Ballast Water Policy

8.5.9 Professional judgement is used to determine the significance of effects. A sensitivity scale for receptors is used to assist in this judgement, as shown in Table 8.3.

Table 8.3: Sensitivity of important ecological features

Sensitivity	Definition
High	Tolerance: the IEF has a very limited tolerance of the effect
	Adaptability: the IEF is unable to adapt to the effect

[21] Cheffings, C.M. & Farrell, L. (eds), Dines, T.D., Jones, R.A., Leach, S.J., McKean, D.R., Pearman, D.A., Preston, C.D., Rumsey, F.J., Taylor, I. (2005) *The Vascular Plant Red Data List for Great Britain. Species Status No. 7*. JNCC, Peterborough.

[22] In July 2014, Scottish Ministers adopted a list of 81 priority marine features (PMFs) – many of which are features characteristic of the Scottish marine environment. Most are on other conservation status lists so may be valued higher than this.

[23] These are all the species that were identified as requiring action in the UKBAP and continue to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework, including any additions.

Sensitivity	Definition
	Recoverability: the IEF is unable to recover, resulting in permanent or long term (>10 years) change
Medium	Tolerance: the IEF has limited tolerance of the effect
	Adaptability: the IEF has limited ability to adapt to the effect
	Recoverability: the IEF is able to recover to an acceptable status over the medium term (5-10 years)
Low	Tolerance: the IEF has some tolerance of the effect
	Adaptability: the IEF has some ability to adapt to the effect
	Recoverability: the IEF is able to recover to an acceptable status over the short term (1-5 years)
Negligible	Tolerance: the IEF is generally tolerant of the effect
	Adaptability: the IEF can completely adapt to the effect with no detectable changes
	Recoverability: the IEF is able to recover to an acceptable status near instantaneously (<1 year)

Confidence in predictions

8.5.10 CIEEM does not cover levels of confidence in predictions, therefore an approach has been adopted based on river conservation evaluation which provides a simple, qualitative index which can be assigned to each predicted effect as follows:

8.5.11 The assessment criteria will follow CIEEM guidance, which states that when describing changes/activities and positive or negative impacts, reference should be made to the following parameters where relevant:

- A: high confidence.
- B: intermediate confidence.
- C: low confidence.

8.5.12 Factors influencing confidence include:

- The frequency and effort of field sampling
- Constraints to the field survey
- The completeness of the data (field and desk)
- The age of the data (although recent data are not necessarily always more reliable than old data)
- The state of scientific knowledge relating to the predicted effects of development activities on the IEF (the accuracy of the magnitude assessment)
- The accuracy of the assessment of significance.

Geographical scope

8.5.13 The study area will include the proposed development boundary plus buffers up to 250 m.

8.5.14 The study areas for potential cumulative effects will be considered up to 5 km from the proposed development boundary. Beyond this distance, effects are considered to be undetectable and therefore not considered significant.

Temporal scope

8.5.15 The assessment will consider potential effects on ecology during both the construction and operational phases of the proposed development.

8.5.16 The assessment will also consider the potential for climate change to impact on future baseline conditions.

8.6 Embedded mitigation and enhancement measures

8.6.1 The proposed development will undergo design iterations, in response to constraints identified as part of the baseline/ field studies so as to avoid and/or minimise potential effects on receptors where possible.

8.6.2 Therefore, the following broad strategies are suggested to avoid and minimise the current predicted negative ecological outcomes. These will require updating following further survey information and through iterative design inputs during the course of the EIA, but form a starting point of measures that are considered potentially applicable at this stage.

8.6.3 Kintore Hydrogen intends to provide biodiversity net gain as part of the proposed development, which may be via a mixture of on- and off-site habitat creation areas.

8.6.4 Good practice measures will be defined in the CEMP and where appropriate through a Landscape and Ecological Management Plan (LEMP) to avoid or minimise ecological impacts during construction. A suitably qualified Ecological Clerk of Works (ECoW) will be appointed to oversee and advise on ecological constraints prior to and during construction phase. In summary the good practice measures will include but not be limited to the follow. Further detail of mitigation will be developed through the EIA assessment and drafting of mitigation and management plans including the CEMP and if applicable a LEMP.

- Seeking to protect and maintain, where possible, important habitats and existing ecological connectivity to the wider landscape.
- Developing a Species Protection Plan for protected species, (e.g. bats, otter, red squirrel, pine marten and badger) where these would be affected by the proposed development with details of appropriate mitigation prior to construction commencing.
- Undertaking any clearance of habitat for breeding birds and reptiles with consideration to the relevant breeding and hibernation seasons and under the supervision of the ECoW.
- Designing temporary and permanent lighting sensitively with respect to impact on foraging species.
- Implementing an INNS management plan (inclusive of a good practice biosecurity plan) for the removal of INNS within the site to avoid further spread within and out with the site.

8.6.5 The following general enhancement measures are considered to be potentially relevant and feasible at this stage. They will be refined and confirmed during the course of the EIA.

- Where feasible seek to enhance retained habitats to increase ecological connectivity to the wider landscape. Habitat connectivity across, around and beyond the site can increase the success of delivering on-site and landscape-scale biodiversity gains.
- Sensitive landscaping and planting regimes to augment retained habitat, which may include measures such as:
  - Create and manage diverse wildflower meadows and margins.
  - Installing owl boxes into woodland habitats to increase overall nesting provisions.
  - Bat and bird boxes can be affixed to trees within the retained woodland and trees and potentially on any suitable buildings to increase nesting/roosting provisions.
  - Suitable enhancement measures for invertebrates (log piles, invertebrate mounds, invertebrate hotels, bee bricks, standing and buried deadwood and creation of hedgerows).
  - Installing hedgehog friendly fencing to facilitate faunal movement and ecological connectivity within the site. Artificial hedgehog boxes could also be incorporated into the grassland or woodland within the site.

8.7 Scope of environmental impacts and effects

8.7.1 The following receptors have been scoped in:

- Important habitats (priority habitats, priority species and GWDTEs) – these are of principal importance and require conservation action due to being threatened.

- Bats, otter, badger, red squirrel, pine marten, brown hare, hedgehog, amphibians, reptiles and birds – evidence or suitable habitat has been identified for these species within the site.

8.7.2 Without avoidance, mitigation or adherence to good practice measures, impacts on the ecological baseline of the site could occur during construction and operation of the proposed development. A summary of the potential effects during these phases is provided below and will be considered in the EIA Report. Following further surveys works, these potential impacts will likely require updating.

Construction

8.7.3 The following potential negative effects on ecology could occur during the construction phase of the proposed development which include:

- Loss of important habitats (priority habitats, priority species and GWDTEs) if removed to facilitate development.
- Removal or fragmentation of potential roosting resource and important commuting and foraging corridors for bats as a result of the removal or alteration of scrub, scattered trees, woodland, grassland, buildings and altering of any standing water and running water habitats.
- Disturbance to roosting bats during works, if demolition or works in proximity to low and moderate suitability buildings.
- Removal or fragmentation of sheltered commuting, foraging opportunities and rest site/couches for otter as a result of the removal of scrub, scattered trees, woodland, grassland and altering of any standing water and running water habitats.
- Disturbance to resting and commuting otter in locale during works if works occur in proximity to potential rest sites.
- Removal of potential commuting, foraging and burrowing opportunities for water vole as a result of the removal of wet grassland and altering of any standing water and running water habitats.
- Removal of commuting, foraging and drey and den creation for red squirrel and pine marten as a result of alterations or removal of woodland habitat.
- Removal of badger setts and disturbance to badger in setts, if removed to facilitate development or if working within proximity to setts during construction works.
- Removal of foraging, commuting and opportunities for sett creation for badger as a result of the removal of improved grassland, woodland, scrub, scattered trees and altering of any standing water and running water habitats.
- Removal of suitable resting and foraging opportunities for hedgehog and brown hare as a result of the removal or alteration of scrub, arable fields and grassland.
- Removal of opportunities for resting, foraging, basking and hibernating reptiles as a result of the removal or alteration of grassland, wet grassland, scrub, log piles, stone walls and piles and woodland.
- Removal of opportunities for resting, foraging, spawning and hibernating amphibians as a result of the removal or alteration of grassland, wet grassland, scrub, log piles, stone walls, woodland and any standing water.
- Removal of suitable nesting, loafing and foraging habitat for a range of bird species as a result of the removal of scattered trees, grassland, scrub, wet grassland, arable fields, woodland and altering of any standing water and running water habitats.
- Removal of suitable basking, pollinating, foraging, residing habitat for invertebrates as a result of the removal or alteration of grassland, scrub, stone walls and piles, woodland, arable fields, standing water and running water habitats.
- Altering or polluting of watercourse, loch and standing water which potentially provide habitat for a range of fish species and freshwater pearl mussels.
- Injury or death of wildlife as a result of increased traffic, increased human presence and if works are not appropriately timed.
- Further spread of INNS during construction works.
- An increased number of vehicles on the local road network could lead to an increase in disturbance of, vehicle collisions with and deaths of faunal species of importance.

Operation

8.7.4 Effects on biodiversity following construction are generally associated with increased human presence and deterioration of the local environment, with long-term effects more frequent. The development presents a number of potentially significant effects, including:

- Breeding success of bird species may be impacted by the increased noise associated with an operational hydrogen plant and its workforce.
- Increased noise associated with operational hydrogen plant and associated traffic could result in disturbance to or disruption of foraging, commuting, nesting/ roosting/ residing activities of bats, badger, otter, red squirrel, pine marten, brown hare and hedgehog.
- Any accidental improper disposal of waste or spillages of materials produced by the electrolysis plant or workforce could risk pollution and degradation of habitats of national and international importance, including the River Don, and cause injury/death to important faunal species such as hedgehog, otter, pine marten, badger, brown hare, reptiles, amphibians and red squirrel.
- Insensitive operational lighting could disrupt the foraging and commuting activities of important fauna including bats, otter, pine marten, badger and owls.

8.8 Limitations and uncertainties

8.8.1 The assessment will use biological records supplied from stakeholders and publicly available data sources to inform desk studies, during the scoping and consultation stages. Desk studies are limited by the reliability of third-party information and the geographical availability of biological and/or ecological records and data.

8.8.2 During the iterative design process, results of further targeted surveys to be undertaken in 2023 will be used to inform current uncertainties and highlight and additional potential significant effects as early as possible. Mitigation measures, requirements for compensation and potential for enhancement will be agreed in reference to the results of further target surveys and on receipt of the design layout and schedule of works. In the meantime, conservative assumptions of those potential impacts, mitigation and compensation measures have been included.

8.8.3 It is therefore considered that the data and information that will be used to complete the assessment will be robust and that there will be no significant data gaps or limitations.

8.9 Inter-related effects

8.9.1 This report will assess effects that are relevant to ecology, which also includes the water environment receptors during construction and operation phases of development (e.g. pollution prevention of watercourses and those species which inhabit them) and the impacts of noise and traffic generation.

8.10 Cumulative effects

8.10.1 The CIEEM Guidelines identify the Zone of Influence (ZoI) as the area over which ecological features may be subject to significant effects as a result of the proposed development and associated activities. This is likely to extend beyond the project site, for example where there are mobile species or hydrological links beyond the site boundaries. Features found to be present or likely to be present within the predicted ZoI and which have potential to be significantly affected (positively and negatively) by the proposed development are included within the scope of this assessment.

8.10.2 A cumulative effect is considered to occur where the magnitude of the combined effect of two or more developments is greater than that of the developments considered separately. A review of other existing and proposed developments within 2 km of the proposed development will be undertaken and potential impacts on ecology will be assessed to identify cumulative effects. Cumulative effects arising from relevant cumulative developments within the largest ZoI area, will be considered. (Other smaller ZoIs for specific receptor impacts are also used in the table below, where

applicable.) There are currently four developments within the site footprint, which might result in significant cumulative effects arising from the proposed development.

8.11 Summary of proposed EIA scope

Table 8.4: Summary of ecology impacts proposed to be scoped in to the EIA

Impact pathway	Justification
Construction	
Habitat/ biodiversity loss	Removal of important or priority habitats as a result of clearance for the construction phase. Removal and/ or fragmentation of suitable habitat for a range of protected and notable species (bats, otter, badger, red squirrel, pine marten, brown hare, hedgehog, amphibians, reptiles and birds).
Destruction/ disturbance of protected species rest sites	Removal of badger setts, red squirrel dreys, otter rest sites and bat roosts during construction to facilitate the development. Disturbance to badger setts, red squirrel dreys, otter rest sites and bat roosts during construction.
Pollution risk	Direct and indirect pollution impacts to a range of species within watercourses and standing water as a result of pollution from fuel, oil, concrete or other hazardous substances, as well as sedimentation.
Infrastructure and man-made drainage	Potential degradation of areas of GWDTE within the site and 250 m ZoI.
Noise, vibration and lighting	Construction activities which create loud noises or vibration have the ability to disturb species such as bats, otter, red squirrel, pine marten, badger, brown hare, hedgehog and fish, through avoidance of the area. Temporary lighting during the construction phase has the ability to disturb crepuscular and nocturnal species such as bats, otter, pine marten, badger and hedgehog through avoidance of the area.
Vehicle movements	Construction activities could result in death or injury of individuals through collision with plant and vehicles.
Operation	
Noise, vibration and lighting	During operation permanent lighting has the ability to disturb crepuscular and nocturnal species such as bats, otter, pine marten, badger and hedgehog.
Vehicle movements	During operation there will be increased activity associated with the development, which could result in death or injury of individuals through collision vehicles
Pollution risk	During operation, direct and indirect pollution impacts to a range of species within watercourses and standing water as a result of pollution from fuel, oil or other hazardous substances

Table 8.5: Summary of ecology impacts proposed to be scoped out of the EIA

Impact pathway	Justification
Construction	
Designated sites – Loch of Skene SSSI/ RAMSAR/ SPA	The designated site is located approximately 5 km south of site at its nearest point to the development. The ZoI is considered to be within the development area and up to 750 m from the boundary (furthest disturbance distance of bird species) and so this site is outside of the ZoI.
Operation	
Designated sites – Loch of Skene SSSI/ RAMSAR/ SPA	As above.

Impact pathway	Justification
Designated sites – Ythan Estuary, Sands of Forvie and Meikle Loch SPA	The designated site is located more than 16 km east of the site at its nearest point to the development but linked via the River Don. Due to the controls provided by the CAR and PPC Permit regulations on abstraction and discharges, in addition to the distance, there is also considered to be no pathway for potential significant impacts on the Ythan Estuary, Sands of Forvie and Meikle Loch SPA via water abstraction or discharge impacts on the River Don.

9 Transport and Access

9.1 Introduction

9.1.1 This chapter sets out the proposed approach to the assessment of potential effects of the proposed development on transport and access matters during construction of the proposed development.

9.1.2 The transport and access issues relating to the proposed development will be examined in a Transport & Access Chapter in the EIA Report (EIAR). This will be supported by technical appendices and figures as appropriate, including a Transport Assessment (TA) and Abnormal Indivisible Load (AIL) Route Survey Report.

9.1.3 This chapter has been prepared by Pell Frischmann Consultants Limited. Pell Frischmann is familiar with the study area and has extensive experience in the preparation of EIAR transport reviews and the production of TA studies.

9.2 Consultation to date

9.2.1 Consultation with respect to transport and access matters has not been undertaken prior to submission of this EIA Scoping Report.

9.3 Legislative or policy requirements and technical guidance

9.3.1 The following policy and guidance documents will be used to inform the Transport & Access Chapter:

- Transport Assessment Guidance (Transport Scotland, 2012);
- Environmental Assessment of Traffic and Movement (Institute of Environmental Management and Assessment (IEMA), 2023); and
- National Planning Framework (NPF) 4 (Scottish Government, 2014).

9.4 Baseline

Baseline environment

9.4.1 The study area for the assessment will be defined by the preferred abnormal load and general construction traffic routes to the site during construction as well as traffic flows associated with the operational phase.

9.4.2 Construction materials required at the site will include the delivery of bulk materials such as aggregate, sand and ready-mix concrete in addition to deliveries of plant, electrical infrastructure, hydrogen production equipment and storage sections. Staff working at the construction site will arrive and depart by car.

9.4.3 The likely routes affected by construction traffic will include the following:

- A96 to the north and south of Kintore;
- The B987 between its junction with the A96 and B994;
- The B994 between its junction with the B987 and B977;
- The B977 between its junction with the B944 and Leylodge; and
- The minor road network used to provide connections to the water abstraction and discharge point.

9.4.4 During the operational phase, traffic including staff working at the site and occasional maintenance contractor vehicles will access and egress via the site access junction. The road connections from the site access junction to the A96 and Kintore town would be used for these movements.

9.4.5 During construction, it is expected that abnormal loads will be delivered to site from the north from the Port of Entry (PoE) at Aberdeen Harbour via the A956, A90, A96, B987, B994 and B977. All traffic will access the site via the new access junction to be constructed at the B977 in the location illustrated in the site layout plan.

9.4.6 A review of active travel and Core Paths in the study area has been undertaken. Whilst there are no National Cycle Routes (NCR) within the study area, Core Paths do exist near the site and or its likely access routes and these would be considered in the assessment.

Proposed approach to surveys and further baseline data collection

9.4.7 Traffic data for the trunk road network would be obtained from Transport Scotland's (TS) traffic database. The following count sites may be used to collect data for the A96:

- A96 south of Kintore – TS Counter 176182; and
- A96 north of Kintore- TS Counter ATCNE018.

9.4.8 Further traffic data would be obtained from new Automatic Traffic Counters (ATC) deployed on the B994, B987 and B977 (near the site access) over a 7 day period, in order to collect vehicle volumes, composition and speed per direction per hour.

9.4.9 We would propose to use National Road Traffic Forecasts (NRTF) low growth assumptions to determine future year traffic flows. This will enable the likely impacts during the year of construction to be assessed.

9.4.10 In addition to reviewing the physical links, consideration of road accidents in the study area network leading from the A96 to the site would be reviewed for a five year period using data from the online resource, www.crashmap.co.uk.

9.5 Approach to assessment

9.5.1 A Transport Assessment (TA) will be provided to review the impact of transport related matters associated with the proposed development. This will be appended to the EIAR and will be summarised into an Transport & Access Chapter within the EIAR.

9.5.2 It is not anticipated that a formal, detailed Transport Assessment will be required as these are not generally considered necessary for temporary construction works. A reduced scope Transport Assessment will therefore be provided in a format that is more suited to a development of this nature.

Assessment criteria

9.5.3 Potential impacts that may arise during the assessment may include the following for users of the road network and those residents along the access routes:

- Severance;
- Driver delay;
- Pedestrian delay;
- Pedestrian amenity;
- Fear and intimidation;
- Accidents and safety; and
- Hazardous and abnormal loads.

9.5.4 Changes in traffic flow will be considered against the above criteria to determine significant effects.

Magnitude of impact

9.5.5 The following rules taken from the IEMA guidance would be used as a screening process to define the scale and extent of the assessment:

- Rule 1: Include highway links where traffic flows are predicted to increase by more than 30% (or where the number of HGVs is predicted to increase by more than 30%); and
- Rule 2: Include any other specifically sensitive areas where traffic flows are predicted to increase by 10% or more.

9.5.6 Increases below these thresholds are generally considered to be insignificant given that daily variations in background traffic flow may fluctuate by this amount. Changes in traffic flow below this level predicted as a consequence of the proposed development will therefore be assumed to result in no discernible environmental impact and as such no further consideration will be given to the associated environment effects.

9.5.7 The estimated traffic generation of the proposed development will be compared with baseline traffic flows, obtained from existing traffic survey data, in order to determine the percentage increase in traffic.

Sensitivity of receptors

9.5.8 Potentially significant environmental effects will be assessed where the thresholds as defined above are exceeded. Suitable mitigation measures will be proposed, where appropriate. This assessment will consider the construction and operational traffic associated with the proposed development.

9.5.9 The IEMA guidance provides details on how the sensitivity of receptors should be assessed. Using that as a base, professional judgement was used to develop a classification of sensitivity for users based on the characteristics of roads and locations. This is summarised in Table 9.1.

9.5.10 Where a road passes through a location, users are considered subject to the highest level of sensitivity defined by either the road or the location characteristics.

Table 9.1: Classification of receptor sensitivity

Sensitivity of receptor	Criteria for road users
High	Where the road is a minor rural road, not constructed to accommodate frequent use by HGVs. Includes roads with traffic control signals, waiting and loading restrictions, traffic calming measures. Where a location is a large rural settlement containing a high number of community and public services and facilities.
Medium	Where the road is a local A or B class road, capable of regular use by HGV traffic. Includes roads where there is some traffic calming or traffic management measures. Where a location is an intermediate sized rural settlement, containing some community or public facilities and services.
Low	Where the road is Trunk or A-class, constructed to accommodate significant HGV composition. Includes roads with little or no traffic calming or traffic management measures. Where a location is a small rural settlement, few community or public facilities or services.
Negligible	Where roads have no adjacent settlements. Includes new or existing strategic trunk roads that would be little affected by additional traffic and suitable for Abnormal Loads, and new strategic trunk road junctions capable of accommodating Abnormal Loads. Where a location includes individual dwellings or scattered settlements with no facilities.

Significance of effect

9.5.11 The impacts on receptors within the study area will be reviewed during the construction phase, with a peak construction period assessment undertaken. This will review the maximum impact and presents a robust assessment of the effects of construction traffic on the local and trunk road networks. A similar assessment for the operational phase will also be undertaken.

9.5.12 A comparison between receptor sensitivity and the magnitude of impact will be undertaken. The resultant effect will be determined from the effects matrix detailed in Table 5.3.

9.5.13 Significance is categorised as major, moderate, minor or negligible. Effects judged to be of major or moderate significance will be considered to be significant in accordance with the EIA Regulations and would be the focus of further mitigation where feasible.

9.5.14 Where an effect could be one of major/moderate or moderate/minor significance, professional judgement will be used to determine which option should be applicable, as these effects can be classed as significant. Effects judged to be of minor or negligible significance will be considered not significant.

Geographical scope

9.5.15 The study area outlined in the baseline environment encompasses the geographical limit for the study, with each major road link considered within the assessment.

Temporal scope

9.5.16 The assessment will focus on the peak month for construction delivery activities. The operational access review will assume a typical production day.

9.5.17 No further consideration of seasonal changes is proposed.

9.6 Embedded mitigation and enhancement measures

9.6.1 Mitigation measures that are likely to be embedded in the assessment are:

- Production of a Construction Traffic Management Plan;
- The design of suitable access junction arrangements with full consideration given to the road safety of all road users;
- A Staff Sustainable Access Plan; and
- A Framework Abnormal Load Transport Management Plan.

9.6.2 Additional mitigation will be included, where feasible, should the assessment reveal effects that are significant following the application of standard mitigation measures.

9.7 Scope of environmental impacts and effects

Construction

9.7.1 The impacts for road users (pedestrians, cyclists, equestrians and drivers) and those living along the links within the study area will be considered during the construction phase. The assessment would be based on the worst case traffic flows at the peak of construction activity.

9.7.2 No road junction capacity assessments will be undertaken as the likely scale of the temporary construction phase is highly unlikely to result in junction capacities being exceeded.

Operation

9.7.3 The impacts for the same receptors as used in the construction phase will be considered during the operational phase.

Decommissioning

9.7.4 The traffic generation levels associated with the decommissioning phase will be less than those associated with the development phase as some elements such as access roads would be left in place on the site. As such, the construction phase is considered the worst case assessment to review the impact on the study area. An assessment of the decommissioning phase would therefore not be undertaken, although a commitment will be made to reviewing the impact of this phase prior to any decommissioning works proceeding.

9.8 Limitations and uncertainties

9.8.1 There are no significant limitations to proposed assessment methodology. The assessment will be based upon a peak construction or operational traffic flow and as such provides a maximum-case assessment scenario.

9.9 Inter-related effects

9.9.1 The transport effects of the assessment will also be considered in the noise and air quality assessment due to potential for traffic movements to create potentially significant effects in those wider subject areas.

9.9.2 The transport data from the study will also be used in the carbon balance calculations for the proposed development.

9.10 Cumulative effects

9.10.1 A cumulative assessment will take place where a nearby other development has planning consent, has a publicly available TA or Transport Statement and would have a significant impact on the study network roads (i.e. over 30% increase in traffic flows). These traffic flows would be included into the baseline flows used within the cumulative assessment for the proposed development.

9.11 Summary of proposed EIA scope

Table 9.2: Summary of transport impacts proposed to be scoped in to the EIA

Impact pathway	Justification
Construction	
Users of the A96, B987, B994 and B977	Increased traffic flows during construction phase.
Residents living alongside the B987, B994 and B977	Increased traffic flows during construction phase.
Residents of Kintore	Increased traffic flows during construction phase.
Operation	
Users of the A96, B987, B994 and B977	Increased traffic flows during operational phase.
Residents living alongside the B987, B994 and B977	Increased traffic flows during operational phase.
Residents of Kintore	Increased traffic flows during operational phase.

Table 9.3: Summary of transport impacts proposed to be scoped out of the EIA

Impact pathway	Justification
Decommissioning	
All receptors	The traffic generation levels associated with the decommissioning phase will be no more than those associated with the construction phase, and likely lesser as some elements such as access roads would likely be left in place on the site (requiring less material movement and traffic generation). As such, the construction phase is considered the worst-case assessment to review the impact on the study area. An assessment of the decommissioning phase will therefore not be undertaken, although a commitment will be made to reviewing the impact of this phase prior to any decommissioning works proceeding.

10 Noise and Vibration

10.1 Introduction

10.1.1 This chapter of the EIA Scoping Report has been produced by the Savills Acoustics, Noise & Vibration team, all of whom are corporate (MIOA or FIOA) or associate (AMIO) members of the Institute of Acoustics (IOA, the UK's professional body for those working in acoustics, noise and vibration). The team is also a corporate member of the Association of Noise Consultants (ANC).

10.1.2 Generally, but dependent upon the specific circumstances, an assessment of noise and vibration effects associated with the construction and operation of this type of development is scoped in to the EIA process. However, for this development, the following aspects could potentially be scoped out as they are unlikely to result in significant effects:

- depending on the construction methodology, an assessment of construction vibration effects may reasonably be scoped out, particularly if percussive/impact piling will not be required;
- an assessment of operational road traffic noise effects, on the basis that there would be only negligible road traffic movements; and
- an assessment of operational vibration effects, on the basis that there would no, or only negligible, vibration sources included.

10.1.3 Further justification for the aspects proposed to be scoped out is provided in Sections 10.7, and 10.11, below.

10.2 Consultation to date

10.2.1 Consultation with respect to noise and vibration has not been undertaken prior to submission of this EIA Scoping Report.

10.3 Legislative or policy requirements and technical guidance

Legislative Context

10.3.1 Section 60, Part III of the Control of Pollution Act 1974 (CoPA)[24] refers to the control of noise (including vibration) on construction sites. It provides legislation by which local planning authorities can control noise from construction sites, by stopping activities if necessary, to prevent noise disturbance occurring. In addition, it recommends that guidance provided by British Standard (BS) BS 5228:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Parts 1&2'[25], is implemented to ensure compliance with Section 60. BS 5228 is an approved Code of Practice under the Act.

10.3.2 Section 61, Part III of the CoPA refers to prior consent for work on construction sites. It provides a method by which a contractor can apply for consent to undertake construction works in advance. If consent is given, and the stated method and hours of work are complied with, then the local authority cannot take action under Section 60.

10.3.3 Section 72, Part III of the CoPA refers to 'best practicable means' (BPM), which is defined as:

"reasonably practicable, having regards among other things to local conditions and circumstances, to the current state of technical knowledge and to the financial implications'. While 'Means' includes 'the design, installation, maintenance

[24] The Stationery Office Limited. Control of Pollution Act, Chapter 40, Part III. 1974.

[25] British Standards Institution. British Standard 5228-1:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites - Part 1: Noise & British Standard 5228-1:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites - Part 2: Vibration

and manner and periods of operation of plant and machinery, and the design, construction and maintenance of buildings and acoustic structures."

10.3.4 If BPM is applied, then it can provide a defence against prosecution by the consenting body, usually the local authority.

10.3.5 Part 3 of the Environmental Protection Act 1990 (the EPA)[26] contains the main legislation relating to statutory nuisance. A statutory nuisance is *'an unlawful interference with a person's use or enjoyment of land or some right over, or in connection with it'*. Noise emitted from premises so as to be prejudicial to health or a nuisance constitutes a statutory nuisance.

Guidance and Best Practice

10.3.6 The following is a list of relevant BSs and other documents which, as far as practicable, the noise and vibration assessment will be undertaken in accordance with.

- BS 7445-2:1991 'Description and measurement of environmental noise — Part 2: Guide to the acquisition of data pertinent to land use'[27];
- BS 5228:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites' – Part 1: Noise;
- BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'[28]; and
- Design Manual for Roads and Bridges, LA111 'Noise and Vibration' (DMRB)[29].

10.4 Baseline

Baseline environment

10.4.1 The location of the proposed development site and the nearest residential dwelling 'noise sensitive receptors' (NSRs) is in a predominantly rural area, approximately 3 km south-west of Kintore town centre. A minor B-road, the B977, is located to the south-east of the proposed development site and Kintore Substation is located to the north-east of the proposed development site.

10.4.2 Based on the above, it is considered likely that baseline sound levels at the nearest residential NSRs to the proposed development site will be relatively low as is typical for rural locations away from transport links and sites of commercial/industrial activity.

10.4.3 Due to the relatively close proximity of the Kintore Substation to some residential NSRs, the acoustic environment may be affected by increased noise levels at 100 Hz and harmonics thereof than would otherwise be the case, associated with magnetostriction effects typical of that from electrical infrastructure.

Proposed approach to surveys and further baseline data collection

10.4.4 In order to quantify baseline sound levels at the nearest residential NSRs to the proposed development site, a sound level survey will be undertaken that will comprise deployment of four unattended sound level surveys over a period of up to seven days, covering at least one weekend period.

[26] The Stationery Office Limited. Environmental Protection Act, Chapter 43, Part III. 1990.

[27] British Standards Institution. British Standard 7445-2:1991 Description and measurement of environmental noise - Part 2: Guide to the acquisition of data pertinent to land use.

[28] British Standards Institution. British Standard 4142:2014+A1:2019. Methods for rating and assessing industrial and commercial sound.

[29] Highways England. Design Manual for Roads and Bridges, LA111 'Noise and Vibration' (2020).

10.4.5 Measured data will take account of weather conditions during the survey to obtain a dataset from which representative baseline environmental noise levels for the assessment will be derived, consistent with BS 7445-2.

10.4.6 Proposed survey locations will include dwellings, or areas, representative of the nearest NSRs to the north, east, south and west of the proposed development site.

10.4.7 Preferably access to identified survey locations for the deployment of the survey equipment will be agreed with landowners in advance of the survey work commencing. If this cannot be facilitated, then the 'fall back' option would be to arrive on the day of survey deployment and attempt to agree access in person. If access cannot be agreed on the day, a series of attended short-term surveys would be undertaken during the daytime (07:00 to 19:00 hours), evening (19:00 to 23:00 hours) and night-time (23:00 to 07:00 hours) periods.

10.5 Approach to assessment

Assessment criteria

10.5.1 The significance of an effect is determined based on the magnitude of an impact and the sensitivity of the receptor affected by the impact. This section describes the proposed criteria that will be applied in the noise and vibration assessment to characterise the magnitude of potential impacts and sensitivity of receptors.

Construction noise

10.5.2 The magnitude of construction noise impacts will be determined in accordance with Annex E of BS 5228-1:2009+A1:2014. The criteria for assessing noise impact from construction works have been based on Example Method 2 contained within Annex E.3.3 of BS 5228-1:2009+A1:2014.

Construction traffic

10.5.3 The magnitude of construction road traffic noise impacts will be determined in accordance with the DMRB classification of magnitude of noise impacts in the short-term. These DMRB criteria best reflect the temporary nature of the construction impacts and allow for a robust, worst case assessment of response to construction traffic noise albeit the DMRB mostly relates to traffic on new trunk roads and motorways rather than increases in traffic on existing roads.

Operational noise

10.5.4 The calculation of specific sound levels at the nearest NSRs, associated with the operation of the proposed development, will be made using the methodology in ISO 9613-2:1996 'Acoustics – Attenuation of sound during propagation outdoors Part 2: General method of calculation'[30].

10.5.5 The calculation will be based on information provided regarding the proposed development. Where acoustic data for specific proposed plant and/or activity is unknown, the assessment will include assumptions based on professional judgement and experience of assessing the operational of similar projects.

10.5.6 The magnitude of impact of the noise effects associated with the operation of the proposed development will be determined based upon the general methodology contained within BS 4141:2014+A1:2019.

Sensitivity of receptors

10.5.7 There is no nationally adopted guidance on how the sensitivities of NSRs should be determined. Therefore, for this assessment, the sensitivity of classes of receptor is defined through consideration of the vulnerability, recoverability and value/importance of that receptor class. The criteria for defining noise sensitivity are described in Table 10.1.

[30] International Standard ISO 9613-2:1996. Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation.

Table 10.1: Criteria for receptor sensitivity

Sensitivity	Typical NSRs identified
Very High	Subject to particular circumstances
High	Schools, churches and concert halls etc.
Medium	Residential properties, hotels, hospitals, nursing homes and care homes and sites of historic or cultural importance
Low	Area used primarily for leisure activities, including Public Rights of Way (PRoW), sports facilities, offices and retail businesses
Negligible	All other areas such as those used primarily for industrial or agricultural purposes

Significance of effect

10.5.8 The significance of the effect with regards to noise will be determined by correlating the magnitude of the impact and the sensitivity of the receptor.

10.5.9 A significance of no change is considered to be below the 'no observed effect level' (NOEL). A significance of negligible or minor is considered to be below the 'lowest observed adverse effect level' (LOAEL). A significance of moderate is considered to be between the LOAEL and the 'significant observed adverse effect level' (SOAEL). A significance of major or substantial is considered to be above the SOAEL.

10.5.10 For the purpose of the assessment, any effects with a significance level of minor or less will be considered to be not significant in EIA terms. Effects with a significance level of moderate will not automatically considered to be significant. Further consideration of the assessment outcome will be given where a moderate effect is predicted before a determination of whether an effect is significant/not significant in EIA terms. Effects with a significance level of major will be considered to be significant in EIA terms.

Geographical scope

10.5.11 Noise and vibration levels decrease over distance. As the design of the proposed development will include mitigation measures to avoid significant effects at the nearest NSRs, the geographic scope of the noise and vibration assessment, for site-based activity, will be limited to an area up to and including the nearest NSRs.

10.5.12 With regard to offsite activity, i.e. construction traffic movements on the local road network, the geographic scope of the noise and vibration assessment will include sections of road for which the 18-hour 'annual average weekday traffic' (AAWT) movements are anticipated to increase by at least 10% above baseline. This is on the basis that an increase of less than 10% would result in a negligible increase in noise.

Temporal scope

10.5.13 The temporal scope of the noise and vibration assessment will include the construction and operational phases of the proposed development.

10.5.14 The consent is not expected to be time-limited. As such, a decommissioning assessment is proposed to be scoped out.

10.6 Embedded mitigation and enhancement measures

10.6.1 The likelihood for adverse noise and/or vibration effects associated with the construction and operation of the proposed development will be minimised through the implementation of embedded, or inherent, mitigation.

10.6.2 At the construction stage, activities will be undertaken in following 'best practicable means' (BPM), with modern and well maintained plant utilised. A 'construction and environmental management plan' (CEMP) will be prepared in advance of works commencing.

10.6.3 In the event that significant noise and/or vibration effects are predicted to occur even with the embedded mitigation, the requirement for further mitigation measures will be considered.

10.6.4 This may include measures such as temporary barriers during the construction phase, or installation of permanent barriers or plant enclosures during the operational phase.

10.7 Scope of environmental impacts and effects

Construction

10.7.1 Construction of the proposed development, both on-site activity and off-site road traffic movements, has the potential to cause levels of noise and/or vibration at NSRs that could resulting in adverse effects. As such, an assessment of construction noise effects will be scoped in to the assessment.

10.7.2 However, based on the expected construction methodology and the rapid attenuation of vibration with distance from the source, significant vibration effects at sensitive receptors are considered unlikely. On this basis, a construction vibration assessment is proposed to be scoped out of this assessment. The potential exception would be if percussive piling were required in proximity to any sensitive receptors, such as residences occupied at the time of construction. This is not currently expected and is unlikely, but would be re-confirmed at the EIA stage. If necessary an assessment of vibration impacts and mitigation would be undertaken, in consultation with the local planning authority at the EIA stage.

10.7.3 Where construction road traffic movements are anticipated to increase the total flow by at least 10%, a construction road traffic noise assessment will be scoped in and undertaken.

Operation

10.7.4 Operation of the proposed development, both on-site activity and if applicable any significant level of off-site road traffic movements, has the potential to cause levels of noise and/or vibration at NSRs that could resulting in adverse effects. As such, an assessment of operational noise effects will be scoped in to the assessment.

10.7.5 However, significant vibration effects are considered very unlikely, as no significant vibration sources are expected in proximity to sensitive receptors. The main plant items with the potential for vibration are the hydrogen export compressors, which are anticipated to be located within the site well away from sensitive receptors. On this basis, an assessment of operational vibration effects is proposed to be scoped out of this assessment; however the potential for vibration effects will be considered as an environmental constraint in optioneering the site layout design and a further assessment could be undertaken at the EIA stage, in consultation with the local planning authority, should that become necessary.

10.7.6 On the basis that there would be minor operational road traffic movements, not expected to increase the total flow by at least 10% on a road link, an assessment of operational road traffic noise effects is proposed to be scoped out of this assessment.

10.8 Limitations and uncertainties

10.8.1 To ensure transparency within the EIA process, the following limitations and assumptions have been identified.

Construction methodology

10.8.2 Depending on the availability of the proposed construction methodology and acoustic data of proposed noise-generating plant, the assessment may be undertaken based on assumed data, informed through professional

judgement and experience. If this is necessary, assumptions will err on the side of caution, to allow for a robust assessment.

Operational sound source data

10.8.3 A quantitative assessment will be undertaken based on source levels provided by the plant manufacturer and measurement data on similar types of equipment. Where necessary, assumptions will be made based on the maximum design envelope parameters.

Prediction methods and assessment

10.8.4 There are uncertainties in any prediction methodology. International Organization for Standardisation (ISO) 9613 Part 2 provides a method for predicting acoustic propagation outdoors. The method is applicable in practice to a great variety of sound sources and environments. It is applicable (directly or indirectly) to most situations including industrial sound sources, construction activities and many other ground-based sound sources. The estimated accuracy for values of the average downwind sound pressure level is stated as +/-3 dB for a mean source/receptor height of up to five metres and source/propagation separation distance of up to 1 km. For a mean source height between 5 and 30 m, the estimated accuracy is given as +/-1 dB for a source/propagation separation distance of 0 to 100 m and +/- 3 dB for a source/propagation separation distance of >100 m. This is a standard approach and is considered to be an acceptable prediction methodology.

10.8.5 With regard to subjective response, the noise standards adopted for the assessment will have been based upon the subjective response of the majority of the population or will be based upon the most likely response of the majority of the population. This is considered to be the best that can be achieved in a population of varying subjective response which will vary dependent upon a wide range of factors.

10.9 Inter-related effects

10.9.1 Potential inter-related impacts from construction and operational noise will be considered in the ecology and population & health assessments, where applicable. The inter-relationship with traffic generation has been noted above.

10.10 Cumulative effects

10.10.1 This assessment will be completed through communication with stakeholders to identify relevant projects and between the environmental topic teams to identify shared receptors.

10.10.2 The risk for cumulative adverse effects will primarily be dependent on the proximity of the cumulative development to the NSRs closest to the proposed development. Any cumulative development, either noise generating or noise sensitive (i.e. residential or educational etc.) within 1 km of the identified NSRs would be considered.

10.10.3 In addition, if any cumulative development results in a large increase in offsite traffic movements of above 10% on any roads also used by the proposed development, the potential for cumulative traffic noise effects will also be considered.

10.11 Summary of proposed EIA scope

Table 10.2: Summary of noise and vibration impacts proposed to be scoped in to the EIA

Impact pathway	Justification
Construction	
Site activity noise	Potential for high levels of construction activity noise to affect medium or high sensitivity NSRs.
Road traffic noise	If construction flows greater than 10% of baseline road traffic flows, potential for high levels of noise to affect medium or high sensitivity NSRs.
Operation	

Impact pathway	Justification
Site activity noise	Potential for high levels of operational activity noise to affect medium or high sensitivity NSRs.

Table 10.3: Summary of noise and vibration impacts proposed to be scoped out of the EIA

Impact pathway	Justification
Construction	
Site activity vibration	No significantly high vibration levels at source and relatively large distance between vibration activity and NSRs; low risk for adverse vibration impact.
Operation	
Site activity vibration	No significantly high vibration levels at source and relatively large distance between vibration activity and NSRs; low risk for adverse vibration impact.
Road traffic noise	Low operational road traffic flows, expected to be less than 10% of baseline.

11 Air Quality

11.1 Introduction

11.1.1 This section considers the likely effects of the proposed development during the construction and operational phases upon air quality in proximity to the proposed development and the proposed scope of the air quality assessment.

11.1.2 The Kintore Hydrogen Plant would be located in Aberdeenshire Council, which does not have any air quality management areas (AQMA). There are no routine operational sources of air pollutant emissions from the hydrogen plant and it is unlikely that the indicative criteria for requiring an air quality assessment of traffic set out in EPUK and IAQM guidance (2017)[31], a change of 500 light duty vehicles (LDVs) annual average daily traffic (AADT) movements and 100 heavy duty vehicle (HDV) AADT movements, will be exceeded.

11.1.3 It is therefore proposed that a streamlined Air Quality Assessment (AQA) be conducted for the proposed development to set this out; this would take into account the background and future baseline air quality. This assessment will incorporate the production of a Dust Assessment and Dust Management Plan (DMP) Draft.

11.1.4 This section has been produced by the Air Quality Team at Savills. This is led by Dan Smyth, who has over 30 years of experience as an environmental and air quality specialist and is Director of Environment and Infrastructure at Savills.

11.2 Consultation to date

11.2.1 Consultation with respect to air quality has not been undertaken prior to submission of this EIA Scoping Report.

11.3 Legislative or policy requirements and technical guidance

11.3.1 Air Quality Standards and Objectives are established through a range of legislation and policy guidelines as set out below.

11.3.2 Air Quality (Scotland) Regulations 2000[32], the Air Quality (Scotland) Amendment Regulations 2002[33] and the Air Quality (Scotland) Amendment Regulations 2016[34] are underpinned by the Local Air Quality Management Policy Guidance: PG (S) (23)[35] and the Local Air Quality Management Technical Guidance (TG22)[36]. Air Quality Objectives (AQOs)[37] define the targeted ambient atmospheric concentrations of NO_2, PM_{10} and $PM_{2.5}$ not to exceed, which applies to both the construction and operational phases of the proposed development.

11.3.3 Air pollutants defined under these regulations and guidance for assessment are nitrogen dioxide (NO_2), particulate matter in two size fractions (PM_{10} and $PM_{2.5}$), lead, carbon monoxide (CO), sulphur dioxide (SO_2), benzene and 1,3 butadiene.

[31] EPUK and IAQM. (2017, January). Air Pollution and Planning: Land-Use Planning and Development Control: Planning for Air Quality – January 2017. Retrieved from Environmental Protection UK: https://www.environmental-protection.org.uk/policy-areas/air-quality/air-pollution-and-planning

[32] Scottish Statutory Instruments. The Air Quality (Scotland) Regulations 2000 No. 97.

[33] Scottish Statutory Instruments. The Air Quality (Scotland) Amendment Regulations 2002 No. 297.

[34] Scottish Statutory Instruments. The Air Quality (Scotland) Amendment Regulations 2016. ISBN 978-0-11-103083-7

[35] Scottish Government. Part IV of the Environment Act 1995. Local Air Quality Management Policy Guidance PG (S) (23). March 2023.

[36] Defra. Local Air Quality Management Technical Guidance (TG22). August 2022.

[37] Air Quality (Scotland) Amendment Regulations 2016.

11.4 Baseline

Baseline environment

11.4.1 Air quality in the area surrounding the proposed development is generally very good, as stated within the most recent Annual Progress Report (APR)[38] from Aberdeenshire Council. This is due to the rural setting of the site, with relatively few residential dwellings and consequently relatively low levels of traffic in the area.

Proposed approach to surveys and further baseline data collection

11.4.2 Air quality monitoring data in proximity to the site will be obtained from publicly available sources including Aberdeenshire Council and the Department for Environment Food and Rural Affairs (Defra).

11.4.3 The baseline conditions for the proposed site will be identified as part of the AQA through the use of the most recent APR from Aberdeenshire Council, and the background mapping data for local authorities from Defra and the Scottish Air Quality Database (SAQD) project[39].

11.4.4 Following the completion of the baseline section, appropriate receptors and ecological receptors which could potentially be affected by the proposed development will be identified. There are no internationally, nationally or locally designated nature conservation sites within a 5 km radius of the application boundary, which is an appropriate radius of search for this project.

11.5 Approach to assessment

Relevant air pollutants

11.5.1 Of the relevant air pollutants listed in paragraph 11.3.3, there is potential for the combustion-related pollutants NO_2, PM_{10} and $PM_{2.5}$ to be emitted from road traffic generated by the proposed development. The proposed development does not include point-source combustion emissions. Dust raised during construction could also contribute to PM_{10} emissions or nuisance effects from coarser particulate matter.

11.5.2 Controlled venting of excess oxygen and a small proportion of hydrogen (when required, typically during start-up and shut-down) will be required at the proposed development. Oxygen and hydrogen are not air pollutants requiring any AQA under the regulations or guidance. Given that hydrogen is very much lighter than air it will rise rapidly, dissipate, be oxidised to water and would not be explosive. Safety management of venting will be controlled by the HSC, COMAH authorisation and PPC Permit as set out earlier in this Scoping Report. Nevertheless, the Air Quality chapter is proposed to qualitatively describe the dissipation and oxidisation to water of vented hydrogen.

Assessment criteria

11.5.3 Scoping of potential impacts during the construction and operational phases is based 2017 planning guidance provided by EPUK and IAQM. The impact of existing sources in the local area and the impacts of the proposed development on the local area are considered. The guidance indicates that the following factors should be taken into account, where relevant; several are not relevant in the case of the proposed development as identified below.

- the background and future baseline air quality and whether this will be likely to approach or exceed the values set by air quality objectives;
- the presence and location of AQMA as an indicator of local hotspots where the air quality objectives may be exceeded (there is no AQMA in the study area);

[38] Aberdeenshire Council. 2022 Air Quality Annual Progress Report (APR). September 2022.

[39] Scottish Air Quality. Maps of annual concentrations [online]. Available at: https://www.scottishairquality.scot/data/mapping Accessed: 04/08/2023.

- the presence of a heavily trafficked road, with emissions that could give rise to sufficiently high concentrations of pollutants (in particular NO_2), that would cause unacceptably high exposure for users of the new development (no road of this nature has been identified, so this will not be relevant); and,
- the presence of a source of odour and/or dust that may affect amenity for future occupants of the development (this criterion is not relevant).

- The EPUK and IAQM set out seven indicative criteria for requiring an AQA and as such, would be considered in determining the need for an AQA, as shown in Table 11.1. None of these criteria are invoked in this case, which provides a strong indication that a detailed AQA is not required. The expected non-exceedance of the traffic flow thresholds will be reconfirmed at the EIA stage when traffic modelling is undertaken for the Transport and Access chapter.

Table 11.1: Indicative criteria for requiring an AQA as set out by EPUK and IAQM

If the development will:	Indicative criteria to proceed to an Air Quality Assessment [a]
1. Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors. (LDV = cars and small vans	A change of LDV flows of: - more than 100 AADT within or adjacent to an AQMA - more than 500 AADT elsewhere.
2. Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors. (HDV = goods vehicles + buses >3.5t gross vehicle weight).	A change of HDV flows of: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere.
3. Realign roads, i.e. changing the proximity of receptors to traffic lanes.	Where the change is 5 m or more and the road is within an AQMA.
4. Introduce a new junction or remove an existing junction near to relevant receptors.	Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate, e.g. traffic lights, or roundabouts.
5. Introduce or change a bus station.	Where bus flows will change by: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere.
6. Have an underground car park with extraction system.	The ventilation extract for the car park will be within 20 m of a relevant receptor. Coupled with the car park having more than 100 movements per day (total in and out).
7. Have one or more substantial combustion processes, where there is a risk of impacts at relevant receptors. NB. this includes combustion plant associated with standby emergency generators (typically associated with centralised energy centres) and shipping.	Typically, any combustion plant where the single or combined NO_x emission rate is less than 5 mg/s is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates. Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable.

[a] *As a guide, the 5 mg/s criterion equates to a 450 kW ultra low NO_x gas boiler or a 30kW CHP unit operating at <95mg/Nm^3. Users of this guidance should quantify the NO_x mass emission rate from the proposed plant, based on manufacturers' specifications and operational conditions.*

11.5.4 In addition, with respect to the construction phase, IAQM, guidance on impacts from dust emissions[40] has been considered. The proposed development would cause dust impacts during construction with the potential for significant

[40] IAQM (February 2014) Guidance on the assessment of dust from demolition and construction, version 1.1.

effects requiring mitigation, so a dust risk assessment and mitigation via a Dust Management Plan are proposed to tbe scoped in. The approach is set out as follows.

Magnitude of impact

11.5.5 The assessment will refer to the 2014 IAQM Dust Guidance. As outlined in the guidance, there can be four types of activities on construction sites:

- demolition;
- earthworks;
- construction; and,
- trackout.

11.5.6 The potential impact on dust soiling and human health are proposed to be treated as being 'high risk' in order to obtain mitigation measures for the worst-case scenario in which the measures which constitute good or best practice would be applied. As such, the general measures applicable to a high-risk site would be proposed to be applied, adjusted as necessary to ensure that the controls proposed are proportionate to the location.

11.5.7 The magnitude of impacts from construction are identified within IAQM Dust Guidance, including impacts during the site preparation, earthworks, construction and trackout during the construction phase. Magnitude of impact from dust emissions is based on the scale of anticipated works, categorised into Small, Medium, or Large as shown in Table 11.2.

Table 11.2: Magnitude of risk from dust emissions as set out in IAQM guidance

Dust emission magnitude	Features of the source of dust emissions
Small	**Demolition**: Total building volume <20,000 m^3 , construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10 m above ground, demolition during wetter months; **Earthworks**: Total site area <2,500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time formation of bunds <4 m in height, total material moved <20,000 tonnes, earthworks during wetter months **Construction**: Total building volume <25,000 m^3, construction materal with low potential for dust release (e.g. metal cladding or timber); **Trackout**: 3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length
Medium	**Demolition**: Total building volume 20,000 m^3 – 50,000 m^3 , potentially dusty construction material, demolition activities 10-20 m above ground level; **Earthworks**: Total site area 2,500 m^2 – 10,000 m^2 , moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m - 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes; **Construction**: Total building volume 25,000 m^3 – 100,000 m^3 , potentially dusty construction material (e.g. concrete), on site concrete batching; **Trackout**: 10-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m.
Large	**Demolition**: Total building volume >50,000 m^3 , potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level; **Earthworks**: Total site area >10,000 m^2 , potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes; **Construction**: Total building volume >100, 000 m^3 , on site concrete batching, sandblasting; **Trackout**: >50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m.

Sensitivity of receptors

11.5.8 Table 11.3 and Table 11.4 detail the IAQM method of categorising sensitivity of people and property receptors to dust soiling effects and PM_{10}, respectively. As stated within the IAQM guidance, there is no unified sensitivity classification scheme that covers the range of potential effects on receptors.

11.5.9 The proposed development is located in Kintore, Aberdeenshire in an agricultural setting. The area is sparsely populated, with approximately 40 dwellings within a 1 km radius of the electrolysis site. Based on the criteria in Table 11.3 and Table 11.4, these residential receptors will be treated as high sensitivity.

11.5.10 The nearest AQMA to the proposed development is in Aberdeen City, approximately 18 km south east of Kintore, within the authority of Aberdeen City Council. Given the distance to Aberdeen, this can be discounted as a consideration for the AQA.

11.5.11 As there are no ecological designated sites within 5 km of the proposed development, ecological effects can be scoped out of the AQA, so no sensitivity of ecological receptors is defined.

Table 11.3: Sensitivities of people and property receptors to dust soiling effects

Sensitivity	Receptor detail
Low	• the enjoyment of amenity would not reasonably be expected; or • property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or • there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. • indicative examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads
Medium	• users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or • the appearance, aesthetics or value of their property could be diminished by soiling; or • the people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. • indicative examples include parks and places of work.
High	• users can reasonably expect enjoyment of a high level of amenity; or • the appearance, aesthetics or value of their property would be diminished by soiling; and • the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. • indicative examples include dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms.

Table 11.4: Sensitivities of people and property receptors to PM_{10}

Sensitivity	Receptor detail
Low	• locations where human exposure is transient. • indicative examples include public footpaths, playing fields, parks and shopping streets.
Medium	• locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). • indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.

Sensitivity	Receptor detail
High	• locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). • Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.

Significance of effect

11.5.12 Change in concentration of emissions relative to the AQA is considered with the long term average concentration at identified receptors to determine the impact descriptor stated in the 2017 EPUK and IAQM guidance.

11.5.13 Significance of dust effects will be determined based on the magnitude of the impact and the sensitivity of the receptor which may be impacted. This level of significance will only be assigned to the effect once mitigation for the construction activity is considered. The level of effect which is deemed significant is set out within IAQM (2011)[41] guidance, presented in Table 11.5.

Table 11.5: Significance of effects for each activity with mitigation

Sensitivity of surrounding area	Risk of site giving rise to dust effects		
	Low	Medium	High
Low	Negligible	Negligible	Negligible
Medium	Negligible	Negligible	Negligible
High	Negligible	Negligible	Slight adverse
Very High	Negligible	Slight adverse	Slight adverse

Geographical scope

11.5.14 Emissions from the proposed development will be assessed on a spatial scale of a 350 m radius from the site, the maximum distance for dust effects a set out in the IAQM guidance.

11.5.15 The potential for hydrogen emissions from controlled venting will be considered along with its likely duration and potential significance. This primary driver for this is likely to be safety, so the spatial scale is likely to be confined to a few hundred metres and the temporal scale is likely to be up to a few tens of seconds or a few minutes. This will be assessed qualitatively, drawing on any safety case information that is needed at this design stage.

Temporal scope

11.5.16 The assessment will assess the impact of the proposed development on air quality during the construction phase from dust emissions.

11.5.17 No significant operational-phase effects on air quality are considered likely and no assessment, other than a qualitative description of hydrogen venting, is proposed. While there are no proposals to decommission the proposed development, this would effectively be the reverse of construction, which could be completed in a shorter timescale. On this basis no further assessment of decommissioning is proposed.

[41] IAQM (December 2011). Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance.

11.6 Embedded mitigation and enhancement measures

11.6.1 The proposed Dust Assessment and DMP Draft will identify potential measures to mitigate dust from affecting air quality.

11.6.2 The IAQM's 2014 Construction Dust Guidance provides an evaluation matrix which allows for the identification of potential risks of dust generation and associated levels of mitigation which will be required. As set out above, good practice dust management measures will be provided, where proportionate to the site, for a 'high risk' type development. The guidance indicates that this will typically reduce dust effects to a non-significant level.

11.6.3 A comprehensive Construction Environmental Management Plan and Construction Traffic Management Plan will be in place for the construction phase of the proposed development.

11.7 Scope of environmental impacts and effects

Construction

11.7.1 Construction activities and traffic movements have the potential to result in emissions of exhaust gases and dust, resulting in adverse effects.

11.7.2 It is expected that traffic flows will fall below the thresholds for the assessment of the effects of exhaust gas emissions, which will be scoped out on this basis; this will be reconfirmed at EIA stage on the basis of the traffic modelling to be undertaken to confirm the flows expected.

11.7.3 An assessment of the potential effects of dust arising from construction activities will be scoped in to the assessment, following the EPUK and IAQM guidance as set out above.

Operation

11.7.4 Significant operational air quality effects from air pollutant emissions are considered very unlikely given the nature of the proposed development. Operational traffic movements are expected to fall below thresholds set out in Table 11.1 and there are no routine combustion or other sources of emissions associated with the proposed development. On this basis, no complex air quality modelling will be required.

11.7.5 During the operational phase, hydrogen may be vented over short periods (typically expected to be a few tens of seconds to a few minutes) during shutdown for cold standby phases. Hydrogen is not an air pollutant, but a qualitative description of the dissipation of hydrogen from vents and oxidation to water will be included in the assessment. This will cross-refer to information about the safe management and regulation of hydrogen and oxygen venting to be included in the planning application.

11.8 Limitations and uncertainties

11.8.1 Background air quality is variable, with a general trend of improvement over time. Trends from several years' of monitoring data will be reviewed, from multiple monitoring points and published data sources, to establish the future baseline.

11.8.2 The construction activities and plant will be variable over the phases of construction. When assessing dust impacts, a maximum-case scenario for dust generation will be assumed, to identify proportionate mitigation strategies proposed will be suitable for all potential activities.

11.9 Inter-related effects

11.9.1 Potential inter-related effects which are relevant to air quality are transport (traffic generation) and the assessment of population and health impacts. Traffic modelling will be referred to in order to confirm that traffic levels are below the

thresholds at which any significant air pollutant effects are considered likely. The population and health chapter will refer to the assessment and mitigation of dust risk.

11.9.2 As there are no applicable designated ecological sites with air quality sensitivity within 5 km of the proposed development, no inter-related effects between air quality and ecology are expected.

11.10 Cumulative effects

11.10.1 For the construction phase, the zone of interest (ZoI) for air quality will be the road routes with traffic source-air pollutants (the B977 and the A96 from Kintore Station to Denhead) and any large-scale construction projects with potential cumulative dust impacts in proximity to the proposed development, in a ZoI of 700 m (i.e. any potential overlap of dust impact areas).

11.10.2 No cumulative effects during operation are considered likely.

11.10.3 The assessment would take in to consideration other applicable proposed developments identified from the longlist during the cumulative effects assessment (CEA). It is expected, based upon the location of sites in the longlist at scoping stage, that cumulative effects upon air quality are unlikely, so cumulative development effects are expected to be assessed qualitatively.

11.11 Summary of proposed EIA scope

11.11.1 Air quality impacts are expected to be minimal, and largely below thresholds set out in guidance for a AQA. The main potential impact route is dust risk during construction, which will be assessed with a streamlined AQA to recommend good-practice mitigation measures that are proportionate to this development. The dissipation and conversion to water of minor quantities of hydrogen released by controlled venting in operation will also be described qualitatively.

Table 11.6: Summary of air quality impacts proposed to be scoped in to the EIA

Impact pathway	Justification
Construction	
Dust emissions from construction activities and site/delivery traffic movements	Scale of development is such that there is potential for nuisance dust impacts and mitigation measures should be identified.
Operation	
Vented hydrogen	Potential controlled release of minor quantities of hydrogen is not an air quality impact but will be described qualitatively to explain its dispersion and conversion to water.

Table 11.7: Summary of air quality impacts proposed to be scoped out of the EIA

Impact pathway	Justification
Construction	
Complex air quality dispersion modelling of traffic-source air pollutants	Traffic movements are expected to fall below thresholds for assessment set out in the applicable guidance, described out in Table 11.1.
Operation	
Complex air quality modelling of traffic-source, point-source or other air pollutants from combustion	Traffic movements are expected to fall below thresholds for assessment set out in the applicable guidance, described out in Table 11.1. The proposed development will have no point-source air pollutant emissions or combustion processes in operation.

12 Climate Change

12.1 Introduction

12.1.1 This chapter of the ES Scoping Report has been produced by Savills and presents the proposed scope of assessment for climate change effects.

12.1.2 Climate change in the context of EIA can be considered broadly in two parts:

- the impact of greenhouse gas emissions (GHGs) caused directly or indirectly by the proposed development, which contribute to climate change; and
- the potential impact of changes in climate on the proposed development, which could affect it directly or could modify its other environmental impacts.

12.1.3 Assessment of GHG emission impacts is proposed to be scoped in.

12.1.4 Assessment of climate risks to the proposed development is proposed to be scoped out, with the exception of flood risk which will be assessed including a climate change allowance in the Water Environment chapter.

12.1.5 Assessment of inter-related effects due to climate change in the future baseline is proposed to be scoped in, and assessed where relevant in each environmental topic as discussed in Sections 5.2 and 5.6, above.

12.2 Consultation to date

12.2.1 Consultation with respect to climate change has not been undertaken prior to submission of this EIA Scoping Report.

12.3 Legislative or policy requirements and technical guidance

12.3.1 Key climate change legislation is the Climate Change Act 2008 (amended in 2019) and the Climate Change (Scotland) Act 2009 as amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019, which set carbon budgets for the UK and Scotland in support of achieving net zero GHG emissions by 2045 and 2050 respectively.

12.3.2 Related legislation and policy concerns the necessary steps and infrastructure investment required to achieve this, in the areas of energy generation decarbonisation, circular economy and sustainable resource management, transport decarbonisation and potential carbon capture and sequestration. Among this, the UK Hydrogen Strategy sets out the approach to developing the hydrogen sector in the UK to meet the ambition of 10 GW of low carbon hydrogen production capacity by 2030[42]. While not itself policy, the recommendations to government made by the Climate Change Committee are also very relevant.

12.3.3 The main guidance used for the assessment of GHG emissions will be the Institute of Environmental Management and Assessment (IEMA) guide 'Assessing Greenhouse Gas Emissions and Evaluating their Significance'[43] .

12.4 Baseline

Baseline environment

12.4.1 The current baseline of GHG emissions is the existing greenfield site. The land which the proposed development will occupy has no significant direct baseline GHG emissions, being largely agricultural land: while agricultural activity does

[42] HM Government (August 2021) UK Hydrogen Strategy.

[43] IEMA (2022): Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance. 2nd Edition. [Online] Available at: https://www.iema.net/resources/blog/2022/02/28/launch-of-the-updated-eia-guidance-on-assessing-ghg-emissions, accessed: 06/04/22

cause direct and indirect emissions or in some cases sequestration (for example from ruminants, fuel and fertiliser use, and changes in soil carbon stocks from grass or crop growth), these are of a low intensity relative to industrial or other developed land uses. Nor is it a significant carbon store, as the land does not include peat deposits or extensive woodland; soil carbon and vegetation stocks are therefore relatively minor.

12.4.2 The current baseline climatic is the regional climate and weather patterns, recorded in Met Office data, but in the context of trends in global climate changes affecting the UK climate, which are sufficiently well understood to be considered part of the known baseline. The future baseline with climate change will be assessed where relevant in each environmental topic chapter as discussed in Section 5.2, above.

Proposed approach to surveys and further baseline data collection

12.4.3 Baseline data collection will be from published documents and operator information. No field survey is required.

12.5 Approach to assessment

Assessment method overview

12.5.1 Direct and indirect GHG emissions will be calculated for construction and operation of the proposed development by applying published emissions factors which relate a given level of activity, a physical or chemical process, or amount of fuel, energy or materials used to the mass of GHGs released as a consequence.

12.5.2 This will comprise (a) the GHG emissions arising from the proposed development, (b) GHG emissions that it displaces or avoids, compared to the current or future baseline, and hence (c) the net impact on climate change due to these changes in GHG emissions overall. The proposed development cannot operate in isolation and would be functionally linked to its electricity and water supplies and to the gas transmission network for hydrogen export, so the boundary for the assessment of GHG emissions will be on that basis: i.e. including the carbon intensity of supplying the power and water inputs for hydrogen production and the avoided GHGs, compared to the future baseline, from the export and use of hydrogen as a low-carbon fuel.

12.5.3 Annual operational GHG emissions over the proposed operating lifetime (taking into account changes in the future baseline such as grid electricity generation decarbonisation, where feasible) will be presented in the EIAR. Emissions factors and projections published by BEIS and Defra or other literature sources will be used as required.

12.5.4 The GHGs considered in this assessment will be those in the 'Kyoto basket' of global warming gases expressed as their CO_2-equivalent global warming potential (GWP), in units of tCO_2e. GWPs used will be typically the 100-year factors in the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report or as otherwise defined in emissions factors and for national reporting under the United Nations Framework Convention on Climate Change (UNFCCC).

12.5.5 The main guidance used for the assessment of GHG emissions will be the Institute of Environmental Management and Assessment (IEMA) guide 'Assessing Greenhouse Gas Emissions and Evaluating their Significance'[43] .

12.5.6 The principles of PAS2080 Section 7[44] are also relevant to defining the potentially relevant lifecycle stages to assess.

Magnitude of impact

12.5.7 As GHG emissions can be quantified directly and expressed based on their GWP, the magnitude of impact will be reported numerically as tCO_2e rather than requiring a descriptive scale.

[44] British Standards Institution (BSI) (2016) PAS2080:2016 Carbon Management in Infrastructure. BSI, London.

Sensitivity of receptors

12.5.8 GHG emissions have a global effect rather than directly affecting any specific local receptor to which a level of sensitivity can be assigned. The global atmospheric mass of the relevant GHGs and consequent warming potential, expressed in tCO_2e, will therefore be treated as a single receptor of high sensitivity. It is considered to be of high sensitivity given the importance of the global climate as a receptor, the limited and decreasing capacity to absorb further GHG emissions without severe climate change resulting, and the cumulative contribution of GHG emission sources.

Significance of effect

12.5.9 The IEMA assessment guidance for GHG emissions describes five levels of significance for emissions resulting from a development, each based on whether the GHG emission impact of the development will support or undermine a science-based 1.5°C compatible trajectory towards net zero. To aid in considering whether effects are significant, the guidance recommends that GHG emissions should be contextualised against pre-determined carbon budgets, or applicable existing and emerging policy and performance standards where a budget is not available or not meaningfully applicable at the scale of development assessed. It is a matter of professional judgement to integrate these sources of evidence and evaluate them in the context of significance.

12.5.10 Taking the guidance into account, the following will be considered in contextualising the proposed development's GHG emissions:

- The magnitude of gross and net GHG emissions as a percentage of national and local carbon budgets (where feasible);
- The GHG emissions intensity of the proposed development against future baseline emissions intensity energy production and use, and projections or policy goals for future changes in that baseline; and
- Whether the proposed development contributes to, and is in line with, the applicable UK And Scotland policy for GHG emissions reductions, where this policy is consistent with science-based commitments to limit global climate change to an internationally-agreed level (as determined by the UK's current NDC to the UNFCCC).

12.5.11 Effects from GHG emissions will be described as adverse, negligible or beneficial based on the following definitions, which closely follow the examples in Box 3 of the IEMA guidance.

- **Major adverse**: the proposed development's GHG impacts would not be compatible with the UK's or Scotland's 1.5°C-aligned net zero trajectory. Its GHG impacts would not be mitigated, or would be compliant only with do-minimum standards set through regulation. The proposed development would not provide further emissions reductions required by existing local and national policy for projects of this type. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's or Scotland's trajectory towards net zero.
- **Moderate adverse:** the proposed development's GHG impacts would not be fully compatible with the UK's or Scotland's 1.5°C-aligned net zero trajectory. Its GHG impacts would be partially mitigated and may partially meet the applicable existing and emerging policy requirements, but it would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type. A project with moderate adverse effects falls short of fully contributing to the UK's or Scotland's trajectory towards net zero.
- **Minor adverse**: the proposed development's GHG impacts would be compatible with the UK's or Scotland's 1.5°C-aligned net zero trajectory and would be fully consistent with up-to-date policy and good practice emissions reduction measures. A project with minor adverse effects is fully in line with measures necessary to achieve the UK's or Scotland's trajectory towards net zero.
- **Negligible**: the proposed development would achieve emissions mitigation that goes well beyond existing and emerging policy compatible with the 1.5°C-aligned net zero trajectory, such that radical decarbonisation or net zero is achieved well before 2050 and before 2045 for Scotland. A project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions.

- **Beneficial**: the proposed development would result in emissions reductions from the atmosphere, whether directly or indirectly, compared to the without-project baseline. As such, the net GHG emissions would be below zero. A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.

12.5.12 Major and moderate adverse effects and beneficial effects will be defined as **significant**.

12.5.13 Minor adverse and negligible effects will be defined as **not significant**.

Geographical scope

12.5.14 GHG emissions have a global effect rather than directly affecting any specific local receptor. The impact of GHG emissions occurring due to the proposed development on the global atmospheric concentration of the relevant GHGs, expressed in CO_2e, will be considered in the assessment. As GHG impacts are global and cumulative with all other sources, no specific geographical study area is defined for the identification of receptors or assessment of effects.

12.5.15 However, GHG emissions caused by an activity are often categorised into 'scope 1', 'scope 2' or 'scope 3' emissions, following the guidance of the WRI and the WBCSD Greenhouse Gas Protocol suite of guidance documents[45].

- Scope 1 emissions: released directly by the entity being assessed, e.g. from combustion of fuel at an installation;
- Scope 2 emissions: caused indirectly by consumption of imported energy, e.g. from generating electricity supplied through the national grid to an installation; and
- Scope 3 emissions: caused indirectly in the wider supply chain, e.g. in the upstream extraction, processing and transport of materials consumed or the downstream use of products from an installation.

12.5.16 This assessment will seek to include emissions from all three scopes, where this is material and reasonably possible from the information and emissions factors available.

12.5.17 The majority of GHG emissions are likely to occur within the territorial boundary of the UK and hence within the scope of the UK's national carbon budgets. However, in recognition of the climate change effect of GHG emissions (wherever occurring) and the need, as identified in national policy, to avoid carbon leakage overseas when reducing UK emissions, potential scope 3 GHG emissions that may physically occur outside the UK will be considered where relevant.

Temporal scope

12.5.18 GHG emissions from construction and from operation over the expected operating lifetime of the proposed development will be assessed.

12.5.19 The varying atmospheric residence time of GHGs once emitted, and their differing climate impact, will be been considered through the use of 100-year GWP factors to express these in a common CO_2e metric.

12.6 Embedded mitigation and enhancement measures

12.6.1 The purpose of the proposed development is to provide a low-carbon hydrogen fuel, which is part of national energy policy to support net zero emission goals. Its operation is therefore inherently intended to achieve mitigation of GHG emissions from gas fuel use at a local and national level. Its location has been selected on the basis of the significant renewable power resources in Scotland.

12.6.2 Further embedded mitigation for the construction phase is expected to include transport, energy and fuel efficiency measures in a Construction Environmental Management Plan (CEMP) and a commitment to incorporate lifecycle-based

[45] WRI and WBCSD (2004): The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard. Revised edition, Washington and Geneva: WRI and WBCSD.

carbon measurement at the detailed design stage, in decision-making about design and materials choices. Landscape planting may also offer an opportunity for carbon sequestration.

12.7 Scope of environmental impacts and effects

Construction

12.7.1 With regard to construction-stage GHG emissions, the main impact would be the 'embodied carbon' in construction materials used, i.e. the indirect GHG emissions from the supply chain for those materials, particularly for concrete, metals and the major engineered components of the development. These are expected to be relatively minor compared to operational emissions benefits from low-carbon hydrogen production, but will be estimated to consider whether effects may be significant, based on available published life cycle assessment studies or environmental product declarations for key materials and components.

12.7.2 Opportunities to use recycled steel and locally sourced aggregate/low carbon concrete will be explored with the design team. Direct GHG emissions from construction activities (e.g. fuel consumption by construction plant) are judged to be non-material to the assessment, regulated by other legislation and are not proposed to be assessed quantitatively but will be reported qualitatively and mitigated via measures in the CEMP.

12.7.3 Climatic changes over the expected circa three-year construction and commissioning programme during the 2020s are not considered likely to be significant or to introduce climate extremes at a higher risk level than construction contractors are adapted to, within the baseline variability of weather in Scotland. Assessment of construction-stage climate change risks is therefore proposed to be scoped out.

Operation

12.7.4 The proposed development will have no material direct GHG emissions from the site in operation, as its outputs are hydrogen, oxygen and water. However, the consumption of electricity and the production of hydrogen for use (displacing natural gas use) is expected to have substantial indirect impacts with potential significant effects.

12.7.5 The boundary of the operational assessment will include the indirect GHG emission from production of electricity consumed by the proposed development, including that used in electrolysis for hydrogen production and for other process such as the pumped water supply and cooling system. The impact of exporting hydrogen for combustion to displace use of natural gas fuel will also be assessed.

12.7.6 GHG emissions from operational traffic (worker commuting and reagent deliveries) and the embodied carbon of the latter are expected to be minor and non-material, but will be assessed qualitatively.

12.7.7 The main climatic risk to the proposed development from climate change over its operating life is expected to be flooding, which will be assessed with climate change allowances in the Water Environment chapter. The potential for change in flow rates on the River Don due to changes in rainfall patterns under climate change, affecting water abstraction, has also been considered. However, abstraction is managed via the CAR licence granted by SEPA, which includes appropriate restrictions on abstraction during low flow conditions and the application showed that the Don has substantial headroom in flow rates. As this is managed by an existing regulatory regime, and no significant risk is expected, further assessment is proposed to be scoped out.

12.7.8 Other potential risks include the effects potentially more common heatwave events with higher peak and sustained temperatures on the cooling system of the proposed development, the general risk of disruption to electricity and transport networks during severe weather events, and the risk to foundations or the gas pipelines from soil shrinkage. These risks are not considered to be significant nor amenable to mitigation within the developer's control. The cooling system as a matter of course will be designed for a range of temperature conditions with an engineering design margin; electricity and transport network disruption (outside the developer's control) could disrupt hydrogen production but the facility is designed for modular operation with relatively common start-up and shut-down based on electricity supply

and hydrogen demand market factors, so this can be managed; and the proposed development is not located on clay soils at high risk of shrinkage.

12.7.9 Further climate risk assessment is therefore proposed to be scoped out of the EIA.

12.8 Limitations and uncertainties

12.8.1 The main limitations and necessary assumptions are likely to be as follows.

- Use of emission factors to estimate proposed development GHG emissions, particularly where the carbon intensity is likely to change over time. To mitigate uncertainty, emission factors used in national GHG reporting and verified LCA studies will be used, and where necessary the assessment will consider scenarios or sensitivities to any areas of uncertainty.
- The net balance of GHG emissions will be sensitive to the generation sources of electricity supply and to the comparison with natural gas fuel use displaced in the baseline. The representative scenario assessed will draw from the developer's market expectations and national policy for production and use of hydrogen.
- The outline design stage of the hydrogen plant at the time of EIA, with consequentially limited data on construction materials/products and their carbon intensity. As discussed above, the construction stage impacts are not considered likely to be significant relative to the operational stage impacts but will be estimated and further screened in the assessment.

12.9 Inter-related effects

12.9.1 Inter-related effects with climate change and other topic areas arise primarily from the effect that climate change may have on receptors and their sensitivity (including vulnerability and resilience), which could exacerbate other impact pathways. The characterisation of future baseline conditions for each topic chapter in the EIAR will take into account the likely effects of climate change, as far as these are known at the time of undertaking the EIA. This will be based on information available from the Met Office Hadley Centre's UK Climate Projections project (UKCP18), which provides information on plausible changes in climate for the UK, and on published documents such as the UK Climate Change Risk Assessment published by the Climate Change Committee.

12.10 Cumulative effects

12.10.1 All developments that emit GHGs have the potential to impact the atmospheric mass of GHGs as a receptor, and so may have a cumulative impact on climate change. Consequently, cumulative effects due to other specific local development projects will not be separately assessed but are already taken into account when considering the impact of the proposed development by defining the atmospheric mass of GHGs as a high sensitivity receptor, in line with the IEMA GHG guidance.

12.11 Summary of proposed EIA scope

Table 12.1: Summary of climate change impacts proposed to be scoped in to the EIA

Impact pathway	Justification
Construction	
Embodied carbon of construction materials	Likely to be minimal compared to operational emissions, but will be estimated and screened for significance, and will inform construction-stage mitigation proposals.
Operation	
GHG emissions from plant operation, including electricity use and hydrogen export	The carbon intensity of producing electricity consumed by the proposed development, and the avoided GHG emissions from natural gas use displaced by exported hydrogen, are the primary sources of GHG impact.

Impact pathway	Justification
Climate change interaction with flood risk	Appropriate climate change allowances in line with SEPA guidance should be included in the flood risk assessment and conceptual drainage design. This will be assessed in the Water Environment chapter and its appendices.
Inter-related climate change effects	Climate change may affect receptor sensitivity (vulnerability and resilience) for several EIA topics; this will be included in the future baseline section of topic chapters using UKCP18 projections.

Table 12.2: Summary of climate change impacts proposed to be scoped out of the EIA

Impact pathway	Justification
Construction	
Transport and site plant use	Expected to make non-material contribution to the overall lifecycle impacts of the facility.
Climate risks	No significant change in baseline risks from variable weather conditions (to which construction processes and contractors' working methods are adapted) are expected during the likely construction phasing in the 2020s.
Operation	
Non-flooding climate risks	Based on a review of potential development vulnerabilities to potential climatic changes, including greater intensity or frequency of summer heatwave/drought events, soil conditions, and severe winter weather, no significant risks other than flooding are anticipated.

13 Soils, Geology and the Water Environment

13.1 Introduction

13.1.1 This chapter of the scoping report provides an overview of the soils, geology and the water environment (hydrology and hydrogeology), the potential effects associated with the construction and operation of the proposed development and a summary of the proposed assessment methodology.

13.1.2 This section has been prepared by SLR Consulting under the supervision of Gordon Robb (BSc, MSc, MBA, C.WEM, FCIWEM). Gordon is a Technical Director (Hydrology and Hydrogeology) and has more than 30 years' experience assessing renewable energy and electrical infrastructure projects and specifically their potential effects on soils, geology and the water environment. He is based in Scotland and has worked throughout Scotland, including sites in similar settings to the proposed development. He has also prepared and given expert witness testimony for renewable and electrical infrastructure projects.

13.2 Consultation to date

13.2.1 Consultation with the Scottish Environment Protection Agency (SEPA) has been undertaken prior to and during the application for (and the subsequent grant) of a Controlled Activity Regulations (CAR) authorisation for the abstraction of water from the River Don as a potential feedstock for the proposed hydrogen facility. As part of the CAR application process consultation was also undertaken with The River Don Trust.

13.2.2 The CAR authorisation for the abstraction for water from the River Don was granted by SEPA in June 2023 (ref.: CAR/L/5004426).

13.3 Legislative or policy requirements and technical guidance

13.3.1 The soils, geology and water environment chapter will be prepared with reference to best practice guidance and legislation, including (but not limited to):

Legislation

- EU Water Framework Directive (2000/60/EC).
- EU Drinking Water Directive (98/83/EC).
- The Environment Act 1995.
- Environment Protection Act 1990.
- The Flood Risk Management (Scotland) Act 2009.
- Water Environment and Water Services (Scotland) Act 2003.
- Water Environment (Controlled Activities) Regulations 2011.
- The Water Supply (Water Quality) (Scotland) Regulations 2001.
- Private Water Supplies (Scotland) Regulations 2006.
- The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017.

Policy

- National Planning Framework 4 (NPF4).
- Aberdeenshire Council Local Development Plan.

Guidance

- SEPA Pollution Prevention Guidance Notes (PPGs) and Guidance of Pollution Prevention (GPPs).
- Environmental Quality Standards and Standards for Discharges to Surface Waters (WAT-SG-53) Version 7.1 (April 2020).
- Engineering in the Water Environment Good Practice Guide: Intakes and Outfalls. 2nd Edition (August 2019).

- Engineering in the Water Environment Good Practice Guide: Temporary Construction Methods, First Edition (March 2010).
- Engineering in the Water Environment Good Practice Guide: Sediment Management (2010).
- Groundwater Protection Policy for Scotland, Version 3 (2009).
- Land Use Planning System – SEPA Guidance Note 31 (Guidance on Assessing Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems), Version 3, (SEPA, 2017).
- Control of Water Pollution from Linear Construction Projects (C648) (CIRIA, 2006).
- The SuDS Manual C753 (CIRIA, 2015).
- Environmental Good Practice on Site C741 (CIRIA, 2015).

13.4 Baseline

Baseline environment

13.4.1 The proposed development is located approximately 2.8 km south west of Kintore. Ground elevations generally fall to the north east and the River Don, which is at an elevation of 50mAOD.

Geology and hydrogeology

13.4.2 The proposed development is shown by British Geological Survey (BGS) mapping to be underlain by bedrock comprising the Aberdeen Formation (psammite and semipelite) to the east and the Kemnay Pluton (granite and foliated-muscovite-biotite) to the west.

13.4.3 The bedrock is overlain by superficial deposits of Banchory Till (glacial till). An area of lacustrine deposits (clay, silt and sand) is located within the centre of the site, whilst alluvium and glaciofluvial deposits (clay, silt, sand and gravel) are recorded within the northern extent of the site and adjacent to the main watercourses. The hilltops locally are shown to be absent of any superficial deposits.

13.4.4 The majority of the superficial deposits as well as the bedrock beneath the site are unlikely to contain significant amounts of groundwater. The bedrock has been classified by BGS as a low productivity aquifer whereby small amounts of groundwater may be present within the near surface weathered zone and fractures.

13.4.5 The alluvium and glaciofluvial deposits have the potential to contain shallow groundwater and this may be in hydraulic continuity with adjacent surface water.

Soils and peat

13.4.6 Soil mapping indicates that the soils beneath the proposed development comprise humus iron podzols, noncalcerous gleys and alluvial soils.

13.4.7 Priority peatland mapping published by NatureScot indicates that the proposed development is not located within an area defined as priority peatland (Class 1 and 2). The majority of the site is located on mineral soils (Class 0) where peatland habitats are not typically found. Small areas of potential Class 3, 4 and 5 peatland are recorded within and in proximity to the site, however, these areas are not classified as priority peatland habitats.

13.4.8 Soils mapping shows the soils are classified as between classes 3.1 and 4.2 which is defined as prime agricultural land. The majority of the site is noted as class 3.2 which is defined as land capable of average production and where high yields of barley, oats and grass might be obtained.

Hydrology and designated sites

13.4.9 The proposed development is located within the surface water catchment of the River Don, which flows generally eastwards to the north east of the site. The western and central extent of the site is drained by the Tuach Burn, a

tributary of the River Don, which flows eastwards to the north of the site before discharging into the River Don. Several tributaries of the Tuach Burn cross the site including the Dewsford Burn, Park Burn, Tillakae Burn and Sheriff Burn.

13.4.10 The south east of the site is drained by the Black Burn which is located approximately 1.3 km east of the site and flows generally northwards before discharging into the River Don.

13.4.11 The proposed development is not located within a Drinking Water Protected Area (DWPA). Notwithstanding this, it is recognised that watercourses and groundwater may support local private water supplies or be used as irrigation water by farms locally.

13.4.12 The River Don is an important and highly regarded fishery.

13.4.13 The Applicant has initiated a programme of routine surface water quality monitoring in the River Don at the authorised abstraction point and this data will be presented in the impact assessment.

13.4.14 SEPA flood mapping confirms flood extents are typically confined to the watercourse corridors with the exception of the centre of the site near the confluence of the Park Burn and Tillakae Burn where a wider floodplain is noted.

13.4.15 Review of the NatureScot SiteLink website confirms that there are no designated sites within the proposed development or within 500 m of it.

Proposed approach to surveys and further baseline data collection

13.4.16 The potential effects of the proposed development on ground conditions and the water environment will be assessed by completing a desk study and site survey followed by an impact assessment, the processes of which are detailed below.

Desk study

13.4.17 An initial desk study will be undertaken to determine and confirm the baseline characteristics by reviewing available information relating to soils, geology, hydrogeology and hydrology such as groundwater resources, licensed and unlicensed groundwater and surface water abstractions, public and private water supplies, surface water flows, flooding, rainfall data, water quality and soil data. This will include review of published geological maps, Ordnance Survey maps, aerial photographs and relevant site investigation data, geological and hydrogeological reports from neighbouring developments, digital terrain models (slope plans) and geological literature.

13.4.18 The desk study will identify sensitive features (receptors) which may potentially be impaired by the proposed development and will confirm the geological, hydrogeological and hydrological environment.

Field surveys

13.4.19 The hydrological assessment specialists will liaise closely with the project ecology and geology / geotechnical specialists to ensure that appropriate information is gathered to allow a comprehensive impact assessment to be completed.

13.4.20 A detailed site visit and walkover survey will be undertaken to:

- Verify the information collected during the desk and baseline study.
- Identify drainage patterns, areas vulnerable to erosion or sedimentation deposition, and pollution risk.
- Visit and identify any groundwater dependent terrestrial ecosystems (GWDTEs), in consultation with the project ecologist.
- Visit any private water supply sources that might be affected by the proposed development to confirm details of the location of the abstraction, its type and use, as required.
- Prepare a schedule of potential watercourse crossings (for access tracks and pipeline routes).
- Assess the site geomorphology and conduct peat depth probing and auguring to prove the presence (or otherwise) of peat and its condition and distribution.

13.4.21 The desk study and field surveys will be used to identify potential development constraints and be used as part of the site design.

13.4.22 Once the baseline assessment is completed and sensitive soil, geological and water features are confirmed, an impact assessment will be undertaken to assess the potential effects on soils, geology, and the water environment as a result of the construction and operation of the proposed development.

13.5 Approach to assessment

13.5.1 A qualitative risk assessment methodology will be used to assess the significance of the potential effects. Two factors will be considered: the sensitivity of the receiving environment and the potential magnitude should that potential impact occur.

13.5.2 This approach provides a mechanism for identifying the areas where mitigation measures are required, and for identifying mitigation measures appropriate to the risk presented by the proposed development. This approach also allows effort to be focused on reducing risk where the greatest benefit may result.

13.5.3 The sensitivity of the receiving environment (i.e. the baseline quality of the receiving environment as well as its ability to absorb the effect without perceptible change) and the magnitude of impacts will each be considered through a set of pre-defined criteria.

13.5.4 The sensitivity of the receiving environment together with the magnitude of the effect defines the significance of the effect, which will be categorised into level of significance.

Geographical scope

13.5.5 The study area will include all the proposed site infrastructure and a 500 m buffer from the proposed development boundary.

13.5.6 The study area for potential cumulative effects will use the catchments within the study area, with a maximum distance of 2 km from the proposed development. Beyond this 2 km distance, any effect is considered to be so diminished as to be undetectable and therefore not significant.

Temporal scope

13.5.7 The assessment will consider potential effects on soils, geology, and the water environment during both the construction and operational phases of the proposed development.

13.5.8 The assessment will also consider the potential for climate change to impact on future baseline conditions, and flood extents.

13.6 Embedded mitigation and enhancement measures

13.6.1 The proposed development will undergo design iterations and evolution in response to constraints identified as part of the baseline studies and field studies so as to avoid and/or minimise potential effects on receptors where possible.

13.6.2 There is much best practice guidance which has been developed to assist developers minimise the risks associated with construction and operation of facilities like the proposed development and this will be used to develop site-specific mitigation measures. Measures will be proposed to control and mitigate, for example, pollution risk (from anthropogenic and geogenic sources), flood risk and drainage, watercourse crossings, impacts on surface and groundwater flow paths, and management and safeguarding of soils.

13.6.3 A Conceptual Drainage Design will be included in the planning application and referred to in the EIA Report. A detailed drainage design would subsequently be prepared by the Principal Contractor as part of the detailed design stage of the project, post-consent, the details of which can be secured by an appropriately worded planning condition.

13.6.4 It is expected that the following potential mitigation measures will be included in the design of the proposed development:

- with the exception of watercourse crossings, a buffer of up to 50 m will be applied to watercourses where possible (and would only be reduced where other constraints mean this is not possible – in such instances justification would be provided in the EIA report and additional mitigation measures to safeguard the water environment would be specified);
- the layout of access tracks and pipeline routes will be designed to minimise the requirement for watercourse crossings and where possible existing tracks will be used;
- areas of known flood risk (now or in the future) will be avoided wherever possible;
- impacts on private water supply sources, licensed water abstractions and areas of GWDTE will be avoided;
- the Conceptual Drainage Design for the proposed development will present runoff attenuation measures that would be developed at the detailed design stage, which would include appropriate surface runoff attenuation for new impermeable areas to ensure no increase in the greenfield runoff rate during a 1 in 200 year precipitation event including climate change allowance; and
- the Conceptual Drainage Design for the proposed development will present contaminated drainage management measures that would be developed at the detailed design stage, which would include separate sealed drainage and appropriate bunding and detention for drainage from process and chemical or fuel storage areas with the potential to cause ground or water contamination in the event of a spillage, in line with requirements of the PPC Permit for the facility.

13.7 Scope of environmental impacts and effects

13.7.1 Without mitigation or adherence to good practice measures, impacts on soils, geology and the water environment could occur during construction and operation of the proposed development. A summary of the potential effects during these phases is provided below and will be considered in the EIA Report.

Construction

- loss or degradation of high value or carbon rich soils;
- impacts on surface water and groundwater quality from pollution from fuel, oil, concrete or other hazardous substances;
- discharge of sediment-laden runoff to drainage system and watercourses;
- increased flood risk to areas downstream of the site during construction through increased surface run-off;
- changes in groundwater levels from dewatering excavations;
- potential change of groundwater flow paths and contribution to areas of GWDTE;
- disturbance of watercourse bed and banks from the construction of culverts or pipeline crossings; and
- potential pollution impacts to public and private water supplies.

Operation

- change in surface water flow and quality in the River Don as a result of water abstraction and effluent discharge associated with the production of hydrogen;
- increased runoff rates and flood risks, resulting from increases in areas of impermeable hardstanding;
- changes in natural surface water drainage patterns (which may affect water contribution to areas of GWDTE);
- changes to groundwater levels and groundwater movement; and
- pollution impacts on surface water quality from maintenance work.

13.7.2 At this stage, it is proposed that the following can be scoped out of the assessment:

- decommissioning effects as these will be similar to but less than construction effects.
- effects on geology as no sensitive geological features have been identified within the study area, and while there will be effects arising from rock extraction for foundation construction, these will be limited in area and will not extend beyond the development footprint.

- a Water Framework Directive assessment as the rate and volume of water abstraction from the River Don will be regulated by the existing CAR abstraction authorisation and the discharge of effluent from the hydrogen facility would also be agreed and regulated by SEPA as an emission point in a future PPC Permit application.

13.8 Limitations and uncertainties

13.8.1 The assessment will use site investigation, survey data and publicly available data sources, including but not limited to SEPA, NatureScot, Met Office, Aberdeenshire Council, and commercial data supply companies, as well as additional information supplied from stakeholders during the scoping and consultation stages.

13.8.2 It is considered that the data and information that will be used to complete the assessment will be robust and that there will be no significant data gaps or limitations.

13.9 Inter-related effects

13.9.1 This report will assess effects that are relevant to soil, geology, and water environment receptors during construction and operation phases of development, including an appropriate allowance for the effect of climate change on precipitation rates and flood extents. No other inter-related effects are anticipated.

13.10 Cumulative effects

13.10.1 A review of other existing and proposed developments within 2 km of the proposed development will be undertaken and potential impacts on soils, geology and the water environment will be assessed to identify cumulative effects. With regard to the proposed development, it is likely that mitigation measures will be proposed that will have a neutral effect or provide betterment compared to baseline conditions. It is considered unlikely that there will be any significant residual or cumulative effect to report.

13.11 Summary of proposed EIA scope

Table 13.1: Summary of soil, geology and water environment impacts proposed to be scoped in to the EIA

Impact pathway	Justification
Construction	
Pollution risk	Impacts on surface water and groundwater quality from pollution from fuel, oil, concrete or other hazardous substances Discharge of sediment-laden runoff to drainage systems and watercourses Disturbance and or pollution resulting from construction of foundations Potential pollution impacts to public and private water supplies (licensed and unlicensed)
Erosion and sedimentation	Disturbance of watercourse bed and banks from the construction of culverts and pipeline crossings
Fluvial flood risk	Increased flood risk to areas downstream of the site during construction through increased surface runoff from areas of temporary and permanent hardstanding
Infrastructure and man-made drainage	Changes in groundwater levels from dewatering excavations Potential degradation of public and private water supplies (licensed and unlicensed) and areas of GWDTE
Loss or impairment of valuable / carbon rich soils	As a consequence of inappropriate handling, storage or use
Operation	

Impact pathway	Justification
Pollution risk	Pollution impacts on surface water and groundwater quality from maintenance work and routine operation
Fluvial flood risk	Increased flood risk to areas downstream of the site as a result of increased surface runoff from areas of permanent hardstanding

Table 13.2: Summary of soils, geology and water environment impacts proposed to be scoped out of the EIA

Impact pathway	Justification
Construction	
Geology	No sensitive geological features have been identified
Water Framework Directive Assessment	The rate and quality, and controls for the abstraction of water from the River Don have been agreed with SEPA and are regulated by an existing CAR authorisation. The discharge of effluent from the hydrogen facility would be agreed with SEPA via a PPC Permit application.
Operation	
As above	

14 Population and Health

14.1 Introduction

14.1.1 The topic of 'population and health' is proposed to be scoped in to the EIA. The chapter will explore a range of potential health impacts (positive and negative) during construction and operation on the surrounding community, communicating how and where negative impacts are to be addressed, and the uptake of positive impacts are to be optimised.

14.1.2 This section of the ES Scoping Report has been produced by the Health and Social Impact team at Savills.

14.1.3 The team is led by Dr Andrew Buroni (Director of Health and Social Impact at Savills), who is an internationally recognised expert in health and social impact assessment with over 22 years of experience. Dr Buroni holds a Biological/Biomedical Science degree with honours, a Masters in Environmental Impact Assessment (EIA) and a PhD on International Health Impact Assessment (HIA) Methods and Best Practice. He has received formal training in Environmental Health Impact Assessment (EHIA) at the Caribbean Environmental Health Institute by the Pan American Health Organisation and Health Canada, and at the International Health Impact Assessment Consortium (IMPACT) at the University of Liverpool. Dr Buroni also sits on the Institute of Environmental Management and Assessment (IEMA) Health in EIA Working Group, and in the process of developing guidance to further embed the consideration of health within planning and EIA.

14.1.4 Dr Buroni is supported by Tara Barratt (Associate Director, Health and Social Impact at Savills) and Anushree Bhatt (Senior Consultant, Health and Social Impact at Savills).

14.1.5 Tara Barratt has a Master of Science in Environmental Technology with a focus in environmental epidemiology. Tara has seven years' experience coordinating and delivering HIA and Population and Health ES chapters for a range of major infrastructure projects across the UK, Ireland, and Australia.

14.1.6 Anushree Bhatt holds a Master of Environmental Science and an Honours Bachelor of Science with a Double Major in Environmental Science and Human Biology from the University of Toronto. Anushree has five years of Canadian environmental consultancy experience as an HIA specialist and an environmental risk assessor.

14.2 Consultation to date

14.2.1 Consultation with respect to population and health has not been undertaken prior to submission of this EIA Scoping Report.

14.3 Legislative or policy requirements and technical guidance

14.3.1 There is no specific legislation which drives the scope and approach to the population and health assessment. Relevant technical guidance comprises IEMA's Effective Scoping of Human Health in EIA[46] and Determining Significance For Human Health in EIA[47].

14.3.2 In relation to the assessment of electric and magnetic fields (EMF), the following information and guidance is relevant to the assessment of population and health:

[46] IEMA. (2022, November). *Effective Scoping of Human Health in Environmental Impact Assessment*. Retrieved from IEMA: https://www.iema.net/resources/blog/2022/11/17/launch-of-the-eia-guidance-for-considering-impacts-on-human-health

[47] IEMA. (2022, November). Determining Significance For Human Health In Environmental Impact Assessment. Retrieved from IEMA: https://www.iema.net/resources/blog/2022/11/17/launch-of-the-eia-guidance-for-considering-impacts-on-human-health

- ICNIRP Guidelines for Limiting Exposure to Time-varying Electric, Magnetic and Electromagnetic Fields (Up to 300 GHz)[48]; and
- Power Lines: Demonstrating compliance with EMF public exposure guidelines – A voluntary Code of Practice[49].

14.4 Baseline

Baseline environment

14.4.1 Different communities have varying circumstances and sensitivity to population, health, and socio-economic changes (both adverse and beneficial) as a result of social and demographic structure, behaviour and relative economic circumstances.

14.4.2 Table 14.1 provides a summary of available health and socio-economic statistics for Kintore intermediate zone[50], compared to the Scotland national average. For the majority of indicators, health and socio-economic circumstance is better than the Scottish national average. The only indicator which is worse than the national average (marginally so) is the proportion of children who are a healthy weight in primary 1 (76.1% in Kintore compared to a national average of 76.6%).

Table 14.1: Health baseline summary

Indicator	Year	Kintore	Scotland
Socio-economic			
Children in low income families (%)	2016	3.7	16.7
Working age population employment deprived (%)	2017	3.0	9.3
Population income deprived (%)	2017	2.9	12.1
Crime rate (per 1,000 population)	2017	11.8	28.8
Physical health			
Life expectancy, females (years)	2019	84.5	81.0
Life expectancy, males (years)	2019	82.5	76.8
Emergency patient hospitalisations (per 100,000 population)	2020	4,849.7	7,234
Chronic obstructive pulmonary disease (COPD) patient hospitalisations (per 100,000 population)	2020	121.2	207.4
Coronary heart disease (CHD) patient hospitalisations (per 100,000 population)	2020	302.0	341.6
Asthma patient hospitalisations (per 100,000 population)	2020	39.1	68.4
Multiple emergency hospital admissions, aged >65 years (per 100,000 population)	2020	3,293.6	4,998
Deaths all ages (per 100,000 population)	2020	836.5	1,180.7

[48] ICNIRP. (1998). *ICNIRP Guidelines for Limiting Exposure to Time-varying Electric, Magnetic and Electromagnetic Fields (Up to 300 GHz).* Retrieved from ICNIRP: https://www.icnirp.org/cms/upload/publications/ICNIRPemfgdl.pdf (note: not the more recent 2010 ICNIRP guidelines, as UK guidance remains based upon the more conservative 1998 ICNIRP guidelines)

[49] DECC. (2012, March). Power Lines: Demonstrating compliance with EMF public exposure guidelines. Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/48308/1256-code-practice-emf-public-exp-guidelines.pdf

[50] a statistical geography scale that sits 'data zones' and 'local authorities' in scale, created for use with the Scottish Neighbourhood Statistics

Indicator	Year	Kintore	Scotland
Deaths, aged 15-44 years (per 100,000 population)	2020	63.3	117.1
Early deaths from coronary heart disease (CHD), aged <75 years (per 100,000 population)	2020	23.7	52.6
Early deaths from cancer, aged <75 years (per 100,000 population)	2020	100.8	149.6
Behavioural risk/ lifestyle factors			
Alcohol-related hospital admissions (per 100,000 population)	2021	282.0	610.9
Child healthy weight in primary 1 (%)	2018	76.1	76.6
Road traffic accident casualties (per 100,000 population)	2020	38.7	54.7
Key:			
	Better than the national average		
	Worse than the national average		

Proposed approach to surveys and further baseline data collection

14.4.3 A desktop study will be undertaken to establish the local population, health, and socio-economic context for the EIAR. This will involve the collection and interpretation of published demographic, socio-economic data, contrasted against regional and national data. The following open-source websites and datasets are anticipated to be used to develop the population, health and socio-economic baseline:

- Scottish Public Health Observatory (ScotPHO);
- Public Health Scotland; and
- National Records of Scotland.

14.4.4 Data collection and interpretation will build upon the snapshot summary presented in Table 14.1, for example through analysis of trend data, regional data (Aberdeenshire) and a wider range of indicators.

14.4.5 No site surveys are required for the assessment of population and health.

14.5 Approach to assessment

Assessment criteria

14.5.1 The overarching approach builds upon Scottish HIA Guidance[51] structured within the regulatory required assessment process for EIA, including the use of significance criteria. The population and health assessment criteria are defined by IEMA's Guide to Determining Significance for Human Health in EIA, which are shown in more detail below.

Magnitude of impact

14.5.2 The health magnitude methodology criteria proposed to be used in the population and health assessment, defined by IEMA's Guide to Determining Significance for Human Health in EIA, are provided in Table 14.2.

[51] SHIIAN. (2016, August). *Health Impact Assessment Guidance for Practitioners.* Retrieved from Scottish Public Health Network: https://www.scotphn.net/wp-content/uploads/2015/11/Health-Impact-Assessment-Guidance-for-Practitioners-SHIIAN-updated-2022.pdf

Table 14.2: Health magnitude methodology criteria

Category/level	Indicative criteria
High	High exposure or scale; long-term duration; continuous frequency; severity predominantly related to mortality or changes in morbidity (physical or mental health) for very severe illness/injury outcomes; majority of population affected; permanent change; substantial service quality implications.
Medium	Low exposure or medium scale; medium-term duration; frequent events; severity predominantly related to moderate changes in morbidity or major change in quality-of-life; large minority of population affected; gradual reversal; small service quality implications.
Low	Very low exposure or small scale; short-term duration; occasional events; severity predominantly related to minor change in morbidity or moderate change in quality-of-life; small minority of population affected; rapid reversal; slight service quality implications
Negligible	Negligible exposure or scale; very short-term duration; one-off frequency; severity predominantly relates to a minor change in quality-of-life; very few people affected; immediate reversal once activity complete; no service quality implication.

Sensitivity of receptors

14.5.3 Within a defined population, individuals will range in level of sensitivity due to a series of factors such as age, socio-economic deprivation and the prevalence of any pre-existing health conditions which could become exacerbated. These individuals can be considered particularly vulnerable to changes in environmental and socio-economic factors (both adversely and beneficially) whereby they could experience disproportionate effects when compared to the general population.

14.5.4 As an example, the elderly, young children and individuals with chronic pre-existing respiratory conditions would be more sensitive to adverse changes to air quality, with the potential for emergency admission to hospital more likely than for someone of working age who has good respiratory health. On the other hand, an individual who has been unemployed for a long period of time would benefit more from employment opportunities generated by a proposed development in comparison to an individual who is already employed.

14.5.5 The health sensitivity methodology criteria proposed to be used in the population and health assessment, defined by IEMA's Guide to Determining Significance for Human Health in EIA, are provided in Table 14.3.

Table 14.3: Health sensitivity methodology criteria

Category/ level	Indicative criteria
High	High levels of deprivation (including pockets of deprivation); reliance on resources shared (between the population and the project); existing wide inequalities between the most and least healthy; a community whose outlook is predominantly anxiety or concern; people who are prevented from undertaking daily activities; dependants; people with very poor health status; and/or people with a very low capacity to adapt.
Medium	Moderate levels of deprivation; few alternatives to shared resources; existing widening inequalities between the most and least healthy; a community whose outlook is predominantly uncertainty with some concern; people who are highly limited from undertaking daily activities; people providing or requiring a lot of care; people with poor health status; and/or people with a limited capacity to adapt.
Low	Low levels of deprivation; many alternatives to shared resources; existing narrowing inequalities between the most and least healthy; a community whose outlook is predominantly ambivalence with some concern; people who are slightly limited from undertaking daily activities; people providing or requiring some care; people with fair health status; and/or people with a high capacity to adapt.
Very low	Very low levels of deprivation; no shared resources; existing narrow inequalities between the most and least healthy; a community whose outlook is predominantly support with some concern; people who are not limited from undertaking daily activities; people who are independent (not a carer or dependant); people with good health status; and/or people with a very high capacity to adapt.

Significance of effect

14.5.6 The significance of an effect is determined based on the sensitivity/value of a receptor and the magnitude of an impact, which are determined by the criteria above. The method employed for this assessment is presented in Table 14.4. Where a range of significance levels are presented, the final assessment for each effect will be based upon professional judgement. Any effects with a significance level of minor or less are not considered to be significant in terms of the EIA Regulations.

Table 14.4: Significance matrix

		Sensitivity			
		High	Medium	Low	Very low
Magnitude	High	Major	Major/moderate	Moderate/minor	Minor/negligible
	Medium	Major/moderate	Moderate	Minor	Minor/negligible
	Low	Moderate/minor	Minor	Minor	Negligible
	Negligible	Minor/negligible	Minor/negligible	Negligible	Negligible

14.5.7 A description of each significance level is provided in Table 14.5. All descriptions relate to both adverse and beneficial changes.

Table 14.5: Significance conclusion and reasoning related to public health

Category/ level	Indicative criteria
Major (significant)	The narrative explains that this is significant for public health because: ● Changes due to the proposed development have a substantial effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by referencing relevant policy and effect size (magnitude and sensitivity levels), and as informed by consultation themes among stakeholders, particularly public health stakeholders, that show consensus on the importance of the effect. ● Changes due to the proposed development could result in a regulatory threshold or statutory standard being crossed (if applicable). ● There is likely to be a substantial change in the health baseline of the population, including as evidenced by the effect size and scientific literature showing there is a causal relationship between changes that will result from the proposed development and changes to health outcomes. ● In addition, health priorities for the relevant study area are of specific relevance to the determinant of health or population group affected by the proposed development.
Moderate (significant)	The narrative explains that this is significant for public health because: ● Changes due to the proposed development have an influential effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by referencing relevant policy and effect size, and as informed by consultation themes among stakeholders, which may show mixed views. ● Changes due to the proposed development could result in a regulatory threshold or statutory standard being approached (if applicable). ● There is likely to be a small change in the health baseline of the population, including as evidenced by the effect size and scientific literature showing there is a clear relationship between changes that will result from the proposed development and changes to health outcomes. ● In addition, health priorities for the relevant study area are of general relevance to the determinant of health or population group affected by the proposed development.
Minor (not significant)	The narrative explains that this is not significant for public health because: ● Changes due to the proposed development have a marginal effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by effect size of limited policy influence and/or that no relevant consultation themes emerge among stakeholders.

Category/ level	Indicative criteria
	• Changes due to the proposed development will be well within a regulatory threshold or statutory standard (if applicable); but could result in a guideline being crossed (if applicable). • There is likely to be a slight change in the health baseline of the population, including as evidenced by the effect size and/or scientific literature showing there is only a suggestive relationship between changes that will result from the proposed development and changes to health outcomes. • In addition, health priorities for the relevant study area are of low relevance to the determinant of health or population group affected by the proposed development.
Negligible (not significant)	The narrative explains that this is not significant for public health because: • Changes due to the proposed development are not related to the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by effect size or lack of relevant policy, and as informed by the project having no responses on this issue among stakeholders. • Changes due to the proposed development will not affect a regulatory threshold, statutory standard or guideline (if applicable). • There is likely to be a very limited change in the health baseline of the population, including as evidenced by the effect size and/or scientific literature showing there is an unsupported relationship between changes that will result from the proposed development and changes to health outcomes. • In addition, health priorities for the relevant study area are not relevant to the determinant of health or population group affected by the proposed development.

Geographical scope

14.5.8 There are two elements to the population and health geographical scope which need to be defined:

- the geographic scope for baseline data collection in order to establish the existing local burden of poor health and associated sensitivity to changes in the environmental and socio-economic environment; and
- the geographic scope for receptors assessed, and the associated environmental and socio-economic changes at these receptors.

14.5.9 Environmental health determinants (such as changes to air quality and noise exposure) typically have a local distribution pattern, where the hazards are limited by their concentration and physical dispersion characteristics. Changes in transport nature and flow rate have a similarly localised distribution on the local road network. Socio-economic health determinants (such as employment and related income generation) have a wider geographic scope of influence than environmental health determinants due to the willingness to commute significant distances in some cases to skilled work.

14.5.10 The proposed development is located within the Kintore intermediate zone of Aberdeenshire Council area. Baseline data is readily available for Kintore intermediate zone and therefore it is proposed to collect data at this geographic level, which are considered to be representative of the communities living around the proposed development. For context, data will also be collected for Aberdeenshire and Scotland as relevant comparators. It should be noted that due to the wider geographic scope of influence for socio-economic health determinants (i.e. primarily employment and GVA effects), Aberdeenshire data should also be given weight in that case, but Kintore data will also be presented to provide a more local understanding.

14.5.11 The study area defining the relevant sensitive receptors identified for assessment purposes is proposed to remain consistent with the inter-related technical aspects which inform the assessment of population and health.

Temporal scope

14.5.12 The temporal scope of the population and health assessment is proposed to cover construction and operational phases.

14.5.13 The population and health assessment will draw from and build upon the technical outputs from inter-related disciplines. As a result, the analysis and discussion provided as part of the population and health assessment will remain consistent

with the available information, with reference being made to average or peak scenarios as appropriate for each impact pathway.

14.6 Embedded mitigation and enhancement measures

14.6.1 Embedded mitigation and enhancement measures adopted as part of the construction and operation of the proposed development inherently focus on precursors to health and wellbeing outcomes, thereby addressing potential hazards to manage and preclude health risk. The resultant impact (i.e. reduction/enhancement) will have a knock-on reduction/enhancement effect on population and health.

14.6.2 For example, construction would be undertaken in accordance with a Construction Environment Management Plan (CEMP) which sets out the key management measures that contractors would be required to adopt and implement in order to control the generation or release of environmental pollutants with the potential to cause adverse health and wellbeing outcomes.

14.6.3 During operation, such mitigation measures are embedded within the design of the proposed development itself e.g. through the application of specific safety measures, processes or abatement technology that will be controlled by a PPC Permit issued by SEPA.

14.7 Scope of environmental impacts and effects

Construction

Introduction

14.7.1 The following health determinants are proposed to be scoped in for the construction phase assessment:

- air quality;
- noise exposure;
- transport nature and flow rate;
- socio-economic factors (employment); and
- access to open space, recreation and Core Paths.

14.7.2 The approach to each health determinant assessment is provided in more detail in the sub-sections below.

Air quality

14.7.3 Temporary and intermittent changes in air quality associated with earthworks, on-site construction activities, traffic movements and trackout are expected during the construction phase.

14.7.4 While embedded mitigation measures detailed within a CEMP would be implemented to reduce the release of emissions, the population and health assessment will draw from and build upon key outputs from the Air Quality chapter to determine the significance of any associated health and wellbeing effect.

Noise exposure

14.7.5 Construction may be undertaken in a single phase or in several phases intermittently during the 2026 to early 2030s period. Temporary changes in noise associated with on-site construction activities and traffic movements are expected during each phase.

14.7.6 While embedded mitigation measures detailed within a CEMP would be implemented to reduce changes in noise exposure, the population and health assessment will draw from and build upon key outputs from the Noise and Vibration chapter to determine the distribution of any change in noise exposure, and the significance of any associated health and wellbeing effect.

Transport nature and flow rate

14.7.7 There will be changes in transport nature and flow rate during the construction phase due to deliveries and from staff movements.

14.7.8 Of relevance to population and health, are potential changes to severance, pedestrian amenity, pedestrian fear and intimidation, and risk of accidents and injury. The population and health chapter will draw from the Traffic and Access chapter to further communicate the potential impact on health and wellbeing.

Socio-economic factors (employment)

14.7.9 Employment is one of the most important wider determinants of health, whereby being in good quality and long-term employment is conducive to good health and wellbeing.

14.7.10 Employment opportunities would be provided throughout the construction phase. As a result, the population and health assessment will draw from and build upon key outputs from the Socio-Economics chapter to better understand the magnitude and distribution of these impacts, and consequent significance to population health.

Operation

Introduction

14.7.11 The following health determinants are proposed to be scoped in for the operation phase assessment:

- noise exposure;
- transport nature and flow rate;
- EMF exposure;
- hydrogen safety; and
- access to open space, recreation and Core Paths.

14.7.12 The approach to each health determinant assessment is provided in more detail in the sub-sections below.

Noise exposure

14.7.13 Long-term and permanent changes in noise during operation are expected. As a result, the population and health assessment will draw from and build upon key outputs from the Noise and Vibration chapter to determine the distribution of any change in noise exposure, and significance of any associated health and wellbeing effect

Transport nature and flow rate

14.7.14 In addition to staff movements during operation, there will be transport movements required for the delivery of consumables and for maintenance contractors' vehicles.

14.7.15 As with the construction-phase assessment, of relevance to population and health, are potential changes to severance, pedestrian amenity, pedestrian fear and intimidation, and risk of accidents and injury. The population and health chapter will draw from the Traffic and Transport chapter to further communicate the potential impact on health and wellbeing from any significant change in transport movements.

Socio-economic factors (employment)

14.7.16 Employment is one of the most important wider determinants of health, whereby being in good quality and long-term employment is conducive to good health and wellbeing.

14.7.17 Employment opportunities would be provided throughout the operation phase. As a result, the population and health assessment will draw from and build upon key outputs from the Socio-Economics chapter to better understand the magnitude and distribution of these impacts, and consequent significance to population health.

EMF exposure

14.7.18 Electricity supply would be via underground cable from Kintore Substation. The underground cables would supply 400 kV AC power and would be routed from the west side of the expanded substation to the electrolysis plant.

14.7.19 While residential properties would be avoided, there is potential for community concern regarding potential exposure to EMF by residents or transient receptors (such as walkers, cyclists etc.). Furthermore, as detailed in the (former) DECC voluntary Code of Practice, it is not possible to conclude by default that the ICNIRP exposure guidelines will not be exceeded by design without further and more detailed assessment, for underground cables or transmission infrastructure operating at >132 kV.

14.7.20 As a result, it is proposed to scope in consideration of the potential population and health effects from EMF exposure by providing an assessment of EMF associated with the underground cables to ICNIRP thresholds which are set to be protective of public health.

Hydrogen safety

14.7.21 There is potential for community concern surrounding the flammable nature of hydrogen and associated risk of fire and explosion from storage and pipeline transport within the hydrogen plant site, and in the export pipeline to the national gas grid.

14.7.22 While a range of well-established regulatory measures would be in place to ensure safe operations which result in no significant fire or explosion risk, it is proposed to discuss these concerns and the regulatory and safety controls in place within the population and health chapter, to further reduce the potential for adverse risk perceptions to manifest within the local community.

Health determinants proposed to be scoped out

14.7.23 It is proposed to scope out potential population and health effects from changes in air quality during operation on the basis that no significant sources of emissions would be present.

14.7.24 It is proposed to scope out potential population and health effects from changes in groundwater quality (where any groundwater abstractions exist) as no discharge of contaminated runoff would occur, as regulated by the PPC Permit and as will be assessed in the Soils, Geology and the Water Environment chapter.

14.8 Limitations and uncertainties

14.8.1 The population and health assessment draws from and builds upon the technical outputs from inter-related disciplines. As a consequence, the assumptions and limitations of those assessments will also apply to any information used in the population and health chapter (e.g. for modelling work undertaken). It is, however, considered that the information available provides a suitable basis for a robust assessment of population and health.

14.9 Inter-related effects

14.9.1 There is the potential for interaction between population and health, and the following other topic areas:

- air quality;
- noise and vibration;
- traffic and transport; and
- socio-economics.

14.10 Cumulative effects

14.10.1 The population and health zone of influence (ZoI) for the cumulative effect assessment will differ for each health determinant, being based on the ZoI used for each inter-related technical cumulative assessment that is used to inform the population and health cumulative assessment.

14.10.2 The following types of cumulative development have the potential to result in cumulative effects on population and health:

- other developments that could result in an environmental and/or socio-economic change that is additive to the effects associated with the proposed development; and
- other developments that result in EMF which are located in close proximity (approximately 50m) to transmission infrastructure associated with the proposed development.

14.11 Summary of proposed EIA scope

Table 14.6: Summary of population and health impacts proposed to be scoped in to the EIA

Impact pathway	Justification
Construction	
Air quality	Earthworks, on-site construction activities, traffic movements and trackout would result in temporary changes in air quality, with the potential to impact health and wellbeing.
Noise exposure	On-site construction activities and traffic movements would result in temporary changes in noise, with the potential to impact health and wellbeing.
Transport nature and flow rate	Changes in transport nature and flow rate during the construction phase due to deliveries and from staff movements have the potential to impact health and wellbeing.
Socio-economic factors (employment)	Job opportunities would be provided during the construction phase. Employment is one of the most important wider determinants of health, and therefore there is potential for beneficial health and wellbeing impacts.
Operation	
Noise exposure	Long-term and permanent changes in noise during operation are expected, with the potential to impact health and wellbeing.
Transport nature and flow rate	Changes in transport nature and flow rate during the construction phase due to staff movements, the delivery of consumables and maintenance vehicles could have the potential to impact health and wellbeing.
Socio-economic factors (employment)	Job opportunities would be provided during the operation phase. Employment is one of the most important wider determinants of health, and therefore there is potential for beneficial health and wellbeing impacts.
EMF exposure	Underground cables operating at 400 kV AC would supply electricity from Kintore substation.
Hydrogen safety (risk perception)	There is potential for community concern surrounding the flammable nature of hydrogen and associated risk of fire and explosion. The population and health chapter will address these concerns to reduce the potential for adverse risk perceptions to manifest within the local community.

Table 14.7: Summary of population and health impacts proposed to be scoped out of the EIA

Impact pathway	Justification
Construction	
No impacts scoped out.	
Operation	
Air quality	No significant sources of emissions have been identified.

Impact pathway	Justification
Groundwater quality	No discharge of contaminated runoff would occur, as regulated by the PPC Permit and as will be assessed in the Soils, Geology and the Water Environment chapter.

15 Socio-Economics

15.1 Introduction

15.1.1 This chapter of the EIA Scoping Report has been produced by Savills and sets out the proposed methodology to assess the potential socio-economic effects of the proposed development during the construction and operational phases.

15.1.2 Socio-Economic effects are proposed to be scoped in the EIA. The consideration of socio-economic conditions of the EIA will cover issues such as demographic changes and economic effects, which are generally considered to be medium and long term effects.

15.1.3 This section also considers the potential effects arising from the proposed development, accounting for what will be provided as part of the scheme.

15.1.4 The following effects are therefore proposed to be scoped in the Socio-Economic Chapter of the EIAR:

- effect on residents of the economic impact area, Aberdeenshire Council, who could work on the construction of the proposed development;
- effect on residents of the economic impact area, Aberdeenshire Council, who could benefit from employment opportunities at the proposed development once operational; and
- effect on the local authority revenues as a result of the proposed development once operational.

15.2 Consultation to date

15.2.1 Consultation with respect to socio-economics has not been undertaken prior to submission of this EIA Scoping Report.

15.3 Legislative or policy requirements and technical guidance

15.3.1 There is no specific legislation on the methods that should be used to assess the socio-economic effects of the proposed development in EIA. However, several national and local policy documents are relevant to the goals and socio-economic impacts of the hydrogen plant, as follows.

- National Grid Gas Transmission, Project Union Launch Report, May 2022[52]
- Scottish Government Scotland's National Strategy for Economic Transformation, October 2022[53]
- Scottish Government, Home Energy Efficiency programmes - Energy Efficient Scotland: Delivery report 2018 to 2019[54]
- Scottish Government, Hydrogen Action Plan, December 2022[55]
- Scottish Government, National Planning Framework 4, 2023[56]
- Scottish Government, Planning Circular 3/12: Planning Obligations and Good Neighbour Agreements, 2012[57]
- Aberdeenshire Council, Aberdeenshire Local Development Plan, January 2023[58]

15.3.2 The following best practice guidance documents are expected to be followed, although they do not form part of legislative requirements and technical guidance specific to EIA:

[52] Available from: https://www.nationalgas.com/document/139641/download

[53] Available from: https://www.gov.scot/publications/scotlands-national-strategy-economic-transformation-delivery-plans-october-2022/

[54] Available from: https://www.gov.scot/publications/home-energy-efficiency-programmes-energy-efficient-scotland-delivery-report-2018-2019/

[55] Available from: https://www.gov.scot/publications/hydrogen-action-plan/

[56] Available from: https://www.gov.scot/publications/national-planning-framework-4/

[57] Available from: https://www.gov.scot/publications/circular-3-2012-planning-obligations-good-neighbour-agreements/

[58] Available from: https://online.aberdeenshire.gov.uk/ldpmedia/LDP2021/AberdeenshireLocalDevelopmentPlan2023IntroductionAndPolicies.pdf

- Homes and Community Agency (2014) Additionality Guide[59]
- Scottish Enterprise (2008) Additionality and Economic Impact Assessment Guidance Note, *A Summary Guide to Assessing the Additional Benefit, or Additionality of and Economic Development Project or Programme, Appraisal and Evaluation Team*

15.4 Baseline

Baseline environment

15.4.1 The site of the proposed development is located near Kintore in Aberdeenshire, which had a population of 262,690 people in 2021. According to the ONS Annual Population Survey (APS), in 2021 82.3% of people aged 16-64 years old were economically active, and 3.0% were unemployed. This is slightly lower than Scotland (3.4%) and Great Britain (3.6%).

15.4.2 The latest number of jobs in Aberdeenshire is 100,000 based on the Business Register and Employment Survey. The top three industries in terms of jobs in Aberdeenshire are Wholesale and Retail Trade, Manufacturing, and Human Health and Social Work Activities. The county has a higher proportion of jobs in Manufacturing (13%) than Scotland (7.1%) and Great Britain (7.6%)

15.4.3 Based on the 2020 Scottish Index of Multiple Deprivation, Aberdeenshire is one of the least deprived local authorities in Scotland, being ranked 29th among the 32 local authorities (with the first representing the most deprived).

Proposed approach to surveys and further baseline data collection

15.4.4 Baseline information on the socio-economic conditions of the area will be collated from a variety of sources including:

- Scotland's Census;
- Scottish Government Statistics;
- Scottish Annual Business Statistics;
- the Scottish Index of Multiple Deprivation; and,
- relevant policy and evidence documents from Aberdeenshire Council.

15.4.5 These will provide a broad quantitative 'baseline' of socio-economic conditions. It should be stressed that many social and community effects are by definition complex, interrelated, and difficult to characterise or measure in a precise way. As a result, some judgements are necessarily subjective. An additional review of qualitative consultation responses will be undertaken to gain insight into potentially unquantifiable effects and taken into consideration in the analysis.

15.5 Approach to assessment

15.5.1 Kintore Hydrogen Plant will have the potential to directly support national and regional economic strategies, where both the Scottish Government and Aberdeenshire Council are committed to supporting the low-carbon / renewable energy sector and the national low-carbon and renewable energy strategies including hydrogen production.

Assessment criteria

15.5.2 There is no specific legislation or guidance on the methods that should be used to assess the socio-economic effects of the proposed development. Quantitative assessment will be used where possible and significance criteria will be produced to ensure that there is a consistent identification of effects applied during the assessment. Due to the complexity of socio-economic issues and the numerous interactions that can occur with neighbouring and more distant communities, it is not always possible to predict the precise nature or scale of each impact. Qualitative assessment will

[59] Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/378177/additionality_guide_2014_full.pdf

therefore also be used where necessary and justified. The methodology for assessing economic impacts will involve the following key stages.

15.5.3 Firstly, an analysis will be made of the current state of the local economy including unemployment, skills and occupation profile of residents.

15.5.4 Secondly, the applicant has commissioned a technical assessment on the number of jobs anticipated to be generated on site during the operational phase to inform its application for the next Hydrogen Allocation Round (HAR). This includes detail on the direct and indirect number of jobs generated and safeguarded alongside the different occupation types and associated skillsets. This work will be reviewed and inform the assessment for the EIAR. The technical assessment will be included as an appendix with the chapter. We anticipate this assessment to follow best practice guidance (for example, the Homes and Community Agency's Additionality Guide, 2023; Additionality & Economic Impact Assessment Guidance Note; Scottish Enterprise, 2008), applying assumptions to account for leakage, displacement and multiplier effects.

15.5.5 The proposed method will also be based on current best practice, including published industry reports on the economic benefit of the low-carbon gas supply in providing a fair energy transition for the UK.

Magnitude of impact

15.5.6 The magnitude of impacts is assessed as 'major', 'moderate', 'minor' and 'negligible' as set out in Table 15.1.

Table 15.1: Magnitude of impact and typical descriptions

Magnitude	Evidence for magnitude assessment
Major	Evidence of significant socio-economic challenges or benefits relating to receptor. Accorded a high priority in local, regional or national economic and regeneration policy.
Moderate	Some evidence of socio-economic challenges or benefits linked to receptor, which may be indirect. Change relating to receptor has medium priority in local, regional and national economic and regeneration policy.
Minor	Little evidence of socio-economic challenges or benefits relating to receptor. Receptor is accorded a low priority in local, regional and national economic and regeneration policy.
Negligible	No discernible change in baseline socio-economic conditions.

Sensitivity of receptors

15.5.7 The sensitivity criteria used to provide a consistent identification of effects in the assessment are shown in Table 15.2.

15.5.8 Likely sensitive receptors include residents of Aberdeenshire who could be employed during the construction or operation of the proposed development; and residents of Aberdeenshire who access public services funded by Aberdeenshire Council.

Table 15.2: Receptor sensitivity levels and description

Sensitivity	Evidence for sensitivity assessment
High	Evidence of significant socio-economic challenges relating to receptor. Accorded a high priority in local, regional or national economic and regeneration policy.
Medium	Some evidence of socio-economic challenges linked to receptor, which may be indirect. Change relating to receptor has medium priority in local, regional and national economic and regeneration policy.
Low	Little evidence of socio-economic challenges relating to receptor. Receptor is accorded a low priority in local, regional and national economic and regeneration policy.

Significance of effect

15.5.9 The level of significance of an effect will be estimated by using the sensitivity level of relevant receptors and the magnitude of the impact. We will also consider resilience to change and the receptors ability to adapt to the new circumstances as a result of the development effects. The significance matrix of DMRB LA 104 (shown in Table 5.4) will be used to judge the significance of an effect based on each receptor's sensitivity and the impact magnitude.

Geographical scope

15.5.10 The principal study area for the purposes of this chapter is defined as the local authority area of Aberdeenshire. In Savills' experience, this is the appropriate scale to assess effect on economy and employment. However, we anticipate a proportion of employees with specialist skills to be drawn from outside the Aberdeenshire area.

Temporal scope

15.5.11 Potential effects upon socio-economic receptors will be assessed in relation to temporary and permanent effects. As a general rule, temporary effects relate to construction phases of development and permanent effects relate to the operational phase.

15.6 Embedded mitigation and enhancement measures

15.6.1 Embedded mitigation and enhancement measures adopted as part of the construction and operation of the proposed development focus on minimising any potential adverse socioeconomic effects during construction and maximising the local benefits generated by the scheme during operation.

15.6.2 Comprehensive Construction Environment Management Plan (CEMP) and Construction Traffic Management Plans (CTMP) will be in place with measures to be adopted to minimise any adverse socioeconomic effects.

15.6.3 Kintore Hydrogen intends at the appropriate project juncture to hold 'meet the buyer' events and engage proactively with Aberdeenshire Council and other relevant local and regional economic stakeholders to maximise uptake of local employment, including transferrable skills from the highly qualified oil, gas and renewables sector workforce.

15.7 Scope of environmental impacts and effects

15.7.1 Potential effects are likely to relate to:

- the number of new construction jobs created and the capacity of the local construction labour market to meet this construction demand;
- the number of new jobs as a result of the operational phase of the development;
- the effect of the GVA added to the local economy; and
- the effect of the additional revenue generated for Aberdeenshire County Council.

Construction

15.7.2 Construction of the proposed development will support the employment of a range of trades and professions in the construction industry. It will also have an indirect economic effect through the sourcing of building materials, services and supplies as well as the local spending of construction workers.

Operation

15.7.3 There are a number of operational effects that will result from the proposed development. These include the creation of operation and maintenance jobs, and an increase in the workday population. The chapter will also estimate the effects on local revenue generation for Aberdeenshire County Council.

Scoped out effects

15.7.4 The potential for businesses and residents to be adversely affected by construction traffic will be considered as part of the assessment of transport effects in the Transport and Access chapter. In general, it is considered that disruption during construction will be controlled and managed through implementation of the CEMP and CTMP, and no further significant socio-economic effects are considered likely, so assessment of this in the Socio-Economics chapter is proposed to be scoped out.

15.7.5 Due to the development scale of the proposed development and the fact that there are no identified tourist attractions near the site of the proposed development (based on VisitScotland data[60]), effects on tourism attractions and accommodation facilities are proposed to be scoped out.

15.8 Limitations and uncertainties

15.8.1 By the nature of the methodology, estimates of change in the socio-economic elements such as economic and employment effects are subject to uncertainty. The estimates in the chapter will be based on good practice, but there would likely be a degree of uncertainty around estimates. This chapter's estimated effects are likely to be in a range of +/- 20% of figures given to account for this uncertainty, as is standard practice with this type of estimates.

15.8.2 The economic analysis and conclusions presented in this assessment assume that there are no major macro-economic shocks to the UK economy. Ongoing issues include the Russo-Ukrainian War, and high inflation. The potential impact of such external factors means that socio-economic figures should be kept may change in the future.

15.8.3 The uncertainty range will be presented in the EIAR, and EIAR conclusions will be based on the lower end of the likely range as regards the conclusions of any socio-economic benefits.

15.9 Inter-related effects

15.9.1 There is the potential for interaction between socioeconomics and the following other topic areas:

- traffic and transport; and
- population and health.

15.10 Cumulative effects

15.10.1 Assessment of the cumulative schemes will be undertaken within the identified ZoI of 5 km. This distance is estimated to represent an appropriate catchment for potential economies of scale from relevant cumulative developments for the generation of economic activity. The cumulative schemes are initially defined in this report, but this list will be adjusted for only relevant scheme for the assessment of socioeconomic effects to be considered within the ZoI.

15.11 Summary of proposed EIA scope

Table 15.3: Summary of socio-economic impacts proposed to be scoped in to the EIA

Impact pathway	Justification
Construction	
Employment	Construction of the proposed development will support jobs in the local economy directly and indirectly.
Operation	
Employment	The proposed development is anticipated to generate a number of direct and indirect jobs.

[60] VisitScotland (2023) Aberdeen City and Aberdeenshire Map, Available from: https://www.visitscotland.com/places-to-go/aberdeen-city-shire

Impact pathway	Justification
Local authority revenues	The proposed development will also contribute to local revenue generation for Aberdeenshire County Council.

Table 15.4: Summary of socio-economic impacts proposed to be scoped out of the EIA

Impact pathway	Justification
Construction	
Disruption to local businesses and residents (not elsewhere assessed)	Disruption during construction will be controlled and managed through implementation of the CEMP and CTMP, and assessed in the Transport & Access and Population & Health chapters where impact pathways are applicable.
Operation	
Tourism attractions and accommodation	Due to the location and scale of the proposed development and there being no identified tourist attractions near the site.

16 Other Impact Pathways

16.1 Introduction

16.1.1 This section considers other categories or pathways of potential environmental impact that are enumerated in Schedule 4, paragraph 5 of the EIA Regulations.

16.2 Heat, light and radiation

Heat

16.2.1 The electrolysis cells and other equipment will be provided with appropriate cooling systems as required, as ground- or building-mounted systems. Impacts of these, such as energy consumption, noise emissions and the visibility of cooling units, will be assessed in the Climate Change, Noise & Vibration and Landscape & Visual chapters.

16.2.2 The impact of any changes to river water temperature in the River Don from the water discharge pipeline will be assessed in the Soils, Geology and the Water Environment chapter and in the Ecology & Biodiversity chapter where applicable.

16.2.3 No other significant effects from heat are considered likely and further separate assessment is proposed to be scoped out of the EIA.

Light

16.2.4 Lighting will be required during construction and operation as set out in the project description. Potential light impacts will be included in the Landscape & Visual Chapter (also informing the Archaeology & Cultural Heritage Chapter with respect to any visual impacts from lighting on heritage assets' settings) and in the Ecology & Biodiversity chapter with respect to impacts on species such as bats.

16.2.5 No other significant effects from lighting are considered likely and further separate assessment is proposed to be scoped out of the EIA.

Radiation

16.2.6 The proposed development would not be a source of ionising radiation. Electrical infrastructure, such as substations, overhead lines and underground cables, are a source of non-ionising power-frequency electric and magnetic fields (EMF). However, given the location of the development adjacent to the existing Kintore Substation with minimal distance for the grid connection (which will seek to avoid residential properties) and the presence of several existing high-voltage overhead lines crossing or adjacent to the site, there would be no significant change in public exposure to power-frequency EMF.

16.2.7 Power-frequency EMF is managed by the electricity industry under a voluntary Code of Practice published by the former Department for Energy and Climate Change (DECC), which sets guideline limits set to be protective of occupational and public health. The proposed development and its grid connection will a matter of course comply with these exposure guidelines. Compliance and public risk perception will be assessed in the Population and Health Chapter.

16.2.8 The proposed development does not include tall structures or radio infrastructure that could cause electromagnetic interference.

16.2.9 No significant effects from radiation are considered likely and further separate assessment is proposed to be scoped out of the EIA.

16.3 Use of natural resources

16.3.1 The proposed development will use raw water from the River Don to product hydrogen. The developer has been issued an abstraction licence by SEPA under the Controlled Activity Regulations, which limits abstraction to an environmentally sustainable level under a variety of flow conditions. As this is controlled by an existing environmental regulatory regime, no significant adverse effects are considered likely.

16.3.2 The proposed development site is partly on agricultural land and will affect soil resources. The Land Capability for Agriculture map of soil quality indicates that the proposed development site comprises primarily lesser-quality grade 3.2 grade 4.1 or 4.2 soils. Impacts on soils will be assessed in the Soils, Geology and the Water Environment chapter.

16.3.3 No other significant effects from the use of natural resources are considered likely and further separate assessment is proposed to be scoped out of the EIA.

16.4 Production of waste

16.4.1 In operation, the proposed development would generate waste water from the water treatment and purification stage and waste oxygen from the hydrogen production. Discharge of waste water will be controlled under an Environmental Permit from SEPA. Impacts on from water discharge will be assessed in the Soils, Geology and the Water Environment chapter.

16.4.2 Oxygen will be vented and is not a waste product requiring further management or causing an environmental impact. A very small amount of hydrogen, relative to total production, will also be vented during start-up and shut-down. Again, this is not a waste product requiring further management or causing an environmental impact, and represents an insignificant loss of the energy production at the proposed development.

16.4.3 Fire risk is discussed in Section 16.8, below.

16.4.4 No other significant effects from production of waste are considered likely and further separate assessment is proposed to be scoped out of the EIA.

16.5 Aviation

16.5.1 The Civil Aviation Authority (CAA) has a general interest in charting all known structures of 91.4 m (300 feet) or more above ground level. The proposed development will not have any permanent structures of this height. Depending on height, tower cranes used during construction would be notified to the CAA and lit for aviation safety as required.

16.5.2 The proposed development site lies within the safeguarding zone of Aberdeen Airport. It would fall mainly into areas marked as requiring the airport to be consulted if structures exceeding 45 m or 90 m in height are proposed. Some areas on the access road and water pipeline route may fall into the zone of consultation for structures exceeding 15 m in height. The proposed development structures in these locations are not expected to exceed the respective heights and no impact on aviation safety or Aberdeen Airport safeguarding is considered likely. Further assessment is proposed to be scoped out of the EIA.

16.6 Pollution and nuisances

16.6.1 Effects relating to pollution and nuisances (including effects on water and soil resources and effects in relation to noise and air quality) will be assessed in the respective topic chapters where applicable. Further separate assessment is proposed to be scoped out of the EIA.

16.7 Risk to human health

16.7.1 Potential effects on population and human health are considered in Section 6.

16.8 Risk of major accidents or disasters

16.8.1 The potentially relevant accidents or disasters are considered to be:

- fire or explosion risk from hydrogen produced and stored on the hydrogen plant site or in the pipeline;
- fire risk from oxygen released by the electrolysis process;
- potassium hydroxide spillage (in the alkaline technology option); and
- ground, river or surface water flood risk.

Hydrogen inventory and transmission

16.8.2 Hydrogen is a flammable gas and could pose a fire or explosion risk from the transient inventory within the production process, small buffer tanks and pipelines within the hydrogen plant site or in the export pipelines to the national gas grid.

16.8.3 The hydrogen plant will have a direct pipeline connection to its National Grid Gas connection point with FM10 and/or FM24 where the hydrogen will be blended into the gas network. The stored hydrogen inventory will exceed the 5 t lower tier threshold for the site to fall within the COMAH (Control of Major Accident Hazards) Regulations 2015 and may possibly exceed the 50 t upper tier threshold. As such its safe operation will be regulated by the competent authority, which is the Health and Safety Executive (HSE) working in conjunction with SEPA. HSE defines 'safety' as including environmental protection in the context of COMAH[61]. The COMAH regulations require operators to take all measures necessary to prevent major accidents and limit their consequences to people and the environment

16.8.4 The facility will also require a Hazardous Substances Consent (HSC) from Aberdeenshire Council. Similarly to COMAH, the purpose of the HSC is to ensure that risk to people and to the environment is taken into account before a controlled quantity of a hazardous substance is allowed to be present at a site.

16.8.5 Every COMAH facility is required to have a major accident prevention policy (MAPP) and upper tier facilities are also required to prepare a Safety Report, prior to operation, for assessment by the competent authority. The MAPP covers identification and evaluation of major hazards, control procedures, emergency planning and auditing. A Safety Report includes more detail on the likelihood of potential accidents, consequences (including an environmental assessment), and the prevention and control measures.

16.8.6 As such, safety will be regulated through well-established regimes by both Aberdeenshire Council and the HSE with SEPA, and no significant fire or explosion risk from hydrogen storage is considered likely.

Potassium hydroxide release

16.8.7 This is only applicable in the case of the alkaline electrolysis technology. It is not required for the PEM technology.

16.8.8 Potassium hydroxide (also known as lye or caustic potash) would be stored as a liquid solution at 15-25% strength in tanks on the site. It is a corrosive and irritant to the skin, eyes or lungs if inhaled. Release by spillage could cause a risk of ground or water contamination.

16.8.9 Appropriate storage will be regulated by SEPA under the PPC Permit for the site, which will require bunded tanks and a sealed drainage system to minimise the risk of spillage and ensure containment should that occur.

16.8.10 No significant accident or disaster risk from potassium hydroxide is therefore considered likely.

[61] HSE (undated): Understanding COMAH. A guide for new entrants. [Online] https://www.hse.gov.uk/comah/guidance/understanding-comah-new-entrants.pdf, accessed 21/06/23

Oxygen and hydrogen venting

16.8.11 Oxygen is not itself flammable but in elevated concentrations could increase fire risk from other sources, either within the hydrogen plant site or at off-site receptors. This is a well understood risk that is common to industrial air separation or cryogenic liquefaction plants that have oxygen venting. Hydrogen is a flammable gas and could cause a fire or explosion risk if present in concentrations above the lower ignition level or lower explosive level. However, as it is lighter than air, vented or fugitive hydrogen would normally readily disperse.

16.8.12 The hydrogen plant design will include vent stacks for oxygen produced by the electrolysis cells, which will be of a height to provide dispersion of the vented oxygen to a safe concentration at all on-site and off-site locations in line with the guidance in European Industrial Gases Association (EIGA) document 154/16: Safe Location of Oxygen and Inert Gas Vents[62].

16.8.13 It will also include vent stacks for a small amount of hydrogen during start-up and shut-down of the plant, when the production level is too low for compression and export to the gas grid and when certain pipeline sections need to be purged with nitrogen for safety. The venting volume and stack design will be controlled such as to avoid any ignition or explosive risk from hydrogen. Further detail will be provided in safety information submitted with the planning application.

16.8.14 No significant effect due to elevated fire risk from oxygen or hydrogen venting is therefore considered likely.

Flood risk

16.8.15 Flood risk, flood consequences and any requirements for additional flood resilience or emergency planning will be assessed in the Soils, Geology and the Water Environment chapter and its appended Flood Risk Assessment (FRA).

Summary of major accidents or disasters

16.8.16 Safe operation of the proposed development will be regulated through the HSC, COMAH and PPC regimes, under the control of Aberdeenshire Council and the competent authority (HSE and SEPA) respectively. Given the regulatory controls and oversight, no significant environmental impacts from accidents and disasters are considered likely.

16.8.17 It is proposed that the EIAR Project Description chapter will further discuss the regulatory controls on safety and the facility's design for safe operation. The impact of public perceptions of risk will be assessed in the Population and Health chapter and flood risk, as noted above, will be assessed in the FRA.

16.8.18 Further separate assessment is of accidents and disasters is proposed to be scoped out of the EIA.

16.9 Transboundary effects

16.9.1 Transboundary effects are those likely to have significant a significant effect on the environment of a European Economic Area (EEA) state other than the UK. The need to consider the potential for such transboundary effects is rooted in the United Nations Economic Commission for Europe (UNECE) Convention on EIA in a Transboundary Context, adopted in 1991 in the Finnish city of Espoo and commonly referred to as the 'Espoo Convention'. The Convention requires that assessments are extended across borders between Parties of the Convention when a planned activity may cause significant adverse transboundary impacts. The Espoo Convention has been implemented by the EIA Directive and transposed into UK law under the EIA Regulations, Part 10.

16.9.2 Having regard to all of the potential environmental impact pathways set out in the preceding sections of this Scoping Report, there is considered to be no potential for transboundary effects. There is no potential for any impacts from

[62] EIGA (2016): Safe Location of Oxygen and Inert Gas Vents. Doc 154/16. [Online] https://www.eiga.eu/uploads/documents/DOC154.pdf, accessed 21/06/23

discharge of treated water into the River Don to extend beyond the UK territorial waters. All other impacts would be limited to an area of a few kilometres around the proposed development.

16.9.3 Assessment of transboundary effects is therefore proposed to be scoped out of the EIA.

17 Cumulative Development Search

17.1 Introduction

17.1.1 An initial search has been made in July 2023 for other developments and proposals that may be of relevance for the Cumulative Effects Assessment (CEA) to be undertaken in the EIA. The search will be updated at the time of carrying out the EIA.

17.1.2 Other developments may be at the plan or policy stage, planning application stage, or may be consented or under construction. Collectively, in this section, they are referred to as 'developments' regardless of stage.

17.1.3 The results of the initial search are included here to request comment from the planning authority about the status of the other developments listed and about any further developments (including those likely to be forthcoming during the EIA process but may not yet be listed on the planning register) that the planning authority would suggest for consideration in the CEA.

17.2 Overarching criteria

17.2.1 There are broadly two categories of development with the potential to give rise to likely significant cumulative effects:

- those that, due to their scale, location and/or nature of impact pathways, have the potential to add to the impacts of the proposed hydrogen plant development such as to cause a likely significant effect at sensitive receptors; and
- those that introduce new sensitive receptors at a location where they have the potential to experience a greater impact from the proposed hydrogen plant development (and if applicable the combined impact with another development) than existing representative sensitive receptors assessed in the EIA.

17.2.2 These overarching criteria generally exclude minor householder applications and business applications (such as building extensions or changes of use), of which there are very large numbers at any given time, unless these introduce new receptors or new construction/land-uses outside existing developed areas that could be affected by the proposed hydrogen plant development.

17.2.3 Examples of other developments with a potentially-significant combined effect might be those requiring large-scale construction with noise or traffic impact pathways, in sufficient proximity to the proposed hydrogen plant development so as to affect the same sensitive receptors. Construction, operation and demolition phases of other developments have been considered as there may be combined effects with the proposed hydrogen plant development from different phases, for example an impact that is extended over time or a combined impact at one time, at a given sensitive receptor.

17.2.4 Examples of new sensitive receptors might be new residential properties or other landuses likely to be regarded as a sensitive for one or more EIA topics, that lie in closer proximity to the proposed hydrogen plant development than existing receptors or in an area where no existing receptors would have been assessed in the EIA, or which significantly increase the number of sensitive receptors affected at that location. This would not include every potential new sensitive receptor individually, as representative receptors are typically used to determine the greatest impacts at a given location or in a given direction from the proposed development. For example, the nearest residence in a north-westerly direction from particular noise sources in the proposed development would be representative of the greatest noise impact at all residential receptors in that direction, and a new residence in the same direction but lying further away would not usually require additional cumulative effects assessment; but a new housing estate where there was previously only a single property or small number of residences might be included due to the substantial increase in number of residents affected.

17.3 Search area and data sources

17.3.1 The search area for potential cumulative developments is based on the Zones of Influence (ZoIs) predicted at this stage for the EIA topic areas. The largest ZoIs at this stage are approximately 5 km from the main development site for landscape, visual and heritage impacts. Potential smaller ZoIs for other topics such as construction dust and noise at other areas of activity within the proposed application boundary have also been considered, as have likely road access routes for construction and operational traffic.

17.3.2 Cumulative developments have been categorised as Tier 1, Tier 2 or Tier 3 to describe their level of maturity, certainty over delivery, and detail of information available. These tiers are taken from the Planning Inspectorate's Advice Note 17[63] for nationally-significant infrastructure developments in England, which provides a helpful framework albeit not being required guidance for the proposed hydrogen plant development.

17.3.3 Tier 1 developments are those with submitted applications, consents, or that are already under construction. Tier 2 developments are those at scoping stage for EIA. Tier 3 developments are those otherwise indicated as a possibility, e.g. through pre-application discussion with a local planning authority or at sites allocated for development in relevant local development plans. At tiers 2 and 3 there is typically only limited information available concerning a proposed development's design and potential environmental effects. Assessment of specific cumulative effects is therefore not always possible, but in such cases possible effects that are foreseeable will be discussed to the extent feasible in the CEA.

17.3.4 The following data sources have been searched:

- Savills' database of development proposals;
- development projects listed on the Aberdeenshire Council planning register: https://upa.aberdeenshire.gov.uk/online-applications/search.do?action=simple&searchType=Application
- developments projects listed on the Energy Consents Unit planning register: https://www.energyconsents.scot/ApplicationSearch.aspx?T=2; and
- sites allocated for development in the Aberdeenshire Local Development Plan 2023 (https://www.aberdeenshire.gov.uk/planning/plans-and-policies/ldp-2023/).

17.3.5 The search of local authority planning applications has focused on those with a live application (at any stage of the process, including EIA screening and pre-application discussions) or with permission granted within the last three years, as this is the typical period for expiry of a planning consent if not implemented. Earlier consented developments would be expected to be under construction or completed and to be identified through baseline studies, or their planning permission is likely to have lapsed. However, where evidence such as condition discharge, variation applications or appeals within the time period searched suggests a development applied for or consented earlier is still 'live' but not yet constructed, this has also been included in the initial long-list.

17.4 Shortlisting

17.4.1 The initial search within the ZoI returned a little over four hundred developments. The longlist was screened using the overarching criteria set out above and then further reviewed against the following criteria to provide an initial shortlist for CEA. These criteria were not exhaustive or wholly prescriptive: professional judgement by the EIA co-ordinator advised by topic specialists has also been applied throughout.

17.4.2 Shortlist inclusion criteria were as follows:

[63] Planning Inspectorate (2019): Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects, version 2. [Online] Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-17/, accessed 08/08/23

- EIA developments or those where an EIA screening or scoping request indicated the possibility of significant environmental effects was foreseen;
- 'major developments' where identified as such in planning application or decision;
- developments whose scale, nature or location suggests potential for particular cumulative impacts – e.g. minerals and waste projects, an industrial or combustion process as a source of air or water pollutant or noise emissions, a potential large traffic generator such as distribution warehouse or retail park, or a development in proximity to designated site or other protected asset;
- completed developments with potential operational impacts that may not be captured in baseline studies (e.g. due to very recent start of operation); and/or
- developments that introduce sensitive receptors for which the assessment of effects on existing sensitive receptors identified through baseline study and included in the assessment of a particular environmental impact would not be representative.

17.4.3 Shortlist exclusion criteria were as follows.

- evidence such as aerial photography indicates that the development is completed and forms part of the existing baseline and receptors;
- an application that was refused (with no appeal pending);
- developments for which existing sensitive receptors are adequately representative for determining likely significant effects; and/or
- judgement that due to factors including distance, scale or existing context of the development that no impact pathway with the potential for significant cumulative effects with the proposed hydrogen plant development exists.

17.4.4 From this EIA-wide shortlist (to be updated at EIA stage, including in response to any comment from the planning authority at the scoping stage) the individual ZoIs and details of impact pathways will used by each topic author to determine a shortlist applicable to that topic for the CEA.

17.4.5 Table 17.1, overleaf, shows the shortlist at this stage. The developments are mapped in Figure 5.1. Comments on any additional known or forthcoming developments, proposals or allocations that should be considered would be welcomed.

Table 17.1: Shortlisted cumulative developments

ID	Planning ref.	Description	Address	Postcode	App. date	Approval	Dist. main site (m)	Dist. red line (m)	EIA?	Shortlist reason	Tier
1	APP/2022/2022	Scheme comprises formation of battery energy storage system (BESS) (49.9 megawatts), construction of substation, welfare facility, security fencing, CCTV, floodlighting, formation of access, attenuation basin and associated infrastructure.	South Leylodge Farmhouse, Kintore, Inverurie, Grampian,	AB51 0XY	30/09/2022	20/04/2023	50	50	No	Adjacent to the main site, potential cumulative visual impact, construction impacts and construction traffic on the B977	1
2	ENQ/2023/0382	Scheme comprises construction of 49.9 megawatts battery storage facility.	Kintore Substation Kintore, Kintore, Inverurie, Grampian,	AB51 0	13/03/2023	N/A	817	601	No	Potential cumulative landscape/visual impact and construction traffic on the B977	1
3	APP/2021/2903	Scheme comprises construction of workshop (class 5) and office (class 4) and formation of bus/taxi depot with SUDS. Scheme also includes translucent rooflights. This project also includes associated infrastructure works and access roads.	Land At Hill Of Cottown, Kintore, Inverurie, Grampian,	AB51 0YA	28/01/2022	13/12/2022	727	727	No	Potential cumulative landscape/visual impact to the north of the main site.	1
4	N/A	Scheme comprises of a proposed residential development for 150 units. Associated works include access roads, sewer systems, infrastructure, enabling and landscaping works. Please note this site has been identified through the Aberdeenshire Council Housing Land Audit - (HLA).	Woodside Croft, Town Park (Gauch Hill), Inverurie, Grampian	AB51 0	N/A	N/A	2,473	988	N/A	Large residential potentially introducing additional sensitive receptors and potential possible change in landscape character from viewpoints to north east towards Kintore.	1
5	APP/2022/0651	Scheme comprises national for construction of enclosed 132kv gas insulated switchgear substation and associated infrastructure (formation of	Land South-east Kintore Grid E, Kintore, Inverurie, Grampian	AB51 0XY	05/05/2022	12/10/2022	571	571	No	Expansion to substation adjacent to site with potential for cumulative impacts through a range of	1

ID	Planning ref.	Description	Address	Postcode	App. date	Approval	Dist. main site (m)	Dist. red line (m)	EIA?	Shortlist reason	Tier
		substation platform, fenced compound with cctv, siting of battery storage container, formation of access tracks, sustainable urban drainage system basin, temporary construction of compound and landscaping electricity substation comprising platform area, control building, battery storage container, associated plant and infrastructure, fencing, cctv, access tracks, sustainable urban drainage system basin and landscaping.								environmental pathways	
6	APP/2020/1437	Scheme comprises national for electricity substation comprising platform area, control building, associated plant and infrastructure, ancillary facilities, landscape works and road alterations and improvement works.	Land To The West Of Kintore El, Kintore, Inverurie, Grampian	AB51 0XZ	04/08/2020	27/04/2021	274	274	No	Expansion to substation adjacent to site with potential for cumulative impacts through a range of environmental pathways	1
7	APP/2020/1673	Scheme comprises formation of battery energy storage compound, siting of substation, construction of boundary fencing, 4 security cameras, suds and access track (as approved by APP/2019/0373) with the addition of additional new planting on these side. This project also includes associated infrastructure works and access roads.	Fordtown, Kintore, Inverurie, Grampian	AB51 0XJ	04/09/2020	24/02/2021	1,470	15	No	Adjacent to access route for AGI with potential cumulative construction and traffic impacts.	1
8	APP/2022/0249	Scheme comprises formation of battery energy storage compound (up to 49 megawatts), siting of switch room, HV container, site office, construction of boundary	Land South Of A96 East Of, West Broomhill, Kintore, Sheriffburn	AB51 0XA	17/02/2022	01/07/2022	2,443	631	No	Potential for cumulative landscape/visual impacts	1

ID	Planning ref.	Description	Address	Postcode	App. date	Approval	Dist. main site (m)	Dist. red line (m)	EIA?	Shortlist reason	Tier
		fencing, 5 CCTV masts and formation of access track, including sustainable urban drainage system and parking.	House, Inverurie, Grampian								
9	APP/2023/1017 and ECU00004756	Scheme comprises construction of energy storage facility with a maximum output of 300MW.	Midmill Business Park, Tofthills Avenue, Kintore, Inverurie, Grampian	AB51 0Q	22/05/2023	N/A	3,083	1,167	No	Potential for cumulative landscape/visual impacts, construction and grid connection	1
10	APP/2022/2613	Scheme comprises construction of 4 holiday cabins, associated car parking and associated service buildings (amended layout to planning permission app/2021/1327).	Deystone, Kintore, Inverurie, Grampian	AB51	16/12/2022	14/02/2023	4,642	45	No	Adjacent to potential access for pumping station construction. Introduces additional sensitive receptors.	1
11	APP/2023/0872	Scheme comprises conditions 1 (a) siting, design, layout, external appearance, finishing materials, (b) design statement, (c) landscaping, (d) levels survey and site sections, (e) means of access, (f) car parking and turning areas, (g) footpaths to b994 and b987, including bus stops, (h) flood risk assessment, (i) details of water bodies, including method statements, (j) foul and surface water disposal, (k) waste management plan of planning permission in principle app/2017/0288 including sustainable urban drainage system. This project also includes associated infrastructure works and access roads.	Woodside Croft Midmill, Kintore, Inverurie, Grampian	AB51 0	09/06/2023	N/A	2,623	1,731	No	Large residential and potentially increases residential receptors closer to the proposed development than the south edge of Kintore (between business park and A96)	1
12	APP/2022/0283	Residential Development comprising of 600 Dwellinghouses, Neighbourhood	Land At Kintore East Kintore Aberdeenshire		14/02/2022	N/A	3,552	1,330	No	Large residential development potentially introduces sensitive	1

ID	Planning ref.	Description	Address	Postcode	App. date	Approval	Dist. main site (m)	Dist. red line (m)	EIA?	Shortlist reason	Tier
		Centre, Landscaping, Open Space and Associated Infrastructure Without Compliance with Conditions 3 (Dwellinghouse Occupation Date), 4 (Dwellinghouse Occupation until Kintore Primary School opened), 9 (Formation of Access to Supermarket consented under APP/2014/1953 to be formed), 12 (Construction in the Floodplain); and Amendments to the Wording of Conditions 1 and 2 (Timing and Content of MSC submission), 5 (Energy Statement Submission), 6 (Remediation Work Phasing), 7 (Landscaping), 8 (Archaeology), 11 (Approved Use Class of Neighbourhood Centre/Community Facilities) and 13 (Foul Sewerage Details); (Change to Condition numbering) 10 (Travel Plan Phasing), 14 (Public Transport Strategy Phasing) and 15 (Junction Improvement Works Submission) of Planning Permission Reference APP/2013/3830								receptors closer to the water pipeline, pumping station and outfall construction and potential for cumulative construction and traffic impacts	
13	N/A	Scheme comprises of a proposed residential development for 65 units. Associated works include access roads, sewer systems, infrastructure, enabling and landscaping works. This site has been identified through the Aberdeenshire Council Local Development Plan (LDP) which was adopted April 2017.	Greystone Road, Inverurie, Grampian	AB51 5	N/A	N/A	2,423	2,423	N/A	Land identified in the local plan, introduces new residential receptors	3

ID	Planning ref.	Description	Address	Postcode	App. date	Approval	Dist. main site (m)	Dist. red line (m)	EIA?	Shortlist reason	Tier
14	N/A	Scheme comprises of a proposed mixed development. Associated works include access roads, sewer systems, infrastructure, enabling and landscaping works. This site has been identified through the Aberdeenshire Council Local Development Plan (LDP) which was adopted April 2017.	Kintore, Inverurie, Grampian	AB51 0	N/A	N/A	2,741	1,004	N/A	Land identified in the local plan, introduces new residential receptors	3