

4.0 Geology, Hydrogeology and Hydrology

4.1. Superficial Geology

The British Geological Survey (BGS) map 1:50,000 Combined (Sheet 67 Stonehaven) identifies that there are several different superficial deposits noted throughout the development site, these include;

- The majority of the site is associated with Banchory Till Formation. This is associated with stiff stony sandy clayey diamicton with clasts of Dalradian and Highland Border Complex Metamorphic rocks and Caledonian Igneous rocks (typically massive but stratified and more sandy locally).
- An area in the vicinity of Cairnhill is associated with Alluvium (clay, silt, sand and gravel). An indicative location is presented in [Drawing 72054/9012](#), [Appendix 1](#).

4.2. Solid Geology

The British Geological Society (BGS) map 1:50,000 Combined (Sheet 67 Stonehaven) identifies that the principal underlying geology is Aberdeen Formation semi-pelite biotite-rich coarsely bedded with inter-bedded micaceous and feldspathic psammite. There are also outcrops through the site associated with the Glen Effock Schist Formation.

4.3. Mineworkings

Landmark Envirocheck Report (EC 34325749_1_1) states that there is no hazard from shallow mine workings within 1km of the site.

4.4. Quarrying

There are no recorded quarries in the BGS GeoIndex information which relate to the Phase 1A Development Site. The Envirocheck Report ([Appendix 2](#)) does not identify any recorded quarries. [Table 2](#) provides a summary of the onsite quarrying activity identified within the historic mapping ([Appendix 2](#)).

Table 2: Summary of historic quarrying activities

Name	Size (full extents)	Status	Approximate NGR
Old Quarry (approximate location presented in Drawing 72054/9011 , Appendix 1)	20m x 10m	Disused (in-filled 1968)	NO 9045 9351

4.5. Hydrology

[Table 3](#) summarises the surface water features identified during the walkover.

Table 3: Summary of surface water features identified during the walkover

Location	Surface Water Feature	Flow Direction	Approximate size
Onsite	Burn of Pheppie	Easterly	N/A

- The Pheppie Burn is noted in the southern section of the site (flowing easterly). It is not classified under the SEPA River Basin Management Plan.
- The Pheppie Burn is located within the Kincardine and Angus Coastal Catchment Area (SEPA River Basin Management Plan)

4.6. Hydrogeology

- The BGS Hydrogeological Map of Scotland (1:625,000) (1988) states that site is within a region underlain by impermeable rocks (generally without groundwater expected at shallow depth).
- The solid deposits are classified as weakly permeable by the Groundwater Vulnerability Map of Scotland (1995).
- The flow direction of the groundwater is currently unknown at this stage and requires to be established.

4.7. Private Water Supplies

The Contaminated Land Officer confirmed that there is one known private water supply located approximately 140m north of the Phase 1A Boundary held on Aberdeenshire Councils database. This is presented in [Table 4](#).

Table 4: Offsite Private Water Supply Entry

Name	Postcode	Approximate NGR
Residential Property: The Chimneys, Cairnhill	AB39 3PH	NO 8998 9365

An approximate location of the onsite private water supply is presented in [Drawing 72054/9013](#), [Appendix 1](#).

4.8. Flooding

It is understood that a Flood Risk Assessment (FRA) is to be undertaken as part of the Phase 1A Development proposal and will be reported separately. This is being undertaken by Fairhurst and will be submitted as a separate Report.

4.9. Radon

The Health Protection Agency (HPA) has published updated low resolution maps identifying areas of Radon concern in Scotland (July 2011). These Drawings identify the percentage of homes at or above the Action Level. The site is within an 'Intermediate' Radon probability area identifying that and approximately 1-5% of homes are at or above the Action Level of 100Bq/m³¹.

¹ Information noted in recently published guidance issued July 2011 (HPA-CRCE-023)

4.10. Petroleum/Hydrocarbon Storage Tanks

Table 5: Summary of tanks/premises identified during the walkover

Premises	Identified Tank
Residential Property: Upper Cairnhill	Heating Oil Tank (self-bunded)
Residential Property: The Steading	Not noted (property not fully accessed)
Farm/Steading: Nether Cairnhill & outbuildings	Heating Oil Tank (self-bunded)
Residential Property: Hillhead Croft	Not noted (property not fully accessed)
Residential Property: Nether Cairnhill Cottage	Not noted (property not fully accessed)
Residential Property: The Chimneys (offsite)	Not noted (property not fully accessed)
Residential Property: Smithy Croft (offsite)	Not noted (property not fully accessed)
Residential Property: Smithy Cottage (offsite)	Not noted (property not fully accessed)
Residential Property/Steading: Windyedge & outbuildings/sheds	Not noted (property not fully accessed)
Residential Property/Steading: East Windyedge & outbuilding	Heating Oil Tank (self-bunded)
Onsite source (included within Phase 1A Development Boundary – Drawing 72054/9013, Appendix 1)	
Offsite source (located out with Phase 1A Development Boundary – Drawing 72054/9013, Appendix 1)	

4.11. Review of previous Ground Investigations

4.11.1. Bluebell Cottage, Cammachmore

A previous ground investigation was undertaken for a proposed residential development approximately (60m AOD) 340m north-east of the site. It was a geotechnical intrusive investigation undertaken to ascertain the ground conditions at the site for foundation design purposes and assess the suitability of the underlying soils for a septic tank soakaway. The investigation consisted of one window-sampler borehole location, two trial pits to depths between 1.70mbgl and 2.6mbgl and one infiltration test.

The ground conditions across the site predominantly comprised Topsoil overlying medium dense sandy gravels with angular cobbles and very stiff clayey sand/sandy clay (Glacial Till). Table 6 provides a summary of the ground conditions at the site.

Table 6: Summary of ground conditions

Strata	Typical Thickness Encountered (m)	Typical Depth to Base of Deposits (mbgl)
Topsoil	0.00 – 0.50	0.40
Natural Deposits (Glacial Till comprising cohesive and granular materials)	1.00 – 2.20	1.00 – 2.60

Groundwater was encountered between 1.70mbgl and 2.50mbgl and was recorded as moderate to strong ingress.

It was reported that an allowable bearing value of 150kN/m² may be achieved for the underlying granular deposits. Infiltration testing concluded that the medium-dense gravel deposits were unsuitable for a septic tank soakaway.

5.0 Consultation Responses

5.1. Contaminated Land Officer

A request for relevant information relating to the site was sent to Aberdeenshire Councils Contaminated Land Officer on the 25th March 2011. A response was received on the 13th April 2011. The response confirmed:

- “No land with 500m of the site has been determined or investigated under Part IIA of the Environmental Protection Act”.
- There are not any complaints or notices served with regard to the site or its environs”.
- They are not aware of any mine workings within or in the vicinity of the site”.

A digital copy of the Fairhurst Contaminated Land Officers information request letter and response are presented in [Appendix 5](#).

Aberdeenshire Councils Contaminated Land Officer EIA Scoping Opinion Response

The Contaminated Land Officer’s was also contacted by Aberdeenshire Council’s Planning Department with regard to providing an EIA Scoping Opinion.

The response confirmed that;

- There are a limited number of potential sources of contamination within the site boundary and on adjacent land which may pose a risk to the intended development and the wider environment.

A summary and digital copy of the Contaminated Land Officer’s EIA Scoping Opinion response is presented in [Appendix 5](#).

5.2. Petroleum Officer

On the 25th March 2011, a request for relevant information relating to the site was sent to Aberdeenshire Councils Trading Standards Officer (who oversees the licensing of petroleum premises). A response was received on the 4th April 2011. The response confirmed that there were no registered petroleum tanks within the Phase 1A Site.

A digital copy of the Fairhurst Petroleum Officers information request letter and response are presented in [Appendix 5](#).

5.3. Scottish Environment Protection Agency

A request for relevant information relating to the site was sent to the Scottish Environment Protection Agency (SEPA) (Aberdeen Office) on the 25th March 2011. A response was received on the 19th May 2011. The response confirmed the following;

SEPA’s databases did not identify any licensed private water abstraction (over 10m³ per day) within the site boundary area or within 500m of the site.

Due to the rural nature of the site “...it is possible that there are historic farm tips etc dispersed around the area”.

A digital copy of the Fairhurst SEPA information request letter and complete response are presented in [Appendix 5](#).

SEPA Officer EIA Scoping Opinion Response

A SEPA Officer was also contacted by Aberdeenshire Councils Planning Department with regard to providing an EIA Scoping Opinion. The response dated 29th April 2011 confirmed that:

Flood Risk

- "...SEPA would object to any planning application for the development on the site unless it was supported by a Flood Risk Assessment (FRA) to demonstrate that the development accords with the principles of Scottish Planning Policy".

Surface water drainage

- "...it is essential that there is recognition of green corridors and SUDS as amenity across the area".

Engineering activities in the water environment

- "...bridging solutions or bottomless or arched culverts which do not affect the bed and banks of the watercourse should be used...if the proposed engineering works are likely to exacerbate flood risk then a Flood Risk Assessment (FRA) should be submitted".

Hydrogeology

- "...the applicant will need to provide detailed plans of the proposal with any cuttings or excavations for roads or building developments clearly defined and address any groundwater drainage/abstraction requirement at the planning application stage".
- "...A detailed water features survey will be required. This should include any springs, wells and abstractions, as well as discharges, surface water features and potentially sensitive habitat (ground water dependant terrestrial ecosystems – GWDTE) in the area.
- "...A private water supply survey should be undertaken to identify any that may be present in the vicinity. If Private Water Supplies (PWS) are present".
- "...It is noted that an initial ground contamination assessment will be undertaken. If significant contamination is identified, then remediation and/or other mitigation measures may be required".

Summary and digital copies of the SEPA EIA Scoping Opinion response are also presented in [Appendix 5](#).

5.4. Scottish Natural Heritage

SiteLink (<http://www.snh.org.uk/snhi/>) was accessed on the 12th April 2011 and confirmed that the site is not within a designated area ².

² Sites of Special Scientific Interest, Special Areas of Conservation, Special Protection Areas, RAMSAR or National Scenic Areas or National Nature Reserves.

SNH Officer EIA Scoping Opinion Response

A SNH Officer was also contacted by Aberdeenshire Councils Planning Department with regard to providing advice in response to the Scoping Report ([Appendix 6](#)). A response dated 26th April 2011 confirmed that there were potentially hydrological impacts to the Red Moss of Netherley Special Area of Conservation (SAC) from the proposed development.

[Red Moss of Netherley Special Area of Conservation (SAC) is located approximately 2km west of the Phase 1A Development Boundary. Following an investigation of the SEPA River Basin Management Plan, it should be noted that the Red Moss of Netherley SAC is located within the River Dee (Grampian) Catchment Area and appears to be associated with the Crynoch Burn (moderate classification status). The proposed development and both watercourses (Burn of Elsie and Burn of Pheppie) are located within the Kincardine and Angus Coastal Catchment Area and flow in an easterly direction (SEPA River Basin Management Plan). As the Red Moss and the Phase 1A are in different Catchment areas it is not considered that the proposed works would negatively impact the Red Moss of Netherley Special Area of Conservation].

A copy of all digital EIA Scoping Opinions received to date are presented in [Appendix 5](#).

6.0 Environmental Information

Information in this section relates to the published environmental information (incidents, legal determinations, waste transfer licences etc) for the site. If a particular feature is identified as being potentially contaminative, it is taken forward to risk assessment stage.

6.1. Contaminated Land Register Entries and Notices

There are no recorded Contaminated Land Registered Entries noted within the Phase 1A Development Boundary.

6.2. Discharge Consents

There are six registered Discharge Consents noted within the Phase 1A Development Boundary. These are presented in [Table 7](#).

Table 7: Registered Discharge Consents onsite and within 250m of the site

Location/Distance from Site	Permit Ref	Date	Discharge Type	Discharge Environment	Potential Source
Dwellinghouse, Cairnhill	K/94/36/U	24-11-94	Septic Tank	Groundwater	No
Farmhouse At Upper Cairnhill	K/65/77/31	16-11-77	Septic Tank	Freshwater Stream/River: Pheppie Burn	No
Farmhouse at West Cairnhill	K/65/77/30	16-11-77	Septic Tank	Freshwater Stream/River: Pheppie Burn	No
House At Cairnhill	K/84/4(CP)	03-12-84	Septic Tank	Onto Land	No
Farmhouse At Nether Cairnhill	K/65/77/33	16-11-77	Septic Tank	Freshwater Stream/River: Pheppie Burn	No
Farmhouse At Nether Cairnhill	K/65/77/32	16-11-77	Septic Tank	Freshwater Stream/River: Pheppie Burn	No

6.3. Enforcement and Prohibition Notices

There are no registered Enforcement and Prohibition information noted within the Phase 1A Development Boundary.

6.4. Integrated Pollution Controls

There are no registered Integrated Pollution Controls noted within the Phase 1A Development Boundary.

6.5. Local Authority Integrated Pollution Prevention and Controls

There are no registered Local Authority Integrated Pollution Prevention and Controls noted within the Phase 1A Development Boundary.

6.6. Local Authority Pollution Prevention and Controls

There are no registered Local Authority Pollution Prevention and Control noted within the Phase 1A Development Boundary.

6.7. Pollution Incidents and Prosecutions

There are no registered Pollution Incidents and Prosecutions noted within the Phase 1A Development Boundary.

6.8. Registered Radioactive Substances

There are no registered Radioactive Substance sites noted within the Phase 1A Development Boundary.

6.9. BGS Registered Landfill Sites

There are no BGS Registered Landfill Sites within the Phase 1A Development Boundary.

6.10. Local Authority Recorded Landfill Sites

Aberdeenshire Council has no landfill data to supply.

6.11. Registered Landfill Sites

There are no registered Landfill Sites within the Phase 1A Development Boundary.

6.12. Registered Waste Transfer Sites

There are no registered waste transfer sites noted within the Phase 1A Development Boundary.

6.13. Registered Waste Treatment or Disposal Sites

There are no registered waste treatment and disposal sites noted within the Phase 1A Development Boundary.

6.14. Notifications of Installations Handling Hazardous Substances

There are no registered Notifications of Installations Handling Hazardous Substances (NIHHS) noted within the Phase 1A Development Boundary.

6.15. Controls of Major Accident Hazard Sites

There are no registered Controls of Major Accident Hazard sites (COMAH) noted within the Phase 1A Development Boundary.

6.16. Fuel Stations

There are no registered Fuel Stations noted within the Phase 1A Development Boundary.

The historic mapping ([Table 1](#)) identified two filling stations in the vicinity of the Phase 1A Development Boundary. The north-bound filling station was located approximately 20m north of the Phase 1A Development Boundary and southbound filling station was located approximately 30m south of the Phase 1A Development Boundary was located approximately 390634, 793548.

6.17. Contemporary Trade Entries

There are no identified Contemporary Trade Entries within the Phase 1A Development Boundary. There are two Contemporary Trade Entries locate offsite however they are within the vicinity of Phase 1A Boundary, these are presented in [Table 8](#).

Table 8: List of Registered Contemporary Trade Directory Entries

Entry	Location/Distance from Site	Type of business	Status	Potential Source
20th Century Classics Ltd	Newtonhill, Stonehaven 20m north (former north-bound petrol filling station)	Classic Car Specialists	Inactive	Yes
Newtonhill Filling Station	Newtonhill, Stonehaven 30m south (former south-bound petrol filling station)	Petrol Filling Station	Inactive	Yes

6.18. Sensitive Land Uses

There are several Sensitive Land Uses noted within the Phase 1A Development Boundary. These are presented in [Tables 9 and 10](#). Further detail is presented in [Appendix 2](#).

Table 9: List of Registered Sensitive Land Uses (Areas of Adopted Green Belt)

Category	Plan Name	Date	Status
Areas of Adopted Green Belt	The Aberdeenshire Local Plan	26-06-06	Adopted

Table 10: List of Registered Sensitive Land Uses (Nitrate Vulnerable Zone)

Category	Name	Description	Status
Nitrate Vulnerable Zone	Moray/Aberdeenshire/Banff/Buchan	Groundwater	N/A

7.0 Development Proposal

Phase 1A is anticipated to comprise 600-800 dwelling houses and associated infrastructure. There are also plans to encompass neighbourhood facilities including Shops, Surgery, Community Centre and a Place of Worship. There will also be associated open space and play areas.