

# BRGM

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## Serving JSON-LD using WFS 2.0 and OGC Features API

### Final Report



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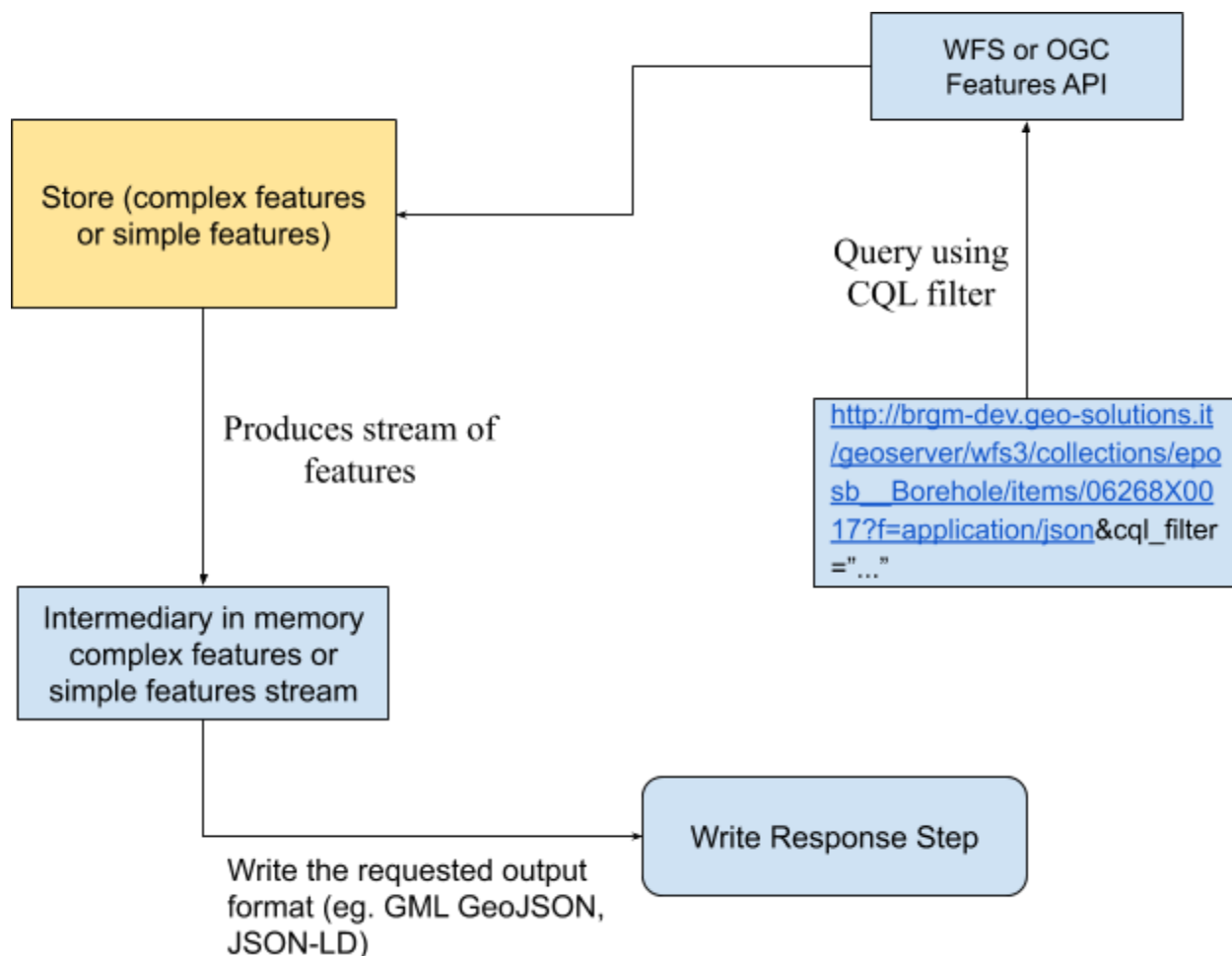
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## Introduction

This document provides a low level technical design specification and description of implementation of the JSON-LD output format for simple and complex features, as described in the proposal intitulated [BRGM - GeoServer WFS3 JSON-LD Proposal](#), as well as the handling of backwards mapping of CQL filters that use JSON-LD paths.



**Figure 1**

High level overview of the workflow GeoServer will use to handle WFS 2.0 and OGC Features API requests targeting complex features or simple features.

The new functionalities were built on top of GeoServer implementation of OGC WFS 2.0 and OGC Features API (former OGC WFS 3.0). This means that using the end-points associated with OGC WFS 2.0 or OGC Features API it will be possible to request features encoded as

JSON-LD, as well use CQL filters that will reference attributes that will be valid against the JSON-LD document (see *Figure 1*).

Is worth clarifying that in this document *complex features* term is used to describe features that were built throughout App-Schema, hence implying that App-Schema mappings between the data source and target GML schema were configured.

The term *simple features* is used to describe features that were not produced by App-Schema, hence no mappings were defined. They are produced by GeoServer, which reads the data source metadata and automatically produces a schema for it, this matches SF-0 of the OGC features profiles.

## Use Cases

Three use cases were considered during this work, they cover both complex features and simple features:

- Complex features (with App-Schema):
  - [Borehole](#), multiple DB tables or views
  - [BoreholeView](#), single DB table or view
- Simple features (no App-Schema):
  - [SELFIE Aquifer](#), simple table or view

Since simple features don't support multiple tables, a view needs to be used for the SELFIE Aquifer use case, which brings its own challenges.

Is worth mentioning, that the idea of using simple features directly is to simplify the publishing process by removing the need of having a target GML and the App-Schema mappings. Independently of the selected output format, GML, GeoJSON or JSON-LD, currently the App-Schema mappings require a target GML schema. Breaking this limitation would require a significant amount of work and was out of the scope of this project.

## Packaging

This section describes how the implementation solution was packaged. A GeoServer plugin named [JSON-LD output format](#) was created. Installing this plugin will make the JSON-LD output available for WFS and OGC Features API, if the OGcAPI plugin is installed.

The *JSON-LD output format* plugin documentation is provided as an annex of this document, it details how to:

- Download and install the plugin, as well to validate that it was correctly installed;
- Configure the plugin, where to store the JSON-LD template and the available directives;
- How to query the JSON-LD output using or not CQL filters.

Is worth mentioning that the [JSON-LD output format](#) was contributed and accepted as a community module of GeoServer project. This means that it will be available in the [nightly builds of GeoServer](#).

## Configuring the plugin

JSON-LD template file (see *Listing 1*) is managed directly through file system editing, without any UI or REST API, the mapping file should be placed, following the same approach as freemarker template, inside the feature type directory, for example:

- workspace/store/featuretypes/json-ld-template.json

If a request targets the JSON-LD output format for a feature type that does not have a JSON-LD template file, an error will be returned.

In the case of a complex feature, the App-Schema datastore will take care of mapping the relational tables into complex features, and the JSON-LD output format will perform a second level mapping, picking up values from the stream of feature using XPath.

In case of a simple feature the stream of simple features, will be encoded as simple GML features, simple GeoJSON features, or a JSON-LD document controlled by a mapping configuration, and hence, potentially complex. In this case the mapping file will use simple attribute names to peek inside the input features. Attributes with multiple cardinality will not be supported by this approach.

```
{
  "@context": {
    "gsp": "http://www.opengis.net/ont/geosparql#",
    "sf": "http://www.opengis.net/ont/sf#",
    "sam": "http://def.seegrid.csiro.au/ontology/om/sam-lite#",
```

```

"om": "http://def.seegrid.csiro.au/ontology/om/om-lite#",
"eposb": "https://data.geoscience.earth/def/eposb#",
"ci": "http://def.seegrid.csiro.au/isotc211/iso19115/2003/citation#",
"md": "http://def.seegrid.csiro.au/isotc211/iso19115/2003/metadata#",
"mdex": "http://def.seegrid.csiro.au/isotc211/iso19115/2003/extent#",
"time": "http://www.w3.org/2006/time#",
"gwmlwc": "http://www.opengis.net/gwml-wellconstruction/2.2#",
"schema": "https://schema.org/",
"dc": "http://purl.org/dc/terms/",
"Feature": "gsp:Feature",
"FeatureCollection": "schema:Collection",
"Point": "sf:Point",
"wkt": "gsp:asWKT",
"features": {
  "@container": "@set",
  "@id": "schema:hasPart"
},
"geometry": "sf:geometry",
"description": "dc:description",
"title": "dc:title",
"name": "schema:name"
},
"type": "FeatureCollection",
"features": [
  {
    "$source": "eposb:Borehole"
  },
  {
    "@id": "${@id}",
    "@type": [
      "Feature",
      "eposb:Borehole",
      "http://vocabulary.odm2.org/samplingfeaturetype/borehole"
    ],
    "name": "${gml:name}",
    "geometry": {
      "@type": "Point",
      "wkt":
        "${strConcat('<http://www.opengis.net/def/crs/OGC/1.3/CRS84>',toWKT(xpath('eposb:bholeHeadw
        orks/gwml-wellconstruction:BoreCollar/gwml-wellconstruction:collarLocation')))}"
    },
    "sam:sampledFeature": {
      "@id": "https://sweet.jpl.nasa.gov/2.3/realmEarthReference.owl#EarthLithosphere",
      "name": "Lithosphere"
    },
    "eposb:custody": [
      {
        "$source": "eposb:custodian"
      },
      {
        "@type": "eposb:Custodian",
        "eposb:custodian": {
          "@type": "ci:ResponsibleParty",
          "ci:organisationName": "BRGM",
          "ci:role": {
            "@type": "ci:RoleCode",
            "@id": "http://def.seegrid.csiro.au/isotc211/iso19115/2003/code/Role/custodian"
          }
        }
      }
    ]
  }
]

```

```

    },
    "eposb:custodyPeriod": {
      "@type": "time:Period",
      "time:hasBeginning": {
        "time:inXSDDateTime": "${eposb:custodianPeriod/gml:beginPosition}"
      },
      "time:hasEnd": {
        "time:inXSDDateTime": "${eposb:custodianPeriod/gml:beginPosition}"
      }
    }
  },
  ],
  "eposb:legalAccessLevel": {
    "@type": "md:LegalConstraints",
    "md:accessConstraints": {
      "@type": "md:RestrictionCode",
      "@id": "http://purl.org/eprint/accessRights/openAccess"
    },
    "md:Constraints": {
      "@type": "md:RestrictionCode",
      "@id": "http://purl.org/eprint/accessRights/openAccess"
    }
  },
  "eposb:length": {
    "@type": "om:SimpleMeasure",
    "om:amount": "${eposb:length}",
    "om:uom": "http://qudt.org/vocab/unit/M"
  },
  "eposb:operation": {
    "@type": "eposb:Operation",
    "eposb:operator": {
      "@type": "ci:ResponsibleParty",
      "ci:organisationName": "BRGM",
      "ci:role": {
        "@type": "ci:RoleCode",
        "@id": "http://def.seegrid.csiro.au/isotc211/iso19115/2003/code/Role/owner"
      }
    }
  },
  "eposb:referenceElevation": {
    "$source": "eposb:referenceElevation",
    "@type": "eposb:Elevation",
    "eposb:elevation": "${eposb:Elevation/eposb:elevation}",
    "mdex:verticalCRS": "http://www.opengis.net/def/crs/EPSG/0/5720",
    "om:uom": "http://qudt.org/vocab/unit/M",
    "eposb:elevationMeasurementMethod": {
      "@id": "${eposb:Elevation/eposb:elevationMeasurementMethod/@xlink:href}",
      "name": "DGPS as Dummy"
    },
    "eposb:elevationType": {
      "@id": "https://data.geoscience.earth/nc1/ElevationType/groundSurface",
      "name": "Ground surface"
    }
  },
  "eposb:startPoint": {
    "@id": "https://data.geoscience.earth/nc1/StartPoint/naturalLandSurface",
    "name": "natural land surface"
  },
},

```

```

"eposb:status": {
  "@id": "${eposb:status/@xlink:href}",
  "name": "Opérationnel"
},
"eposb:boreCollarPositionalAccuracy": {
  "om:uom": "http://qudt.org/vocab/unit/CM"
},
"eposb:locationMeasurementMethod": {
  "@id": "${eposb:locationMeasurementMethod/@xlink:href}",
  "name": "DGPS as Dummy"
},
"eposb:accessibleDepth": {
  "@type": "eposb:AccessibleDepth",
  "eposb:depthObservationTime": {
    "@type": "time:Instant",
    "time:inXSDDateTime":
"${eposb:accessibleDepth/eposb:AccessibleDepth/eposb:depthObservationTime/gml:TimeInstant/gml:timePosition}"
  }
},
"eposb:lifeCycleInfo": {
  "$source": "eposb:lifeCycleInfo/eposb:LifeCycleInfo",
  "@type": "LifeCycleInfo",
  "eposb:updateDate": {
    "@type": "time:Instant",
    "time:inXSDDateTime": "${eposb:updateDate/gml:TimeInstant/gml:timePosition}"
  },
  "status": {
    "@id": "${eposb:status/@xlink:href}",
    "name": "Validé"
  },
  "eposb:creationDate": {
    "@type": "time:Instant",
    "time:inXSDDateTime": "${eposb:creationDate/gml:TimeInstant/gml:timePosition}"
  }
},
"eposb:locatedOnAdminUnit": {
  "@id": "${eposb:locatedOnAdminUnit/@xlink:href}",
  "name": "SANGATTE"
},
"bholeHeadworks": [
  {
    "$source": "eposb:bholeHeadworks/gwml-wellconstruction:BoreCollar"
  },
  {
    "@type": [
      "gwmlwc:BoreCollar",
      "Feature"
    ],
    "gwmlwc:collarElevation": {
      "om:amount": "${gwml-wellconstruction:collarElevation}",
      "mdex:verticalCRS": "http://www.opengis.net/def/crs/EPSSG/0/5720",
      "om:uom": "http://qudt.org/vocab/unit/M"
    },
    "gsp:hasGeometry": {
      "@type": "Point",
      "wkt": "${strConcat('<http://www.opengis.net/def/crs/OGC/1.3/CRS84>',
toWKT(xpath('gwml-wellconstruction:collarLocation')))"
    }
  }
]

```



```
{
  }
}
]
```

**Listing 1**

JSON-LD template for the BoreHole feature type, notice the use of nested collections, e.g. custodians, as well CQL functions.

## Technical solution

This section provides low level details about the system implementation.

### Configuration

Configuration is get loaded lazily as it gets requested. Dynamic reloading of template files is based on resource watchers extending [FileWatcher.java](#) class. When reloading configuration, a log is issued at *INFO* level to notify that happened. Configuration will be cached between calls, using a Guava loading cache.

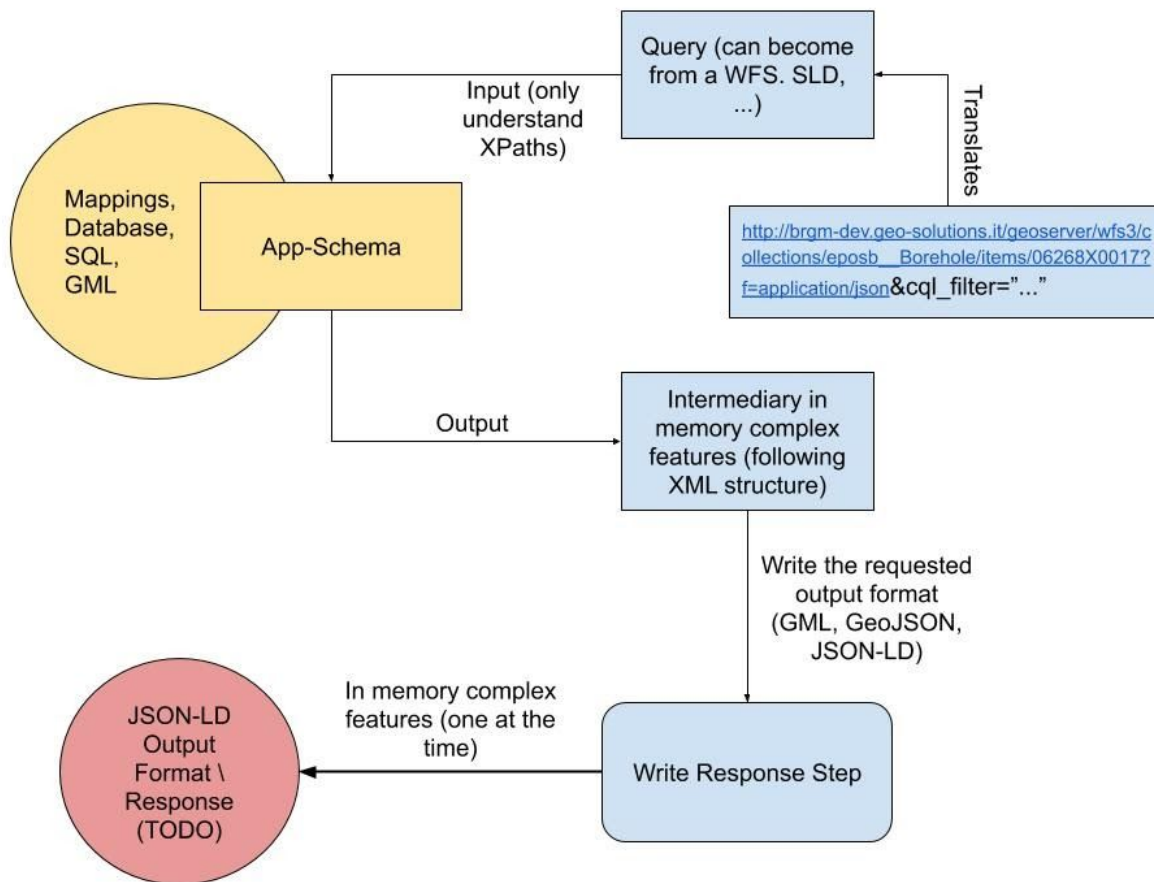
Validating the template configurations is handled by an implementation of a filter visitor which validates the use XPath, used in the JSON-LD template, by evaluating them against the feature type. CQL functions will be validated by evaluating against the feature type the xpath parameter if present.

The validation will make it easier to track down errors by providing the XPath that failed the validation.

### Output implementation

The implemented workflow for producing JSON-LD documents takes advantage of the modularity, flexibility and extension points of GeoServer. The JSON-LD output format plugin integrates with the GeoServer OWS dispatcher cycles to inject its functionalities (see *Figure 2*). This stands true for both complex features and simple features.

Is worth mentioning, that the OGC Features API is not an OWS service, but rather a REST API. Hence the integration with the JSON-LD output format plugin is a slightly different, different input objects need to be handled.



**Figure 2**

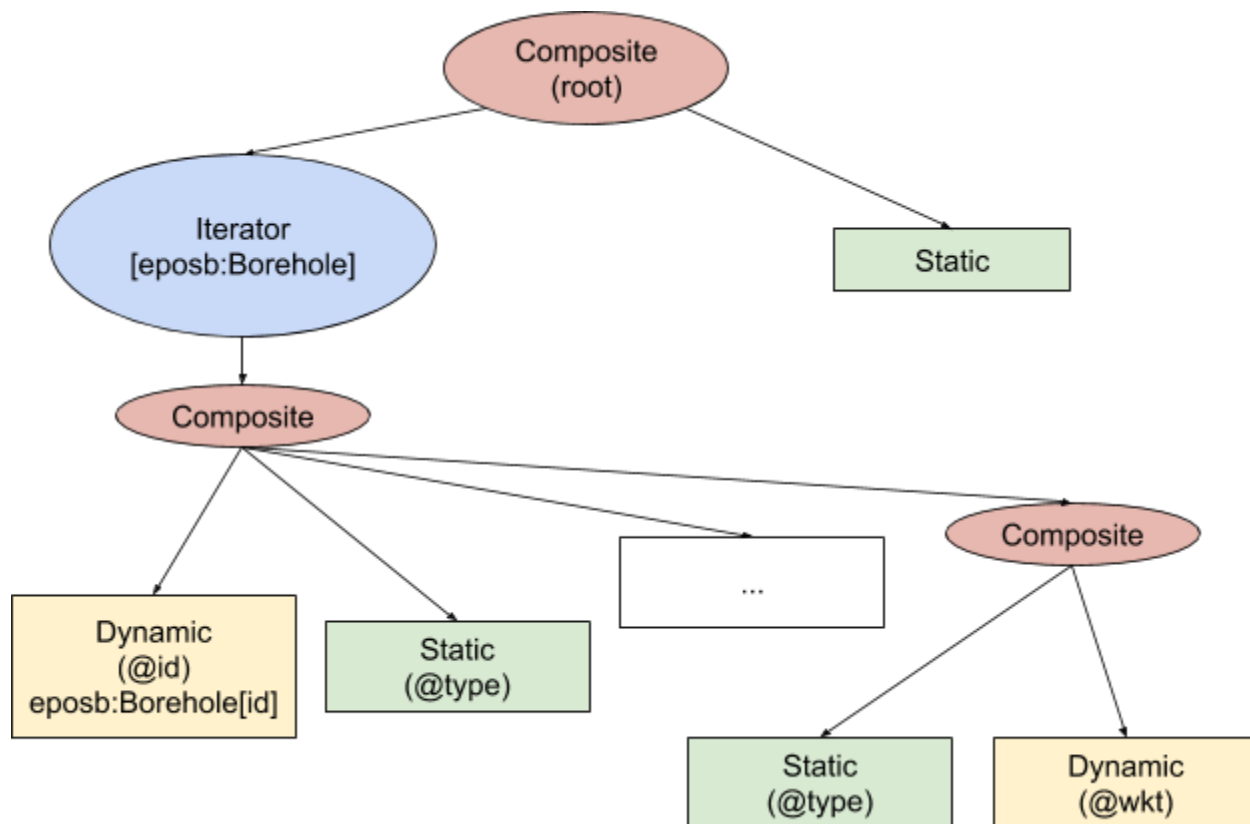
Overview of the implemented workflow for producing a JSON-LD response from a stream of complex features generated by App-Schema.

To activate the JSON-LD output format the media type has to be requested *application/ld+json*. Once the targeted feature type is identified, it will be used to lookup the corresponding JSON-LD template.

The JSON-LD template document is parsed as a [Jackson Json Tree Model](#), and then converted to a tree of JSON builders (see *Figure 3*), each one generating a bit of the output structure using the [Jackson Streaming API](#). The following builders were implemented:

- **Static Builder:** generate a full static JSON object/tree, no matter how nested or the content;

- **Composite Builder:** maps known keys to other builders (static or dynamic). Might be setting the context for the child builders based on the *source* directive (which gets stripped out of output), if the source evaluates to NULL, does not emit anything;
- **Dynamic Value Builder:** builds a single value based on a property, referenced using a Xpath. A CQL expression may be used to transform the value on the fly;
- **Iterating Builder:** iterates over the values of a collection, setting the context of its child builders as we move on during the iteration;
- **Root builder:** a special case of composite builder that is given the feature collection produced by the stores, and that passes it the builder contained in the *features* key.



**Figure 3**

Subset of the JSON builders tree produced for the BoreHole use case.

The builders are constructed picking up static contents no matter how nested and passing the Json node to the static builders, recognizing arrays to create iterating builders, finding xpaths and cql function to produce dynamic builder and using composite builders in cases that are a mix of the others.

Evaluating the JSON can be as simple as calling the root builder and have it start the evaluation process. The builder interface is described in *Listing 2*:

```
public interface JsonBuilder {  
  
    void evaluate (JsonWriter writer, JsonBuilderContext context)  
}
```

### Listing 2

JSON builders interface, the writer will take care of writing the JSON content to the output stream, the context object will provide all the necessary information to encode the final JSON, e.g. the current feature being encoded, the nested collection being encoded, etc ... it is passed down in the builders tree as the encoding process progress.

In *Listing 3* we can see the main attributes of the JSON builder context object:

```
public class JsonBuilderContext {  
  
    Object currentObject;  
  
    JsonBuilderContext parent;  
  
    (...)  
}
```

### Listing 3

JSON builder context object main attributes.

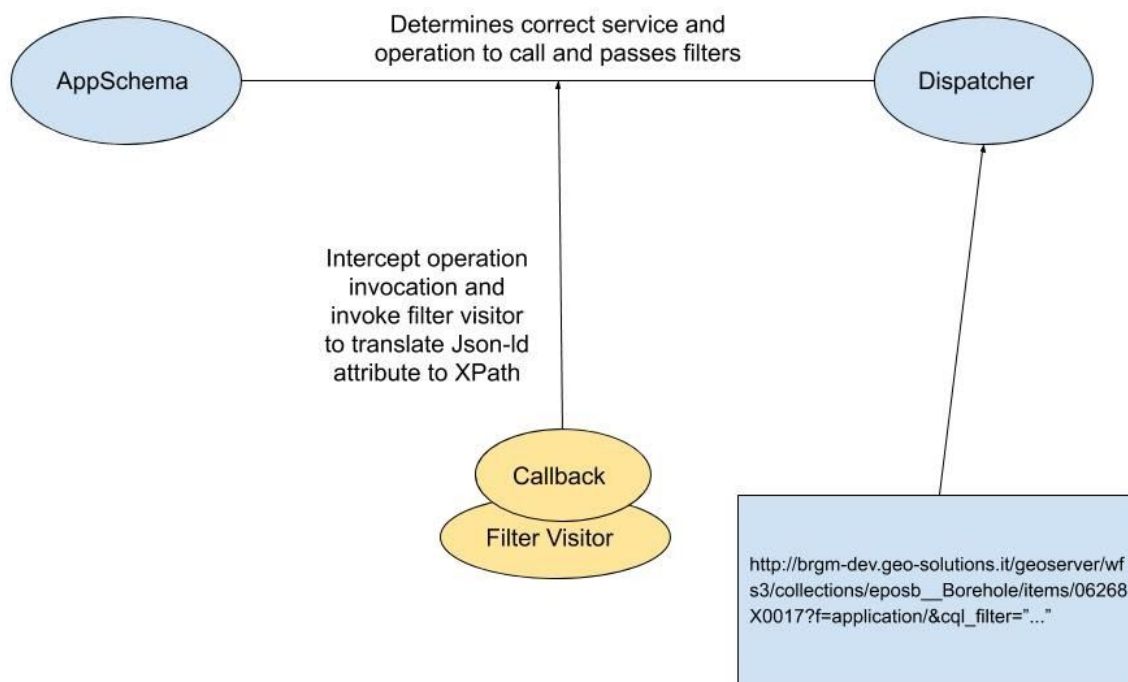
The parent context allows to evaluate expressions referring to the current parent, in nested iterations some of the parents might be varying as we move from one item to the next. In the case of a CQL expression, like the one in Listing 4, where the XPath value refers to a parent context. The builder will walk the tree structure up the path, picking up the referenced parent value XPath, then we will add it to the XPath expression replacing `../..` producing the final XPath.

```
wkt(xpath('../..//gwml-wellconstruction:collarLocation'))
```

### Listing 4

Example CQL expression with an XPath referring parent contexts.





**Figure 4**

JSON-LD backward mapping workflow, the CQL filter is intercepted by the plugin callback before being sent to the data store.

**JSON-LD path:**

`eposb:borehole.eposb:custodian.eposb:custodianPeriod.time:hasBeginning.time:inXSDDateTime`

**XPath:**

`eposb:Borehole/eposb:custodian/eposdb:custodianPeriod/gml:beginPosition`

**Listing 6**

Example of a conversion between a JSON-LD path and to the correspondent XPath.

```
public class JsonLdPathDispatcherCallback implements DispatcherCallback {  
  
    @Override  
    public Operation operationDispatched(Request req, Operation op) {  
        // getFeatureType look up for the template and issue filter visitor  
    }  
  
    (...)  
}
```

**Listing 7**

Excerpt of the dispatcher callback implementation.

```
public class JsonLdPathVisitor extends DefaultFilterVisitor {  
  
    public Object visit (PropertyValue exp){  
        // check if expression is a json-ld path, if true perform translation  
        // towards xpath  
    }  
}
```

**Listing 8**

Excerpt of the implementation of the filter visitor that will convert the CQL filter JSON-LD paths to the correspondent XPaths.



## Conclusion

The templating mechanism provides the necessary flexibility that allows us to control the produced JSON-LD output, capable of working on streams of complex or simple features, during our tests it has proven to be relatively easy to create and maintain. A similar mechanism could be implemented for the GeoJSON output, which is currently produced by following a set of hardcoded transformation rules.

The backwards mapping completes the solution by allowing end users to query the system using JSON-LD paths, hiding from the end user that an intermediary mapping is performed using the JSON-LD output. Since the plugin is capable of converting the CQL filter JSON paths to the original XPathS used in the JSON-LD template, the filter (in most situations) is delegated to the underlying store allowing us to take full advantage of its native querying capabilities.

With formats like GeoJSON and JSON-LD becoming more mainstream, e.g. the OGC Feature API prioritizes JSON and GeoJSON encoding is being tested|evaluated for INSPIRE, it would be interesting to explore the possibility of removing from App-Schema the need of having a target GML schema and having the mapping defined between a data source and the target GML schema. For example, in the JSON-LD template instead of referencing properties using XPathS, we could reference databases tables and columns directly.

## Next steps

The interaction with GeoServer community sparkle a few discussions where good to have and possible future improvements were discussed for the JSON-LD plugin:

- Include features JSON-LD representation in the HTML features output format, this would make it easier for search-engines to correctly catalogue the API.
- Improving the visualization of the [ogcapi](#) collections items page thanks to the json-ld context, e.g. linking attribute's column header to its definition.
- Adding the capability to convert JSON-LD output to alternative RDF encodings, relying on libraries such as [rdf4j](#).

## Live use cases

Follows a list of live examples using WFS 2.0 and OGC Features API requests targeting GeoSolutions DEV server:

- Targeting BoreHole feature type:
  - WFS 2.0:

- [http://brgm-dev.geo-solutions.it/geoserver/eposb/ows?service=WFS&version=2.0.0&request=GetFeature&typeName=eposb:Borehole&count=50&outputFormat=application%2FId%2Bjson&cql\\_filter=features.eposb:length.om:amount>80](http://brgm-dev.geo-solutions.it/geoserver/eposb/ows?service=WFS&version=2.0.0&request=GetFeature&typeName=eposb:Borehole&count=50&outputFormat=application%2FId%2Bjson&cql_filter=features.eposb:length.om:amount>80)
- [http://brgm-dev.geo-solutions.it/geoserver/eposb/ows?service=WFS&version=2.0.0&request=GetFeature&typeName=eposb:Borehole&count=50&outputFormat=application%2FId%2Bjson&cql\\_filter=features.eposb:referenceElevation.eposb:elevation<0](http://brgm-dev.geo-solutions.it/geoserver/eposb/ows?service=WFS&version=2.0.0&request=GetFeature&typeName=eposb:Borehole&count=50&outputFormat=application%2FId%2Bjson&cql_filter=features.eposb:referenceElevation.eposb:elevation<0)
- [http://brgm-dev.geo-solutions.it/geoserver/eposb/ows?service=WFS&version=2.0.0&request=GetFeature&typeName=eposb%3ABorehole&count=50&outputFormat=application%2FId%2Bjson&cql\\_filter=features.bholeHeadworks.gsp:hasGeometry.wkt IS NULL](http://brgm-dev.geo-solutions.it/geoserver/eposb/ows?service=WFS&version=2.0.0&request=GetFeature&typeName=eposb%3ABorehole&count=50&outputFormat=application%2FId%2Bjson&cql_filter=features.bholeHeadworks.gsp:hasGeometry.wkt IS NULL)
- [http://brgm-dev.geo-solutions.it/geoserver/eposb/ows?service=WFS&version=2.0.0&request=GetFeature&typeName=eposb%3ABorehole&count=50&outputFormat=application%2FId%2Bjson&cql\\_filter=features.bholeHeadworks.gwmlwc:collarElevation.om:amount%3E15%20AND%20features.bholeHeadworks.gwmlwc:collarElevation.om:amount%3C20](http://brgm-dev.geo-solutions.it/geoserver/eposb/ows?service=WFS&version=2.0.0&request=GetFeature&typeName=eposb%3ABorehole&count=50&outputFormat=application%2FId%2Bjson&cql_filter=features.bholeHeadworks.gwmlwc:collarElevation.om:amount%3E15%20AND%20features.bholeHeadworks.gwmlwc:collarElevation.om:amount%3C20)
- WFS 3.0:
  - [http://brgm-dev.geo-solutions.it/geoserver/wfs3/collections/eposb\\_\\_Borehole/items?f=application%2FId%2Bjson&limit=50&cql\\_filter=features.eposb:length.om:amount>80](http://brgm-dev.geo-solutions.it/geoserver/wfs3/collections/eposb__Borehole/items?f=application%2FId%2Bjson&limit=50&cql_filter=features.eposb:length.om:amount>80)
  - [http://brgm-dev.geo-solutions.it/geoserver/wfs3/collections/eposb\\_\\_Borehole/items?f=application%2FId%2Bjson&limit=50&cql\\_filter=features.eposb:referenceElevation.eposb:elevation<0](http://brgm-dev.geo-solutions.it/geoserver/wfs3/collections/eposb__Borehole/items?f=application%2FId%2Bjson&limit=50&cql_filter=features.eposb:referenceElevation.eposb:elevation<0)
  - [http://brgm-dev.geo-solutions.it/geoserver/wfs3/collections/eposb\\_\\_Borehole/items?f=application%2FId%2Bjson&limit=50&cql\\_filter=features.bholeHeadworks.gsp:hasGeometry.wkt IS NULL](http://brgm-dev.geo-solutions.it/geoserver/wfs3/collections/eposb__Borehole/items?f=application%2FId%2Bjson&limit=50&cql_filter=features.bholeHeadworks.gsp:hasGeometry.wkt IS NULL)
  - [http://brgm-dev.geo-solutions.it/geoserver/wfs3/collections/eposb\\_\\_Borehole/items?f=application%2FId%2Bjson&limit=50&cql\\_filter=features.bholeHeadworks.gwmlwc:collarElevation.om:amount%3E15%20AND%20features.bholeHeadworks.gwmlwc:collarElevation.om:amount%3C20](http://brgm-dev.geo-solutions.it/geoserver/wfs3/collections/eposb__Borehole/items?f=application%2FId%2Bjson&limit=50&cql_filter=features.bholeHeadworks.gwmlwc:collarElevation.om:amount%3E15%20AND%20features.bholeHeadworks.gwmlwc:collarElevation.om:amount%3C20)
- OGC Features API:

- <http://brgm-dev.geo-solutions.it/geoserver/ogc/features/collections/eposb:Borehole/items?f=application%2FId%2Bjson&limit=50&filter=features.eposb:length.om:amount>80&filter-lang=cql-text>
  - <http://brgm-dev.geo-solutions.it/geoserver/ogc/features/collections/eposb:Borehole/items?f=application%2FId%2Bjson&limit=50&filter=features.eposb:referenceElevation.eposb:elevation<0&filter-lang=cql-text>
  - <http://brgm-dev.geo-solutions.it/geoserver/ogc/features/collections/eposb:Borehole/items?f=application%2FId%2Bjson&limit=50&filter=features.bholeHeadworks.gsp:hasGeometry.wkt IS NULL&filter-lang=cql-text>
  - [http://brgm-dev.geo-solutions.it/geoserver/eposb/ows?service=WFS&version=2.0.0&request=GetFeature&typeName=eposb%3ABorehole&count=50&outputFormat=application%2FId%2Bjson&cql\\_filter=features.bholeHeadworks.gwmlwc:collarElevation.om:amount%3E15%20AND%20features.bholeHeadworks.gwmlwc:collarElevation.om:amount%3C20](http://brgm-dev.geo-solutions.it/geoserver/eposb/ows?service=WFS&version=2.0.0&request=GetFeature&typeName=eposb%3ABorehole&count=50&outputFormat=application%2FId%2Bjson&cql_filter=features.bholeHeadworks.gwmlwc:collarElevation.om:amount%3E15%20AND%20features.bholeHeadworks.gwmlwc:collarElevation.om:amount%3C20)
- Targeting BoreHoleView feature type:
    - WFS 2.0:
      - [http://brgm-dev.geo-solutions.it/geoserver/gsmlp/ows?service=WFS&version=2.0.0&request=GetFeature&typeName=gsmlp%3ABoreholeView&count=50&outputFormat=application%2FId%2Bjson&cql\\_filter=features.gsmlp:boreholeLength\\_m.om:amount>83](http://brgm-dev.geo-solutions.it/geoserver/gsmlp/ows?service=WFS&version=2.0.0&request=GetFeature&typeName=gsmlp%3ABoreholeView&count=50&outputFormat=application%2FId%2Bjson&cql_filter=features.gsmlp:boreholeLength_m.om:amount>83)
      - [http://brgm-dev.geo-solutions.it/geoserver/gsmlp/ows?service=WFS&version=2.0.0&request=GetFeature&typeName=gsmlp%3ABoreholeView&count=50&outputFormat=application%2FId%2Bjson&cql\\_filter=features.gsmlp:elevation\\_m.om:amount>0](http://brgm-dev.geo-solutions.it/geoserver/gsmlp/ows?service=WFS&version=2.0.0&request=GetFeature&typeName=gsmlp%3ABoreholeView&count=50&outputFormat=application%2FId%2Bjson&cql_filter=features.gsmlp:elevation_m.om:amount>0)
      - [http://brgm-dev.geo-solutions.it/geoserver/gsmlp/ows?service=WFS&version=2.0.0&request=GetFeature&typeName=gsmlp%3ABoreholeView&count=50&outputFormat=application%2FId%2Bjson&cql\\_filter=features.gsmlp:boreholeLength\\_m.om:amount%3E83%20AND%20features.gsmlp:boreholeLength\\_m.om:amount%3C90](http://brgm-dev.geo-solutions.it/geoserver/gsmlp/ows?service=WFS&version=2.0.0&request=GetFeature&typeName=gsmlp%3ABoreholeView&count=50&outputFormat=application%2FId%2Bjson&cql_filter=features.gsmlp:boreholeLength_m.om:amount%3E83%20AND%20features.gsmlp:boreholeLength_m.om:amount%3C90)
    - WFS 3.0:
      - [http://brgm-dev.geo-solutions.it/geoserver/wfs3/collections/gsmlp\\_\\_BoreholeView/items?f=application%2FId%2Bjson&limit=50&cql\\_filter=features.gsmlp:boreholeLength\\_m.om:amount>83](http://brgm-dev.geo-solutions.it/geoserver/wfs3/collections/gsmlp__BoreholeView/items?f=application%2FId%2Bjson&limit=50&cql_filter=features.gsmlp:boreholeLength_m.om:amount>83)

- [http://brgm-dev.geo-solutions.it/geoserver/wfs3/collections/gsmplp\\_\\_BoreholeView/items?f=application%2FId%2Bjson&limit=50&cql\\_filter=features.gsmplp:elevation\\_m.om:amount>0](http://brgm-dev.geo-solutions.it/geoserver/wfs3/collections/gsmplp__BoreholeView/items?f=application%2FId%2Bjson&limit=50&cql_filter=features.gsmplp:elevation_m.om:amount>0)
- [http://brgm-dev.geo-solutions.it/geoserver/wfs3/collections/gsmplp\\_\\_BoreholeView/items?f=application%2FId%2Bjson&limit=50&cql\\_filter=features.gsmplp:boreholeLength\\_m.om:amount%3E83%20AND%20features.gsmplp:boreholeLength\\_m.om:amount%3C90](http://brgm-dev.geo-solutions.it/geoserver/wfs3/collections/gsmplp__BoreholeView/items?f=application%2FId%2Bjson&limit=50&cql_filter=features.gsmplp:boreholeLength_m.om:amount%3E83%20AND%20features.gsmplp:boreholeLength_m.om:amount%3C90)
- OGC Features API:
  - [http://brgm-dev.geo-solutions.it/geoserver/ogc/features/collections/gsmplp:BoreholeView/items?f=application%2FId%2Bjson&limit=50&filter=features.gsmplp:boreholeLength\\_m.om:amount>83&filter-lang=cql-text](http://brgm-dev.geo-solutions.it/geoserver/ogc/features/collections/gsmplp:BoreholeView/items?f=application%2FId%2Bjson&limit=50&filter=features.gsmplp:boreholeLength_m.om:amount>83&filter-lang=cql-text)
  - [http://brgm-dev.geo-solutions.it/geoserver/ogc/features/collections/gsmplp:BoreholeView/items?f=application%2FId%2Bjson&limit=50&filter=features.gsmplp:elevation\\_m.om:amount>0&filter-lang=cql-text](http://brgm-dev.geo-solutions.it/geoserver/ogc/features/collections/gsmplp:BoreholeView/items?f=application%2FId%2Bjson&limit=50&filter=features.gsmplp:elevation_m.om:amount>0&filter-lang=cql-text)
  - [http://brgm-dev.geo-solutions.it/geoserver/ogc/features/collections/gsmplp:BoreholeView/items?f=application%2FId%2Bjson&limit=50&filter=features.gsmplp:boreholeLength\\_m.om:amount%3E83%20AND%20features.gsmplp:boreholeLength\\_m.om:amount%3C90&filter-lang=cql-text](http://brgm-dev.geo-solutions.it/geoserver/ogc/features/collections/gsmplp:BoreholeView/items?f=application%2FId%2Bjson&limit=50&filter=features.gsmplp:boreholeLength_m.om:amount%3E83%20AND%20features.gsmplp:boreholeLength_m.om:amount%3C90&filter-lang=cql-text)

SELFIE Aquifers feature type is not available yet, but will be added once the database has been filled and the necessary view created.

## Annex A

The following requests are targeting the BoreHole feature type:

- WFS 2.0:
  - <http://brgm-dev.geo-solutions.it/geoserver/eposb/ows?service=WFS&version=2.0.0&request=GetFeature&typeName=eposb%3ABorehole&maxFeatures=50&outputFormat=application%2FId%2Bjson>
- WFS 3.0:
  - [http://brgm-dev.geo-solutions.it/geoserver/wfs3/collections/eposb\\_\\_Borehole/items?f=application%2FId%2Bjson&limit=50](http://brgm-dev.geo-solutions.it/geoserver/wfs3/collections/eposb__Borehole/items?f=application%2FId%2Bjson&limit=50)
- OGC Features API:
  - <http://brgm-dev.geo-solutions.it/geoserver/ogc/features/collections/eposb:Borehole/items?f=application%2FId%2Bjson&limit=50>

... and will produce a JSON-LD output similar to the following:

```
{
  "@context": {
    "gsp": "http://www.opengis.net/ont/geosparql#",
    "sf": "http://www.opengis.net/ont/sf#",
    "sam": "http://def.seegrid.csiro.au/ontology/om/sam-lite#",
    "om": "http://def.seegrid.csiro.au/ontology/om/om-lite#",
    "eposb": "https://data.geoscience.earth/def/eposb#",
    "ci": "http://def.seegrid.csiro.au/isotc211/iso19115/2003/citation#",
    "md": "http://def.seegrid.csiro.au/isotc211/iso19115/2003/metadata#",
    "mdex": "http://def.seegrid.csiro.au/isotc211/iso19115/2003/extent#",
    "time": "http://www.w3.org/2006/time#",
    "gwmlwc": "http://www.opengis.net/gwml-wellconstruction/2.2#",
    "schema": "https://schema.org/",
    "dc": "http://purl.org/dc/terms/",
    "Feature": "gsp:Feature",
    "FeatureCollection": "schema:Collection",
    "Point": "sf:Point",
    "wkt": "gsp:asWKT",
    "features": {
      "@container": "@set",
      "@id": "schema:hasPart"
    },
    "geometry": "sf:geometry",
    "description": "dc:description",
    "title": "dc:title",
    "name": "schema:name"
  },
  "type": "FeatureCollection",
  "features": [
    {
      "@id": "0001000001",
```

```

"@type": [
  "Feature",
  "eposb:Borehole",
  "http://vocabulary.odm2.org/samplingfeaturetype/borehole"
],
"geometry": {
  "@type": "Point",
  "wkt": "<http://www.opengis.net/def/crs/OGC/1.3/CRS84>POINT (1.42975401656321
51.0683628392148)"
},
"sam:sampledFeature": {
  "@id": "https://sweet.jpl.nasa.gov/2.3/realEarthReference.owl#EarthLithosphere",
  "name": "Lithosphere"
},
"eposb:custody": [
  {
    "@type": "eposb:Custodian",
    "eposb:custodian": {
      "@type": "ci:ResponsibleParty",
      "ci:organisationName": "BRGM",
      "ci:role": {
        "@type": "ci:RoleCode",
        "@id": "http://def.seegrid.csiro.au/isotc211/iso19115/2003/code/Role/custodian"
      }
    },
    "eposb:custodyPeriod": {
      "@type": "time:Period"
    }
  }
],
"eposb:legalAccessLevel": {
  "@type": "md:LegalConstraints",
  "md:accessConstraints": {
    "@type": "md:RestrictionCode",
    "@id": "http://purl.org/eprint/accessRights/openAccess"
  },
  "md:Constraints": {
    "@type": "md:RestrictionCode",
    "@id": "http://purl.org/eprint/accessRights/openAccess"
  }
},
"eposb:length": {
  "@type": "om:SimpleMeasure",
  "om:amount": "82.0",
  "om:uom": "http://qudt.org/vocab/unit/M"
},
"eposb:operation": {
  "@type": "eposb:Operation",
  "eposb:operator": {
    "@type": "ci:ResponsibleParty",
    "ci:organisationName": "BRGM",
    "ci:role": {
      "@type": "ci:RoleCode",
      "@id": "http://def.seegrid.csiro.au/isotc211/iso19115/2003/code/Role/owner"
    }
  }
},
"eposb:referenceElevation": {

```



```

"@type": "eposb:Elevation",
"eposb:elevation": "-32.0",
"mdex:verticalCRS": "http://www.opengis.net/def/crs/EPSG/0/5720",
"om:uom": "http://qudt.org/vocab/unit/M",
"eposb:elevationMeasurementMethod": {
  "@id": "http://id.eaufrance.fr/nsa/892#XXX",
  "name": "DGPS as Dummy"
},
"eposb:elevationType": {
  "@id": "https://data.geoscience.earth/nc1/ElevationType/groundSurface",
  "name": "Ground surface"
}
},
"eposb:startPoint": {
  "@id": "https://data.geoscience.earth/nc1/StartPoint/naturalLandSurface",
  "name": "natural land surface"
},
"eposb:status": {
  "@id": "http://id.eaufrance.fr/nsa/146#XXX",
  "name": "Opérationnel"
},
"eposb:boreCollarPositionalAccuracy": {
  "om:uom": "http://qudt.org/vocab/unit/CM"
},
"eposb:locationMeasurementMethod": {
  "@id": "http://id.eaufrance.fr/nsa/917#XXX",
  "name": "DGPS as Dummy"
},
"eposb:accessibleDepth": {
  "@type": "eposb:AccessibleDepth",
  "eposb:depthObservationTime": {
    "@type": "time:Instant",
    "time:inXSDDatetime": "2007/05/14 12:00:00"
  }
},
"eposb:lifeCycleInfo": {
  "@type": "LifeCycleInfo",
  "eposb:updateDate": {
    "@type": "time:Instant",
    "time:inXSDDatetime": "2015/06/16 04:59:45"
  },
  "status": {
    "@id": "http://id.eaufrance.fr/nsa/390#XXX",
    "name": "Validé"
  },
  "eposb:creationDate": {
    "@type": "time:Instant",
    "time:inXSDDatetime": "2007/05/14 12:00:00"
  }
},
"eposb:locatedOnAdminUnit": {
  "@id": "6262774",
  "name": "SANGATTE"
},
"bholeHeadworks": [
  {
    "@type": [
      "gwm1wc:BoreCollar",

```

```

    "Feature"
  ],
  "gtmlwc:collarElevation": {
    "om:amount": "-32.0",
    "mdex:verticalCRS": "http://www.opengis.net/def/crs/EPSSG/0/5720",
    "om:uom": "http://qudt.org/vocab/unit/M"
  },
  "gsp:hasGeometry": {
    "@type": "Point",
    "wkt": "<http://www.opengis.net/def/crs/OGC/1.3/CRS84>POINT (1.42975401656321
51.0683628392148)"
  }
}
],
},
{
  "@id": "0001000002",
  "@type": [
    "Feature",
    "eposb:Borehole",
    "http://vocabulary.odm2.org/samplingfeaturetype/borehole"
  ],
  "geometry": {
    "@type": "Point",
    "wkt": "<http://www.opengis.net/def/crs/OGC/1.3/CRS84>POINT (1.41908220405624
51.0743925999779)"
  },
  "sam:sampledFeature": {
    "@id": "https://sweet.jpl.nasa.gov/2.3/realEarthReference.owl#EarthLithosphere",
    "name": "Lithosphere"
  },
  "eposb:custody": [
    {
      "@type": "eposb:Custodian",
      "eposb:custodian": {
        "@type": "ci:ResponsibleParty",
        "ci:organisationName": "BRGM",
        "ci:role": {
          "@type": "ci:RoleCode",
          "@id": "http://def.seegrid.csiro.au/isotc211/iso19115/2003/code/Role/custodian"
        }
      },
      "eposb:custodyPeriod": {
        "@type": "time:Period"
      }
    }
  ],
  "eposb:legalAccessLevel": {
    "@type": "md:LegalConstraints",
    "md:accessConstraints": {
      "@type": "md:RestrictionCode",
      "@id": "http://purl.org/eprint/accessRights/openAccess"
    },
    "md:Constraints": {
      "@type": "md:RestrictionCode",
      "@id": "http://purl.org/eprint/accessRights/openAccess"
    }
  }
},
},

```



```

"eposb:length": {
  "@type": "om:SimpleMeasure",
  "om:amount": "77.42",
  "om:uom": "http://qudt.org/vocab/unit/M"
},
"eposb:operation": {
  "@type": "eposb:Operation",
  "eposb:operator": {
    "@type": "ci:ResponsibleParty",
    "ci:organisationName": "BRGM",
    "ci:role": {
      "@type": "ci:RoleCode",
      "@id": "http://def.seegrid.csiro.au/isotc211/iso19115/2003/code/Role/owner"
    }
  }
},
"eposb:referenceElevation": {
  "@type": "eposb:Elevation",
  "eposb:elevation": "-30.8",
  "mdex:verticalCRS": "http://www.opengis.net/def/crs/EPSG/0/5720",
  "om:uom": "http://qudt.org/vocab/unit/M",
  "eposb:elevationMeasurementMethod": {
    "@id": "http://id.eaufrance.fr/nsa/892#XXX",
    "name": "DGPS as Dummy"
  },
  "eposb:elevationType": {
    "@id": "https://data.geoscience.earth/nc1/ElevationType/groundSurface",
    "name": "Ground surface"
  }
},
"eposb:startPoint": {
  "@id": "https://data.geoscience.earth/nc1/StartPoint/naturalLandSurface",
  "name": "natural land surface"
},
"eposb:status": {
  "@id": "http://id.eaufrance.fr/nsa/146#XXX",
  "name": "Opérationnel"
},
"eposb:boreCollarPositionalAccuracy": {
  "om:uom": "http://qudt.org/vocab/unit/CM"
},
"eposb:locationMeasurementMethod": {
  "@id": "http://id.eaufrance.fr/nsa/917#XXX",
  "name": "DGPS as Dummy"
},
"eposb:accessibleDepth": {
  "@type": "eposb:AccessibleDepth",
  "eposb:depthObservationTime": {
    "@type": "time:Instant",
    "time:inXSDDateTime": "1998/03/70 11:55:17"
  }
},
"eposb:lifeCycleInfo": {
  "@type": "LifeCycleInfo",
  "eposb:updateDate": {
    "@type": "time:Instant",
    "time:inXSDDateTime": "2014/01/24 11:10:25"
  }
},

```

```

    "status": {
      "@id": "http://id.eaufrance.fr/nsa/390#XXX",
      "name": "Validé"
    },
    "eposb:creationDate": {
      "@type": "time:Instant",
      "time:inXSDDatetime": "1998/03/70 11:55:17"
    },
    "eposb:locatedOnAdminUnit": {
      "@id": "6262774",
      "name": "SANGATTE"
    },
    "bholeHeadworks": [
      {
        "@type": [
          "gwmlwc:BoreCollar",
          "Feature"
        ],
        "gwmlwc:collarElevation": {
          "om:amount": "-30.8",
          "mdex:verticalCRS": "http://www.opengis.net/def/crs/EPSSG/0/5720",
          "om:uom": "http://qudt.org/vocab/unit/M"
        },
        "gsp:hasGeometry": {
          "@type": "Point",
          "wkt": "<http://www.opengis.net/def/crs/OGC/1.3/CRS84>POINT (1.41908220405624
51.0743925999779)"
        }
      }
    ]
  }
}

```

## Annex B

The following requests are targeting the BoreHoleView feature type:

- WFS 2.0:
  - <http://brgm-dev.geo-solutions.it/geoserver/gsmlp/ows?service=WFS&version=2.0.0&request=GetFeature&typeName=gsmlp%3ABoreholeView&count=50&outputFormat=application%2FId%2Bjson>
- WFS 3.0:
  - [http://brgm-dev.geo-solutions.it/geoserver/wfs3/collections/gsmlp\\_\\_BoreholeView/items?f=application%2FId%2Bjson&limit=50](http://brgm-dev.geo-solutions.it/geoserver/wfs3/collections/gsmlp__BoreholeView/items?f=application%2FId%2Bjson&limit=50)
- OGC Features API:
  - <http://brgm-dev.geo-solutions.it/geoserver/ogc/features/collections/gsmlp:BoreholeView/items?f=application%2FId%2Bjson>

... and will produce a JSON-LD output similar to the following:

```
{
  "@context": {
    "gsp": "http://www.opengis.net/ont/geosparql#",
    "sf": "http://www.opengis.net/ont/sf#",
    "schema": "https://schema.org/",
    "dc": "http://purl.org/dc/terms/",
    "gsmlp": "https://data.geoscience.earth/def/gsmlp#",
    "om": "http://def.seegrid.csiro.au/ontology/om/om-lite#",
    "xsd": "http://www.w3.org/2001/XMLSchema#",
    "name": "schema:name",
    "wkt": "gsp:asWKT",
    "description": "dc:description",
    "Feature": "gsp:Feature",
    "geometry": "sf:geometry",
    "FeatureCollection": "schema:Collection",
    "features": {
      "@container": "@set",
      "@id": "schema:hasPart"
    },
    "Point": "sf:Point"
  },
  "type": "FeatureCollection",
  "features": [
    {
      "@id": "BSS000AAAU",
      "@type": [
        "Feature",
        "gsmlp:BoreholeView",

```

```

    "gsmlp:Borehole",
    "http://vocabulary.odm2.org/samplingfeaturetype/borehole"
  ],
  "name": "Forage BSS000AAAU",
  "geometry": {
    "@type": "Point",
    "wkt": "<http://www.opengis.net/def/crs/OGC/1.3/CRS84>POINT (51.0333057709069
1.49000190647486)"
  },
  "description": "Borehole description",
  "gsmlp:purpose": {
    "@id": "http://www.opengis.net/def/nil/OGC/0/unknown",
    "name": "levé hydrogéologique, gestion de l'eau"
  },
  "gsmlp:status": {
    "@id": "http://resource.europe-geology.eu/vocabs/BoreholeStatus/drillingCompleted",
    "@type": "skos:Concept",
    "name": "drillingCompleted"
  },
  "gsmlp:drillingMethod": {
    "@id": "http://www.opengis.net/def/nil/OGC/0/unknown",
    "@type": "skos:Concept",
    "name": "unknown"
  },
  "gsmlp:operator": "BRGM (PIEZOMETRIE)",
  "gsmlp:driller": "INTRAFOR-COFOR",
  "gsmlp:drillEndDate": {
    "@value": "1965/05/12 12:00:00",
    "@type": "xsd:date"
  },
  "gsmlp:startPoint": {
    "@id": "https://data.geoscience.earth/ncl/StartPoint/naturalLandSurface",
    "@type": "skos:Concept",
    "name": "natural land surface"
  },
  "gsmlp:inclinationType": {
    "@id": "https://data.geoscience.earth/ncl/BoreholeInclinationType/vertical",
    "@type": "skos:Concept",
    "name": "vertical"
  },
  "gsmlp:boreholeMaterialCustodian": "unknown",
  "gsmlp:boreholeLength_m": {
    "@type": "om:SimpleMeasure",
    "om:amount": "82.45",
    "om:uom": "http://qudt.org/vocab/unit/M"
  },
  "gsmlp:elevation_m": {
    "@type": "om:SimpleMeasure",
    "om:amount": "-55.6",
    "om:uom": "http://qudt.org/vocab/unit/M"
  },
  "gsmlp:source":
"http://ficheinfoterre.brgm.fr/InfoterreFiche/ficheBss.action?id=00011X0001/R140BC",
  "dct:source": "http://www.geocatalogue.fr/Detail.do?fileIdentifier=BR_BSS_BAA",
  "gsmlp:genericSymbolizer": "Not provided",
  "gsmlp:cored": {
    "@value": "false",
    "@type": "xsd:boolean"
  }

```

```

    },
    "gsmlp:accessToPhysicalDrillCore": {
      "@value": "false",
      "@type": "xsd:boolean"
    },
    "gsmlp:boreholeUse": {
      "@id":
"http://inspire.ec.europa.eu/codelist/BoreholePurposeValue/groundwaterLevelMonitoring",
      "name": "surveillance du niveau de la nappe phréatique"
    },
    "gsmlp:detailedDescription": {
      "@id": "http://www.opengis.net/def/nil/OGC/0/template",
      "name": "template"
    },
    "gsmlp:geophysicalLogs": {
      "@id": "http://www.opengis.net/def/nil/OGC/0/unknown",
      "name": "unknown"
    },
    "gsmlp:geologicalDescription": {
      "@id": "http://ressource.brgm-rec.fr/obs/RawGeologicLogs/BSS001REWW",
      "name": "Borehole BSS001REWW geologic log available."
    },
    "gsmlp:groundWaterLevel": {
      "@id": "http://ressource.brgm-rec.fr/data/Piezometre/06512X0037/STREMY.2",
      "name": "Description of Piezometer attached to BSS001REWW. Provides link to
SensorObservationService offering."
    },
    "gsmlp:groundWaterChemistry": {
      "@id": "http://www.opengis.net/def/nil/OGC/0/unknown",
      "name": "unknown"
    },
    "gsmlp:rockGeochemistry": {
      "@id": "http://www.opengis.net/def/nil/OGC/0/unknown",
      "name": "unknown"
    },
    "gsmlp:poreGasChemistry": {
      "@id": "http://www.opengis.net/def/nil/OGC/0/inapplicable",
      "name": "inapplicable"
    },
    "gsmlp:geoTechnicalInfo": {
      "@id": "http://www.opengis.net/def/nil/OGC/0/unknown",
      "name": "unknown"
    }
  },
  {
    "@id": "BSS000AAAV",
    "@type": [
      "Feature",
      "gsmlp:BoreholeView",
      "gsmlp:Borehole",
      "http://vocabulary.odm2.org/samplingfeaturetype/borehole"
    ],
    "name": "Forage BSS000AAAV",
    "geometry": {
      "@type": "Point",
      "wkt": "<http://www.opengis.net/def/crs/OGC/1.3/CRS84>POINT (51.032940372071
1.46421045798824)"
    }
  },

```

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    "description": "Borehole description",
    "gsmlp:purpose": {
      "@id": "http://www.opengis.net/def/nil/OGC/0/unknown",
      "name": "levé hydrogéologique, gestion de l'eau"
    },
    "gsmlp:status": {
      "@id": "http://resource.europe-geology.eu/vocabs/BoreholeStatus/drillingCompleted",
      "@type": "skos:Concept",
      "name": "drillingCompleted"
    },
    "gsmlp:drillingMethod": {
      "@id": "http://www.opengis.net/def/nil/OGC/0/unknown",
      "@type": "skos:Concept",
      "name": "unknown"
    },
    "gsmlp:operator": "BRGM (PIEZOMETRIE)",
    "gsmlp:driller": "INTRAFOR-COFOR",
    "gsmlp:drillEndDate": {
      "@value": "1964/01/01 12:00:00",
      "@type": "xsd:date"
    },
    "gsmlp:startPoint": {
      "@id": "https://data.geoscience.earth/nc1/StartPoint/naturalLandSurface",
      "@type": "skos:Concept",
      "name": "natural land surface"
    },
    "gsmlp:inclinationType": {
      "@id": "https://data.geoscience.earth/nc1/BoreholeInclinationType/vertical",
      "@type": "skos:Concept",
      "name": "vertical"
    },
    "gsmlp:boreholeMaterialCustodian": "unknown",
    "gsmlp:boreholeLength_m": {
      "@type": "om:SimpleMeasure",
      "om:amount": "68.88",
      "om:uom": "http://qudt.org/vocab/unit/M"
    },
    "gsmlp:elevation_m": {
      "@type": "om:SimpleMeasure",
      "om:amount": "-55.5",
      "om:uom": "http://qudt.org/vocab/unit/M"
    },
    "gsmlp:source":
    "http://ficheinfoterre.brgm.fr/InfoterreFiche/ficheBss.action?id=00011X0002/R130",
    "dct:source": "http://www.geocatalogue.fr/Detail.do?fileIdentifieur=BR_BSS_BAA",
    "gsmlp:genericSymbolizer": "Not provided",
    "gsmlp:cored": {
      "@value": "false",
      "@type": "xsd:boolean"
    },
    "gsmlp:accessToPhysicalDrillCore": {
      "@value": "false",
      "@type": "xsd:boolean"
    },
    "gsmlp:boreholeUse": {
      "@id":
    "http://inspire.ec.europa.eu/codelist/BoreholePurposeValue/groundwaterLevelMonitoring",
      "name": "surveillance du niveau de la nappe phréatique"
  
```

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    },
    "gsmpl:detailedDescription": {
      "@id": "http://www.opengis.net/def/nil/OGC/0/template",
      "name": "template"
    },
    "gsmpl:geophysicalLogs": {
      "@id": "http://www.opengis.net/def/nil/OGC/0/unknown",
      "name": "unknown"
    },
    "gsmpl:geologicalDescription": {
      "@id": "http://ressource.brgm-rec.fr/obs/RawGeologicLogs/BSS001REWW",
      "name": "Borehole BSS001REWW geologic log available."
    },
    "gsmpl:groundWaterLevel": {
      "@id": "http://ressource.brgm-rec.fr/data/Piezometre/06512X0037/STREMY.2",
      "name": "Description of Piezometer attached to BSS001REWW. Provides link to
SensorObservationService offering."
    },
    "gsmpl:groundWaterChemistry": {
      "@id": "http://www.opengis.net/def/nil/OGC/0/unknown",
      "name": "unknown"
    },
    "gsmpl:rockGeochemistry": {
      "@id": "http://www.opengis.net/def/nil/OGC/0/unknown",
      "name": "unknown"
    },
    "gsmpl:poreGasChemistry": {
      "@id": "http://www.opengis.net/def/nil/OGC/0/inapplicable",
      "name": "inapplicable"
    },
    "gsmpl:geoTechnicalInfo": {
      "@id": "http://www.opengis.net/def/nil/OGC/0/unknown",
      "name": "unknown"
    }
  }
]
}

```