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Application of the United Nations Framework Classification for Resources and the United Nations Resource Management System in different geographical contexts

United Nations Framework Classification for Resources Case Study from Austria - Sand and Gravel Resources in Greenfield Areas

Prepared by the Geological Survey of Austria

Summary

This case study classifies sand and gravel resources within an Austrian pilot area according to the United Nations Framework Classification for Resources (UNFC). For the application of UNFC to sand and gravel resources, many of the ‘normal’ measures (profitability assessments, technical feasibility studies, exploration campaigns) to derive the values of the E, F, and G axes of UNFC are largely missing. In addition, since these resources do not occur as localized anomalies in the earth’s crust but as widespread sediment accumulation bodies, an approach applicable at the regional scale is needed. This paper presents a methodology to classify entire sand and gravel deposits, rather than individual mining projects, according to UNFC, and nevertheless obtain results which comply with the original definitions of the E, F, and G Categories of UNFC.



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I. Introduction

1. The United Nations Framework Classification for Resources (UNFC) was first introduced by the United Nations Economic Commission for Europe (UNECE) in 1997 [1] and last updated in 2019 [2]. It is a project-based system for classifying natural resources such as minerals, hydrocarbons, groundwater, solar, wind and geothermal energy as well as secondary resources. The recovery of natural resources is classified according to (a) the project's environmental, economic and social viability (E axis), (b) the project's maturity and technical feasibility (F axis), and (c) the level of confidence in the estimate of resource quantities and qualities (G axis). The UNECE Expert Group on Resource Management (EGRM) and other experts have published specifications and guidance for the application of UNFC and provided case studies for mineral resources in order to facilitate the adoption of UNFC as a universally accepted classification scheme [3] [4] [5] [6] [7] [8].

2. In greenfield areas, where no active mines exist and no mineral exploration has been carried out, the current application of UNFC leads to low Categories (E3F3G3 or E3F3G4) [9]. This is appropriate for metal deposits, where detailed exploration data is needed to predict the extent of the resource, and where active mining operations represent the only basis for technical, environmental, social and economic evaluation. However, in the case of sand and gravel, the considerations for resource assessment are different:

(a) Mapping the extent of sand and gravel resources does not require extensive exploration. Geological understanding of the sedimentary process leading to sand and gravel deposits makes dense drilling campaigns largely dispensable, and such campaigns in fact rarely precede mining. Due to the low-risk nature of operations, sand and gravel mining is routinely started even with considerable uncertainty about extractable quantities (G3);

(b) Extraction and processing methods are well established, and no feasibility studies are routinely carried out by operators prior to sand and gravel mining. The technical viability of the mining project is generally not in doubt. Except for the stability of pit walls, no technical challenges exist which can preclude operations;

(c) Environmental and social conditions can conflict with, or even pre-empt, gravel extraction. However, in both cases they can be - and indeed are - evaluated on the basis of spatial or land-use plans;

(d) Gravel pit operations are often started without prior profitability assessments, simply when, and where, demand for sand and gravel arises, e.g., due to a planned construction project [10]. Factors affecting the economic viability of a gravel pit include (a) lithological composition, which controls the usage - and thus the price - of the material, (b) grainsize distribution, which can increase the cost of processing such as crushing, grading, washing, and (c) the amount of overburden, e.g., soil, peat, clay, which determines the yield of saleable product. These factors are similar for metal mining operations. However, due to

the low-cost nature of operations, gravel mining is usually profitable in the proximity of infrastructure projects where demand is given, transport costs are low, and sales are guaranteed.

3. UNFC's focus on an individual mining project seems unfit for the assessment of sand and gravel deposits in greenfield areas. Applying project-based criteria in regional assessments can lead to an underestimation of quantities due to the difficulty of differentiating between resources in active mining sites and those in unexplored areas. Previous UNFC applications were forced to summarize quantities in a low Category (E3F3G4) although they included resources of higher Categories [6].

4. This paper introduces a way of classifying sand and gravel resources in greenfield areas, based on land use and published geological data. Rather than summarizing greenfield deposits in the E3F3G4 Category, a more nuanced approach is developed using elements such as transport distance, proximity to markets and material suitability. The approach builds on and extends, UNFC application to the Norwegian sand and gravel deposits [6] [7], where the level of conflict for future extraction was identified based on spatial plans, and the deposit subdivided into zones accordingly. This paper first introduces the extended methodology and then presents a case study on sand and gravel resource classification in an Austrian pilot area.

II. Data and Methodology

5. The method employs Geographic Information Systems (GIS) and uses geological maps, borehole data, data on material usage and a wide range of spatial planning information such as zoning plans, environmental protection areas, cultural monument inventories, forests, and water protection zones. Table 1 lists the data to be included in the approach. Among these, data on surface and vertical extent as well as on properties or usage of the material, are indispensable for the classification. Regarding exclusion, conflict, and safeguarded zones, however, the list only serves as an example and will vary between countries and regions. For the classification, it will be important to include all relevant data that exist in the respective area.

6. The surface extent of sand and gravel resources corresponds to the geological deposits defined by traditional geological mapping. Selecting productive sand and gravel deposits from geological maps can be aided by the existence of current or former excavation sites. If data on such sites is available, the approach extends pre-existing technical, financial or material information over a larger area as long as geological homogeneity can be assumed. In the absence of geological maps, deposits can be delineated using digital elevation models and other remote sensing techniques [11].

Table 1

Data and information for the application of UNFC to sand and gravel resources at a regional scale

Type of information	Data source and examples	
Land use data		
Exclusion zones/ potential conflict zones	• Zoning plans	Statutory exclusion zones such as building land, recreational areas, roads, and railway lines; including buffer zones
	• Environmental protection	E.g. ecological / biodiversity areas, biotopes, natural monuments, game passageways, national nature protection areas, national parks, Natura2000 areas, Ramsar areas
	• Forest areas of special importance	
	• Agricultural land of high economic value or strategic importance	
	• Groundwater protection zones	

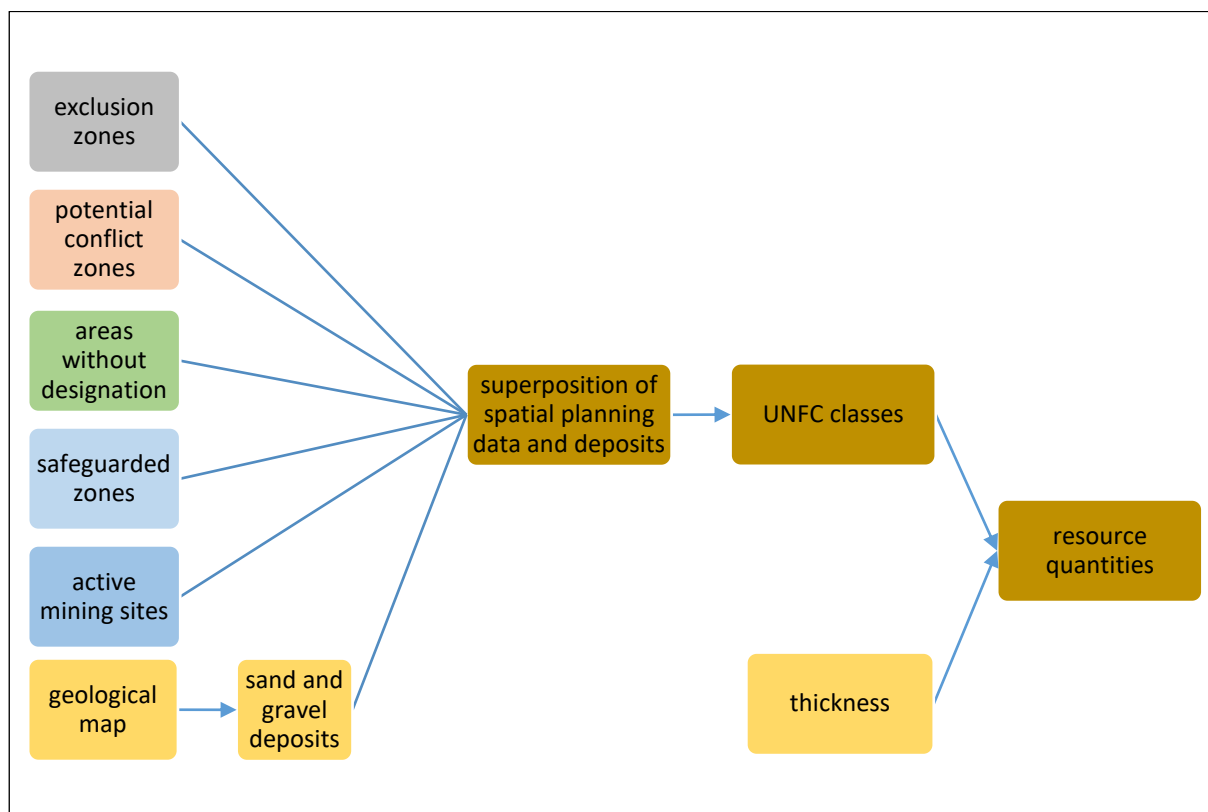
Type of information	Data source and examples	
Safeguarded zones	• Cultural data	E.g., objects of cultural heritage, objects under monument protection, historical monuments; including buffer zones
	• Spatial plans	Additional exclusion zones e.g., to pre-empt emissions resulting from excavation and transport, to protect rivers and meadows inhabited by rare species, or to preserve important aquifers
	• Spatial plans	Statutory or informally considered areas where mining permit applications are given preference in case of conflicts of interest
Active / future mines	• Spatial plans	Location and extent of existing mining areas
	• Mining authority	Pending license applications
Geological data		
Surface extent of deposits	Geological maps	
	• Alternatively: deposit maps derived from remote sensing or digital elevation models	
Vertical extent of deposits	• Borehole logs	
	• Alternatively: thickness models plus information on overburden thickness and sand intercalations	
	• Alternatively: models of gravel base plus a digital elevation model plus information on overburden thickness and sand intercalations	
	• Alternatively: geological reports or any other existing survey data describing thickness	
Resource suitability	• Mining company data on material usage, technical/financial information	
	• Alternatively: geological reports describing material properties such as grain-size distribution, sorting, lithological composition including information on the presence of soluble or sulphur-bearing components (such as gypsum, anhydrite, rauwacke, halite, coal), sulphide/sulphate content, amount of swelling clay minerals, mica, friable components	

7. In many European Union (EU) countries, such as Austria, Ireland or Greece, built-up areas, designated building land, roads and railway lines represent exclusion zones where mining of aggregates is legally prohibited [12]. Provincial regulations may prescribe additional exclusion zones or areas with a *de facto* ban on aggregate mining. In contrast, the protection of landscapes or the environment may be a less restrictive issue, necessary to be considered in mining license negotiations but not constituting a knockout criterion. Landscape or environment protection areas then represent potential conflict zones where an agreement can nevertheless be reached, and mining permitted, in principle. The information, which of the land use designations may restrict or prevent mining activities, i.e., constitute potential conflict or exclusion zones, needs to be provided by local or regional planners.

A. The Geographic Information Systems Methodology

8. Figure I illustrates the workflow of the approach. All spatial planning data in Table 1 are allocated to one of five classes and then combined into one data set. The result is intersected with the sand and gravel deposits selected from geological maps. Subsequently, the Categories along the E, F and G axes are derived for all subareas (polygons resulting from the intersection of GIS polygons) inside each deposit according to the following three subchapters.

Figure I
Workflow for the application of UNFC to sand and gravel resources at a regional scale



B. Methodology for Deriving the E-axis Category

9. The UNFC criteria for E axis classification are economic and environmental viability, social acceptance and the likelihood of a mining project being permitted by mining authorities [2]. For the classification at the regional scale, this is achieved here by distinguishing between permitted areas, safeguarded areas, potential conflict areas and legally prohibited areas (Table 2).

10. Permitted areas and active pits, where the viability has been demonstrated, are classified as E1.1. Safeguarded areas are set aside by spatial planners specifically for future mining. In these areas, no social conflicts or environmentally negative consequences are expected and all necessary conditions (including conditions for the relevant permitting) are certain to be met in case a project is being developed. Therefore, these areas are classified as E1.2.

11. In areas without potential conflict, gravel pits are likely to be socially acceptable and likely to have no negative environmental effects. However, since the granting of a permit is less certain, these areas are classified as E2. Any area without a specified designation in spatial or land use plans is *a priori* considered as conflict-free. Inside potential conflict areas, environmental or social conflicts are to be expected but can potentially be resolved, either by careful choice of the pit location or by compensating for negative effects. These areas are *a priori* classified as E3.2 but can be given the Category E2 if an impact analysis is performed, and results suggest the permit could be granted (see Chapter IV).

12. In exclusion zones, mining is either prohibited by law or permits are *de facto* never granted. The latter may be due to a high societal value or to a cultural monument, ecosystem or habitat worth protecting. In these cases, these areas are classified as E3.3. as there are no prospects for viability.

Table 2
Derivation of UNFC E-axis Categories for sand and gravel resources at a regional scale

<i>Area of investigation</i>	<i>Grouping and description</i>	<i>Category</i>
Active pits	Permitted areas <ul style="list-style-type: none"> • Viability demonstrated 	E1.1
Around active pits or around former pits or in greenfield areas	Safeguarded areas <ul style="list-style-type: none"> • Areas made viable • All necessary conditions (including relevant permitting) are certain to be met 	E1.2
	Outside potential conflict areas <ul style="list-style-type: none"> • Mining likely without conflict • No negative environmental effects • Socially acceptable 	E2
	Inside potential conflict areas <ul style="list-style-type: none"> • Negative environmental effects to be compensated • Social acceptance to be negotiated 	E3.2 / E2*
	Inside exclusion zones <ul style="list-style-type: none"> • No prospects for viability 	E3.3

* E2 is given if an impact analysis is performed, and results are positive (see Chapter IV).

C. Methodology for Deriving the F-axis Category

13. The F-axis Category reflects the technical feasibility and maturity of a mining project [2]. The basis for the classification is the existence and outcome of pre-feasibility and feasibility studies. In the absence of such studies, as is the case for virtually all gravel pits, different criteria have been selected here for deriving the F-axis Category. These include the existence of mining plans and market proximity (Table 3).

14. Active pits where production is already taking place, are classified as F1.1. Mature projects where a mining plan specifies the future extraction process, material flows, stability of pit walls and waste management, are classified as F1.3. These projects can be included in UNFC as soon as companies apply for a mining license. At that moment, the companies typically have to provide such mining plans and feasibility can hence be considered as demonstrated. It should be noted that the granting of a mining license will not increase the feasibility of such projects (F axis) but will instead affect the E-axis Category.

15. In the absence of any projects, the question arises whether a gravel pit operation in a given area is to be expected in the foreseeable future [13]. Mining license applications are difficult to forecast as demand for sand and gravel is driven by activities in the construction industry. The proximity to markets is taken here as an indicator for the potential profitability of a project and for the likelihood of a gravel pit operator applying for a mining permit. Close to urban centres and designated urban expansion areas, any sand and gravel deposit can potentially become a desired resource. Beyond a certain distance to the consumer, however, the transport of sand and gravel becomes too expensive and traffic-related environmental pressure too strong for prospective gravel pit operators to pursue a permit. Consequently, any

area sufficiently close to the markets implies sufficient evidence for the potential and is classified as F2.3, otherwise as F4. The threshold distance depends on economics (price and demand) as well as on the local situation (population density and transport routes) and has to be determined regionally. It may also change over time as market conditions can vary and planned infrastructure projects can suddenly alter the distance to consumers. In addition to long distances to markets, further reasons may also prevent the development of a mining project. In these cases, areas are equally classified as F4.

Table 3

Derivation of UNFC F-axis Categories for sand and gravel resources at a regional scale

<i>Area of investigation</i>	<i>Grouping and description</i>	<i>Category</i>
Active pits	Production taking place	F1.1
Around active pits or around former pits or in greenfield areas	Mature project <ul style="list-style-type: none"> • Mining plan exists • Feasibility is demonstrated 	F1.3
	Near market <ul style="list-style-type: none"> • Sufficient evidence for the potential but no development plans 	F2.3
	No development <ul style="list-style-type: none"> • Far from market or <ul style="list-style-type: none"> • Due to other preventative reasons 	F4

D. Methodology for Deriving the G-axis Category

16. The G-axis Category reflects the degree of confidence in the estimation of resource volumes. The uncertainty associated with the volume estimate of sand and gravel deposits is given by the accuracy of the surface extent delineated during mapping, and by the accuracy of the thickness value. For fluvial terraces or alluvial fans, geomorphology is commonly used to delineate the surface extent of sediment deposits. Mapping accuracy is usually high (tens of centimetres), in particular when using digital elevation models derived from airborne laser scanning. The error becomes negligible when the lateral extent of the deposit reaches tens of kilometres. Therefore, the only critical factor is the accuracy of the thickness value. For large deposits, the error associated with estimating thickness can be directly translated into the G-axis Category (Figure II). The class breaks are according to the UNFC definitions of accuracy reached in geological studies [2].

Figure II

Derivation of G-axis Categories based on the error associated with estimating sand and gravel thickness

E. Methodology of Estimating Quantities

17. Surface and vertical extent are multiplied to calculate volumes in each subarea (polygons resulting from the GIS superposition) within each sand and gravel deposit. For the vertical extent, georeferenced borehole data need to be available. Borehole logs give information not only on depth-to-bedrock but also on overburden thickness and intercalations of other sediments, thus enabling the definition of net gravel thickness. At the same time, lateral heterogeneity within units can be assessed. Gravel base or thickness models can be used in addition, potentially showing regional thickness variations and trends.

18. Once the EFG Categories and the associated volumes have been determined, the quantities are summed up separately for each UNFC Class and for each suitable end-use of the material.

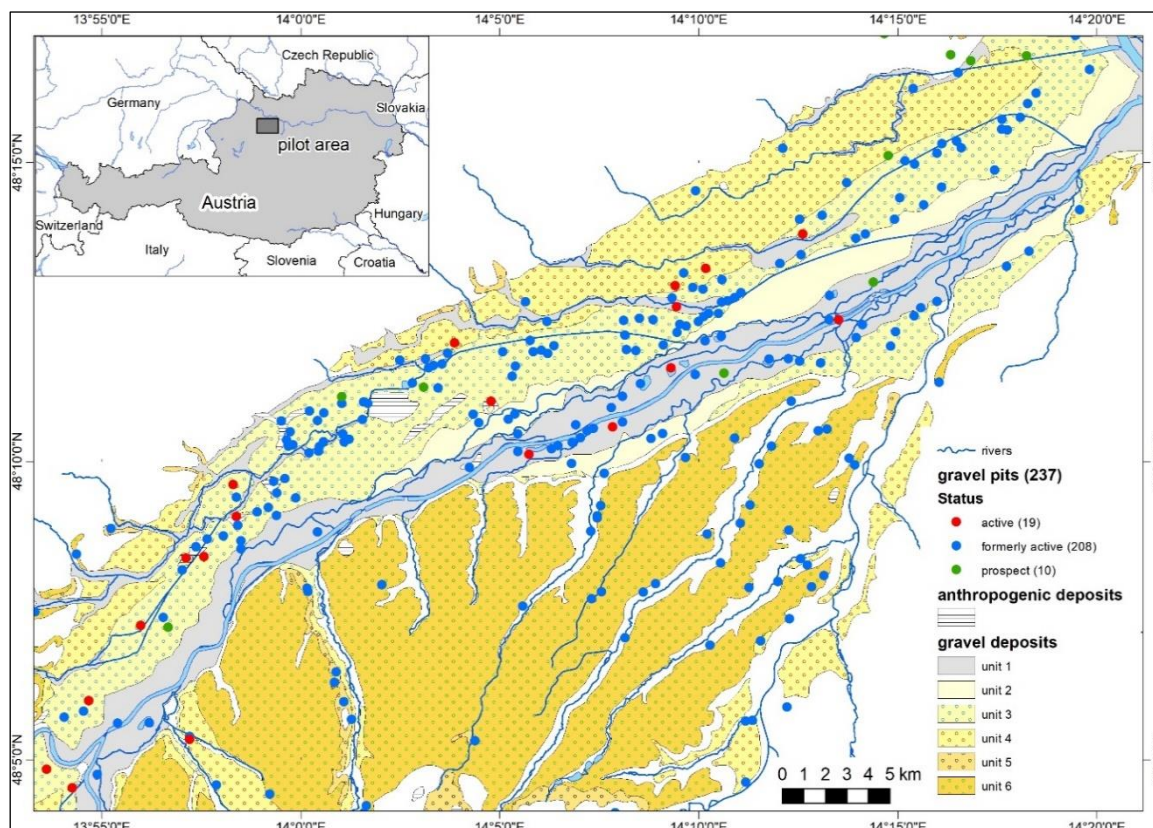
III. Case Study

19. To demonstrate the applicability of the methodology, a pilot area was selected in Austria, and sand and gravel resources were classified according to Tables 2 and 3 and to Figure II. The pilot area is densely populated, rapidly developing, and a high demand for sand and gravel coincides with numerous, often conflicting, land use interests. Six stratigraphically different gravel units are present in the area (Figure III, adapted from [14]). They all represent fluvial terraces deposited during the Pleistocene or Holocene.

20. Regarding material quality, differences exist between these units with respect to grainsize distribution and lithological composition, affecting the suitability as a resource. Due to the frequent occurrence of sandstone and crystalline components [15], the higher units (units 4–6) only offer material for road construction while the material of units 1–3 can also be used for concrete. The resource suitability was derived from data on 227 active and formerly active pit operations, sourced from the Interactive Resources Information System database of the Austrian Geological Survey [16] (Figure III).

Figure III

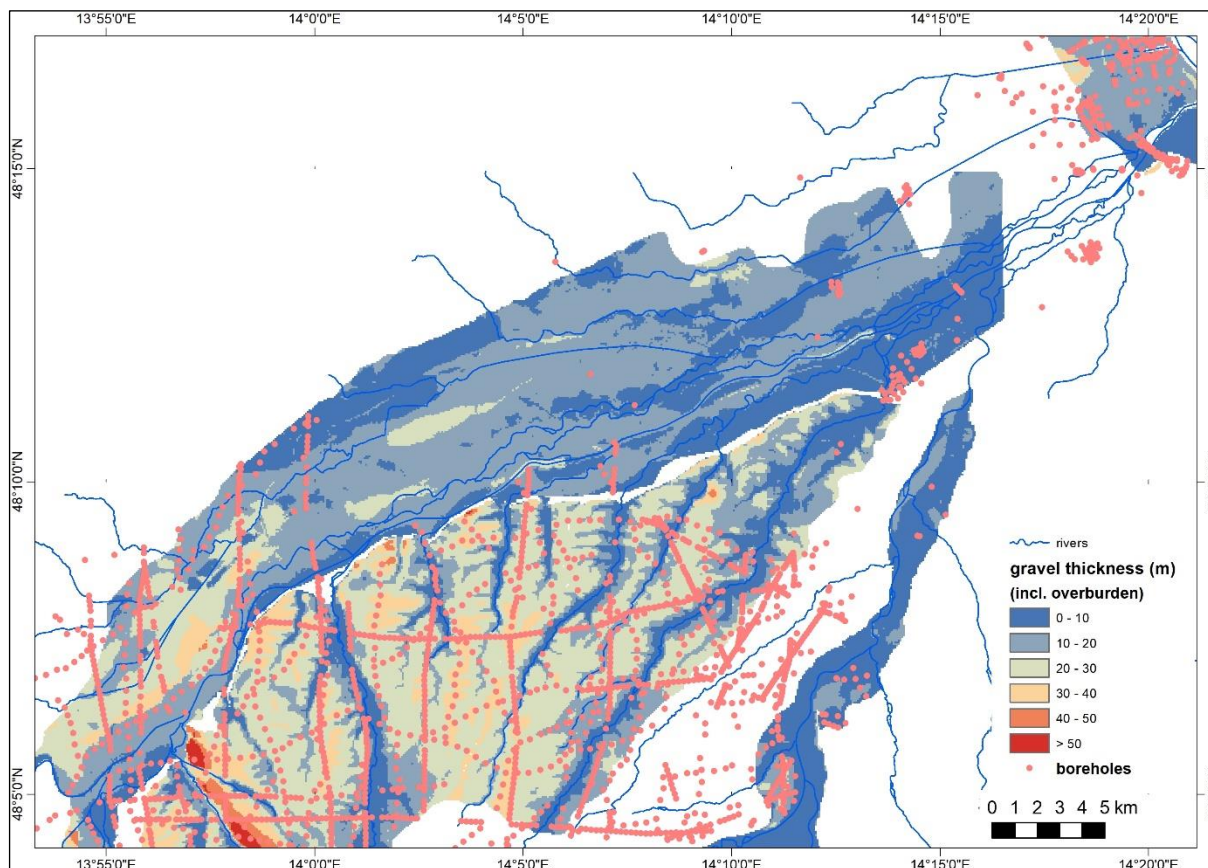
Extent of fluvial terraces in the pilot area (adapted from [14]) and location and number of gravel pits [16]



21. With respect to quantity, the gross average gravel thickness ranges between 9 and 20 m. The higher units reach greater thickness (> 16 m) while the amount of intercalated silt or fine sand is increased ($> 30\%$). In addition, the higher units are covered by thick layers (> 3 m) of loess, further reducing net gravel thickness. This information was sourced from published models of the gravel base [17] [18] [19] and from data of 2145 boreholes penetrating the gravel units [20] (Figure IV). For each unit, an average net gravel thickness (percentage of total thickness) was derived from the borehole logs and used later for volume reduction.

Figure IV

Models of total gravel thickness [17] [18] [19] and location of boreholes [20]



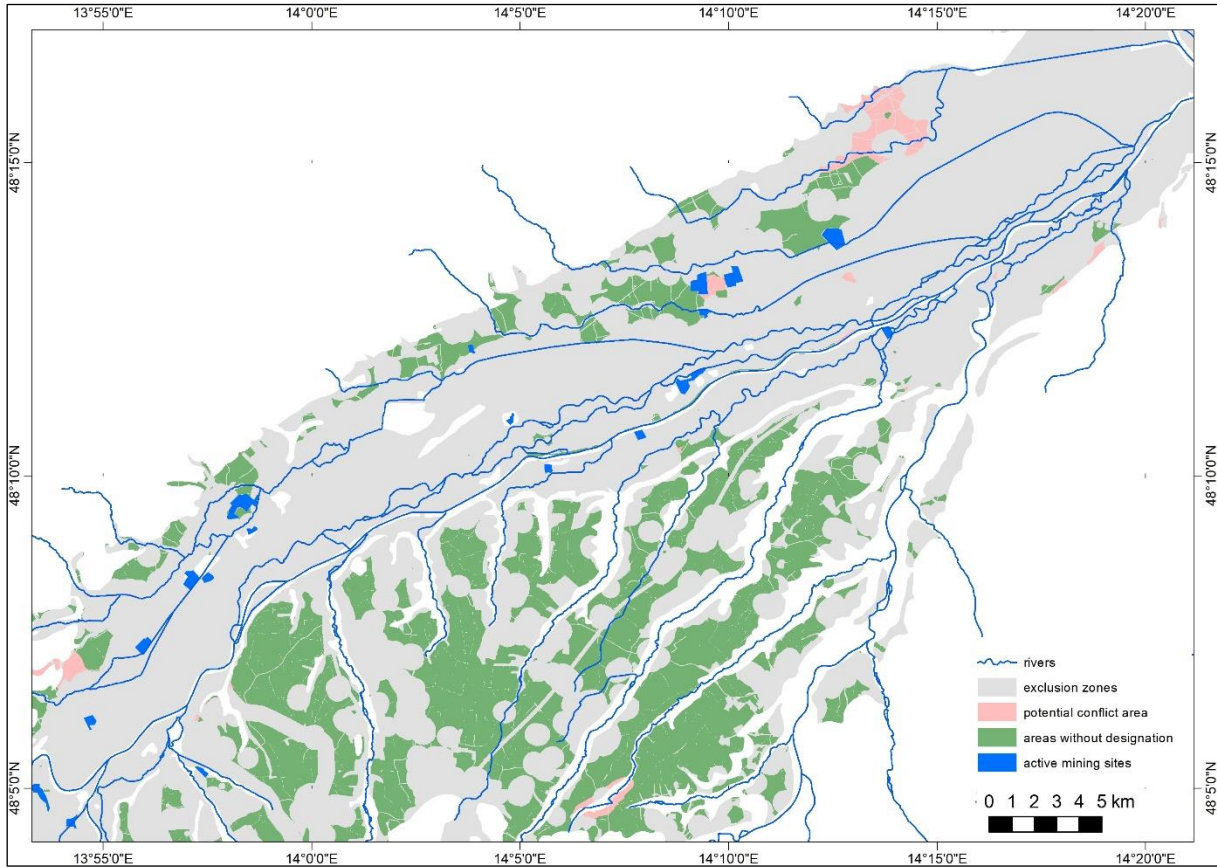
22. The gravel thickness models shown in Figure IV do not contain any information on model uncertainty. Therefore, borehole logs accomplished after publication of the models, i.e., in the years from 2008 until to date, were used to quantify the thickness error. For this purpose, the thickness values from borehole data were considered as true (or observed) values and modelled thickness as predicted values. The discrepancy between the two values was quantified at each borehole and an average error derived for each gravel unit. Areas within the extent of the model, but without borehole information, were classified as G4, otherwise the average error was used to derive the G-axis Category according to Figure II. Note that in areas without models or borehole data, volumes cannot be quantified, and the resources not classified.

23. Figure V shows the distribution of exclusions zones, potential conflict zones, of areas without designation and of active mining areas within the extent of sand and gravel deposits. Ecological areas, green zones, Natura2000 areas and game passageways are considered potential conflict areas, whereas *de facto* banned areas include highly sensitive game passageways, important forests, negative zones, and areas around cultural or natural monuments. Legally excluded according to the Austrian Mineral Resources Act [21] are built-up areas, designated building land, recreational areas, roads, and railway lines (and all their respective buffer zones) as well as water protection zones, national parks, and national protection zones. Of the total surface area (387 km²), 75% are unavailable for aggregate

mining, 1% represents potential conflict areas and 1% are currently mined. In 23% of the area, potential mining is considered *a priori* to proceed without conflict as no competing land use designation is specified in spatial plans.

Figure V

Exclusion zones, potential conflict zones, areas without designation, and active sand and gravel mines



24. The result of deriving E-, F- and G-axes Categories according to Tables 2 and 3 and to Figure II, is shown in Figure VI. For each UNFC class, total resource quantities are given in Table 4, separately for each suitable end-use of the material. The quantities represent the volumes for each subarea (polygons resulting from the GIS superposition), summed up for each UNFC class. Within model areas (Figure IV), volumes (V_p) are calculated for each polygon as per the equation:

$$V_p = r \sum_{x,y} t \times A$$

25. In this equation, the products of total gravel thickness, t , and pixel area, A , are summed over all pixels (10m x 10m) within the polygon, and the result is multiplied by a reduction factor, r , representing net gravel thickness of the corresponding gravel unit. Outside model areas, volumes are calculated as the product of the polygon area, the average thickness derived from boreholes within the polygon, and the reduction factor.

26. Quantities within active mining areas (E1F1G1) represent total extractable volumes before mining. These numbers need to be reduced periodically by the amount of extracted material. This information was, however, not publicly available for the pilot area and thus no revision of these numbers could be performed.

Figure VI
Distribution of UNFC Classes within the extent of sand and gravel deposits

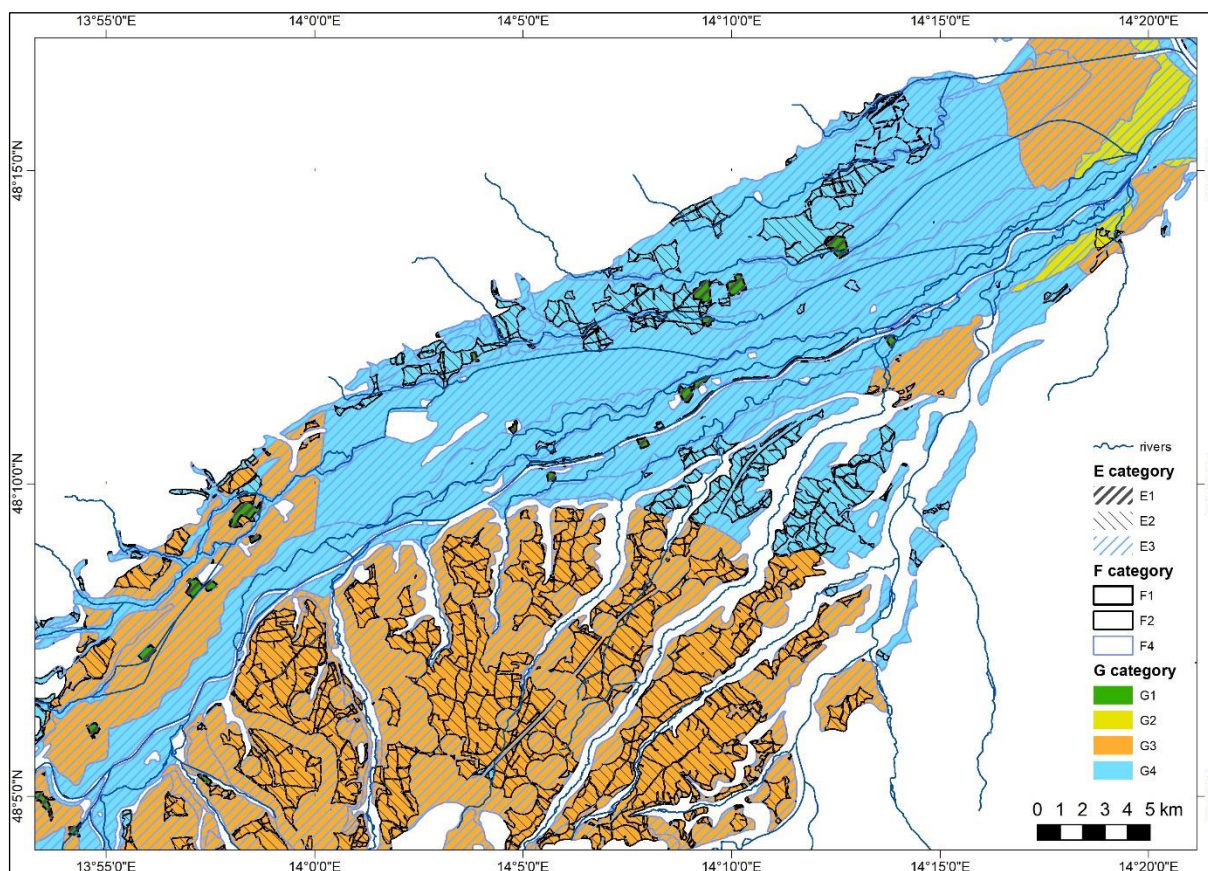


Table 4
Quantities of sand and gravel resources suitable for concrete and for road construction in the pilot area (in million m³)

EFG	Material suitable for concrete	Material suitable for road construction
111	13 ^a	17 ^a
222	1	0
223	8	859
224	27	173
323	1	8
324	3	24
342	48	0
343	512	1477
344	1080	1237

^a Numbers need to be reduced by extracted volumes.

IV. Discussion

27. For this approach to be applicable, data availability is crucial. In EU member states, most spatial planning data listed in Table 1 are available online thanks to the INSPIRE Directive (see the INSPIRE Geoportal at <https://inspire-geoportal.ec.europa.eu/index.html> for an overview of available data sets). With regard to geological maps, reports on petrographic characteristics, borehole records or material usage data, Geological Survey Organizations (GSOs) are likely to have access to such information and can compile an inventory of sand and gravel resources [22]. The GSOs therefore seem particularly well

suited to carry out the UNFC classification according to the described method. Even if some data, such as pending license applications or extracted volumes, are unavailable, the approach can still be implemented.

28. In the pilot area example, homogeneity within each gravel unit was assumed with respect to material quality (lithological composition, amount of intercalated silt or fine sand and thickness of overburden). While borehole logs do indicate homogeneity regarding sand lenses or overburden, data on the lithological composition are scarce and regional variations within any one unit cannot be excluded. The numbers listed in Table 4 may therefore overstate available quantities. If available data indicated heterogeneity, map polygons would need to be subdivided to define homogeneous areas within the deposits.

29. Spatial planning data are categorized according to their effect on potential mining license applications, distinguishing between zones where mining is legally prohibited (or *de facto* never permitted), likely to encounter social or environmental conflicts, likely to proceed without conflict, or even given preference over other land use interests. For this categorization, spatial planners or permitting authorities need to be consulted. Only they can inform for example on *de facto* banned areas, where mining permits will generally not be granted. It is important to note, that the result does not replace, nor pre-empt the outcome of, any permitting procedure. A site-specific evaluation will still be required for any mining permit procedure.

30. The pilot area represents a special case where two types of thickness data exist, previously published subsurface models and borehole logs. The deviations between the two data sets were used to quantify geological confidence. If only borehole data are available, the G-axis Categories need to be derived differently. Uncertainty is then mainly a function of borehole density and geological variability [23]. When thickness modelling is performed, the calculation of model uncertainty can provide the necessary information to determine the G-axis Category [24].

31. In the pilot area, the proximity to markets is given when the distance between the resource and the consumer amounts to < 30 km [25]. This distance, which decides between F2.3 and F4, may vary between regions and has to be determined anew for each UNFC application area. It is also not constant in time as market conditions may change. F3 is not foreseen in the derivation of F-axis Categories (Table 3) as it traditionally reflects the exploration phase, and this phase is usually very limited in the case of gravel mining projects. F1 was only given to active pits in the pilot area as information on pending mining license applications was not readily available.

32. For areas of conflict, scoring systems exist to resolve environmental or social issues by weighing the importance of the sand and gravel resource for the supply of construction material against negative consequences for the community, the environment or for natural resources [26] [27]. With these scoring systems, marks are given on the one hand in favour of gravel mining depending on material suitability, market proximity and on the importance of the resource for the local supply. On the other hand, points are deducted depending on the impact of excavation and transport on the local community, the value of the land, on biodiversity, landscape, cultural heritage, agriculture, forestry and water supply. A positive total score would lead to the classification of the resource as E2 (Table 2). However, this type of conflict resolution should be performed by spatial planners, ideally in cooperation with geologists.

33. The approach presented here is applicable to sand and gravel resources in greenfield areas. It cannot be applied in regional assessments of metal ore deposits or other local anomalies in the earth's crust. It derives resource quantities of sand and gravel deposits and, furthermore classifies them according to UNFC, based on published data. This represents an extension of current UNFC practice which foresees only low categories (E3F3G3 or E3F3G4) in areas, where no active mines exist, and no mineral exploration has been carried out. It is important to note that the results do not represent an economic assessment of a mining project but rather information on a region's endowment with available sand and gravel resources. The results are meant for regional governments and authorities and provide important figures for planning the future supply of construction materials.

34. When presenting regional scale UNFC classes and quantities, such as in Figure VI and Table 4, the difference to project scale UNFC application needs to be made clear, preferably by showing the corresponding deposits or the area of investigation. However, if a commercial operator uses UNFC to report sand and gravel resources in and around the area of an active or prospective mining project, the results can be expected to agree with those derived here for that area.

V. Conclusions

35. For the application of UNFC to sand and gravel resources, many of the ‘normal’ measures (profitability assessments, technical feasibility studies, exploration campaigns) to derive the values of the E, F, and G axes of UNFC are largely missing. In addition, since these resources do not occur as localized anomalies in the earth’s crust but as widespread sediment accumulation bodies, an approach applicable at the regional scale is needed. This paper presents a methodology to classify entire sand and gravel deposits, rather than individual mining projects, according to UNFC, and nevertheless obtain results which comply with the original definitions of the E, F, and G Categories of UNFC.

36. The GIS-based approach largely relies on spatial planning data which in the EU are publicly accessible due to the INSPIRE Directive. Geological data required, such as geological maps or borehole logs, are commonly available at the national Geological Survey Organisations which makes this approach particularly well suited for implementation by these organisations.

37. The classification considers the effect of potential mining operations on the environment, forestry, agriculture, groundwater, and on cultural heritage, and separates areas of potential conflict, areas banned for mining, permitted areas, and areas set aside for future mining. The objective and transparent methodology used to derive the results may help to resolve potential conflicts arising when mining companies seek permits in a given area. The resulting maps of UNFC classes for sand and gravel deposits, and the corresponding quantities, give a good overview of where, and how much, resources are available for potential future extraction. At the same time, through the quantification of geological confidence along the G-axis, information is provided on how accurately resource quantities are known. The results are meant for regional governments and authorities to support planning the future supply of construction materials. As spatial plans, and resulting land use, change with time, sand and gravel resources continue to be excavated, and geological knowledge progresses, the results will need to be updated on a regular basis.

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Acronyms

UNFC:	United Nations Framework Classification for Resources
UNECE:	United Nations Economic Commission for Europe
EGRC:	Expert Group on Resource Classification (predecessor to EGRM)
EGRM:	Expert Group on Resource Management
GIS:	Geographic Information Systems
EU:	European Union
GSO:	Geological Survey Organizations
