Agricultural Land Use Capability Description Statement

Proposed Development of Material Recovery Facility at, Ecohive Complex, Tul il-Kosta / Triq ir-Ramla, Triq ta' Saverja, Naxxar

Tony Meli B.Bus. (Agric.) (W.A.I.T.), PG Dip. Env. Mgmt. (Melit.), MPhil (Dundee)©

1. CONTENTS

1. CONTENTS 2

2. INTRODUCTION 3

2.1 Background 3
2.2 Site Location 4

3. THE SITE RELATIVE TO SURROUNDING AREAS 5

4. SOIL LANDSCAPE AND TYPE 23

5.0 AGRO-ECOSYSTEMS 29

6.0 BASELINE ENVIRONMENTAL ISSUES OF AGRICULTURAL ACTIVITIES33

7.0 SUMMARY OF IMPACTS 36

9. CONCLUSION 42
10. REFERENCES 43

2. INTRODUCTION

This document provides agricultural land use information on the proposed construction of a Materials Recovery Facility plant in the locality of Maghtab and will effectively be an extension of the ECOHIVE Complex to the east of the landfill complex near the Magħtab Distribution Centre, Baħar iċ-Ċagħaq.

2.1 Background

The proposed development is related to the treatment of source-separated and co-mingled dry recyclables and will operate in conjunction with other waste management operations within the ECOHIVE Complex. The ultimate objective is that of reducing dependence on landfilling as a final disposal solution, as well as increasing emphasis on materials recovery and recycling, as an improved waste management practice.

Figure 1: General site locality (Source: Google Earth)

2.2 Site Location

The MRF plant shall form part of the ECOHIVE Complex and the proposed location mainly consists of six fields of an area of about 21,373 square metres to the east of the Maghtab and Ghallis landfills. The general indications are that until recently, agriculture was practised in these fields.

Figure 2: Site location (Source DTR report)

Figure 3: View of fields proposed for development (Source Natura 2000 viewer)

3. THE SITE RELATIVE TO SURROUNDING AREAS

The area where the proposed works are to be carried out consists of a series of six terraced fields adjoining each other. Two of these parcels indicate signs of abandonment and the remaining parcels were used for fodder production. There are no signs of previous irrigation or stored water. The site also contains stretches of non-agricultural areas consisting of low wind-swept trees and remnants of local maquis. The third stretch of land primarily consists of a maquis habitat dominated by carob trees, *Ceratonia silqua*. Close to the east is the garigue area along the coast road, while the Maghtab landfill complex is to the west.

Figure 4: Overview of site proposed for development (Source: Google Earth)

Figure 5: Soil profile of field closest to seashore (left) and adjoining second field (right)

Figure 6: Soil profile under carob tree (left) and same in second field (right)

 

Figure 7: Shallow soil area in second field (left) and Unharvested fodder crop (right)

Figure : Unharvested fodder crop (left) and tree border in second field (right)

Figure 8: Shallow soil in third field (left) and harvested crop (right)

Figure 9: Maquis parcel (left) and maquis with rock outrcrops (right)

Figure 10: Profile fourth parcel (left) and harvested crop fourth parcel (right)


Figure 11: Evidence of cereal crop (left) and fifth field shallow soil profile (right)


Figure 12: Stony surface at fifth field

Figure 13: Uppermost abandoned field

Figure 14: Rock outcrops in the abononed field (left) and topsoil in mostly rubble (right)

All the fields have a very compact shallow topsoil with the depth ranging from a few centimetres to a maximum of 45 cm - with a 30 cm average depth. The subsoil is very stony and rocky, and, in some instances, it was it up to 100 cm deep. The soil near the carob trees shows a thin A horizon, with a thick stony B horizon mostly similar to a raw carbonate hardpan. The shallow topsoil and compact sub-soil, both of which are very stony, do not facilitate root access and mostly fine carob tree roots were noticeable in the subsoil. The dry and very shallow nature of this arable land makes returns very limited, particularly when prone to sea spray and when rainfall can be insufficient. Given the unavailability of water, the area may primarily be used for cereal cultivation for fodder production. In the best scenario, the probability is that this land will remain marginally productive.

The fields envisaged for development are typically marginal due to poor soil properties and shallowness. Most fields showed traces of cereal stalks and, except for the maquis stretch and abandoned field, indicating that cultivation was still practised. There were evident signs of harvesting by machinery and, furthermore, patches that were heavily infested with weeds had been discarded. The size of the carob trees, despite, that these evidently were present for various decades, confirms the limited nutrient availability as was the restricted availability of water. Their height and shape further indicates the prevalent effect of windy weather.

Most of the field supported carob trees, and at times these were interspersed with olive trees, lentisk, and an Aleppo pine. All these fields had present a limited number of disturbed ground species. More prominent on the edges were fennel, *Foeniculum vulgare* and *Ferula melitensis,* perennial wall-rocket, *Diplotaxis tenuifolia,* wild asparagus, *Asparagus aphyllus*, Mediterranean thistle, *Galactites tomentosa,* snapdragons, *Antirrhinum* species, and garland chrysanthemum, *Glebionis coronaria*.

The Magħtab Area forms part of the locality of Naxxar and is located to the east of Burmarrad, west of Bahar ic-Caghaq, south of Salina, and north of the Naxxar/Għargħur Great Fault. The locality under study is an agricultural fringe caught between the landfill complex and the coastline garigue. Most of the fields in the study area are terraced, not irrigated, and support one dry crop. Dryland cultivation is mainly typical of this area and the limited depth of soil in some areas makes production very marginal. The attribute of minimal soil cover, together with the influence of sea spray limits cultivation practices.

Figure 15: Area in 1998 (Source: http://geoserver.pa.org.mt/publicgeoserver)

Figure 16: Area in 2004 (Source: http://geoserver.pa.org.mt/publicgeoserver)

Figure 17: Area in 2008 (Source: http://geoserver.pa.org.mt/publicgeoserver)

Figure 18: Area in 2012 (Source: http://geoserver.pa.org.mt/publicgeoserver)

Figure 19: Area in 2016 (Source: http://geoserver.pa.org.mt/publicgeoserver)

Figure 20: Area in 2018 (Source: http://geoserver.pa.org.mt/publicgeoserver)

The time series area photos confirm that, for the agricultural area under study, the pattern of agricultural practices consistently practised was that of dryland agriculture. This indicates that in the areas under study, the agriculture practised is that for more marginal dry land areas as the soil typology, climatic regime and lack of stored rainfall allow only one crop per year, namely cereals, very often wheat, sown in October/November and harvested dry, latest in May. The limiting soil factor, in conjunction with prevailing cultivation techniques, together with the lack of crop rotation, and even much more limited fertilizer inputs would indicate a minimal crop yield. The climate change trend for an increasing number of consecutive dry days and associated drought conditions will further contribute to a negligible yield.

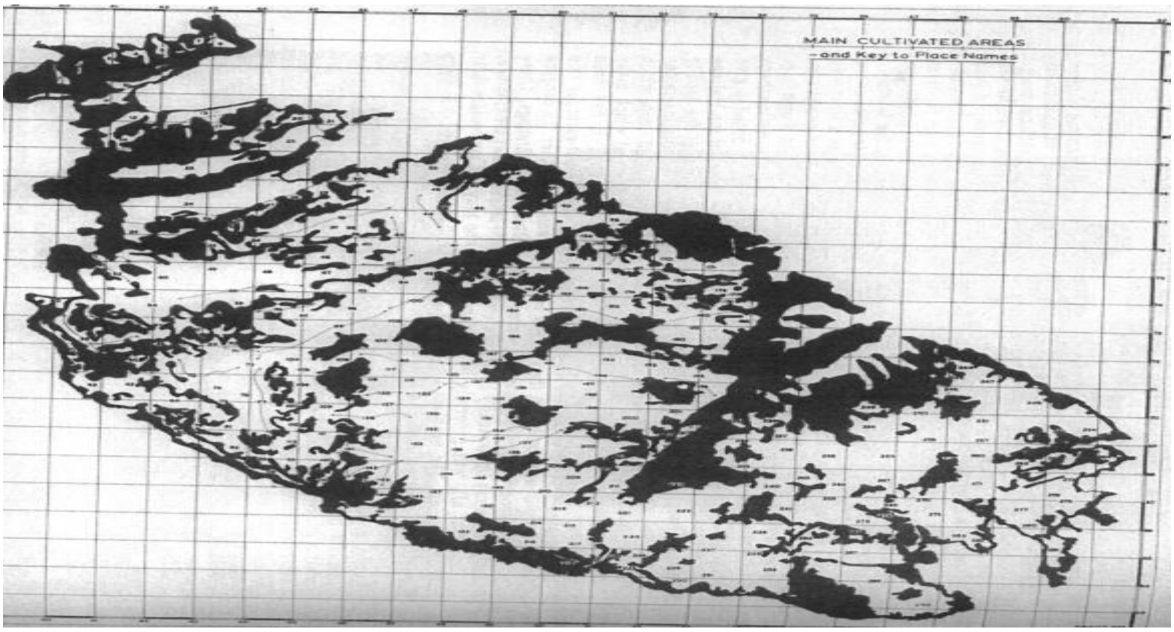

Figure 21: Bowen-Jones 1961 Malta main cultivated areas

The locality under study was considered a cultivated area with cereals and was probably tilled and not left fallow, according to historical findings published Bowen-Jones in 1961. This publication also suggests that no vegetables, no viticulture and no fruit trees were grown in this area. The locality could have bordered on wasteland.

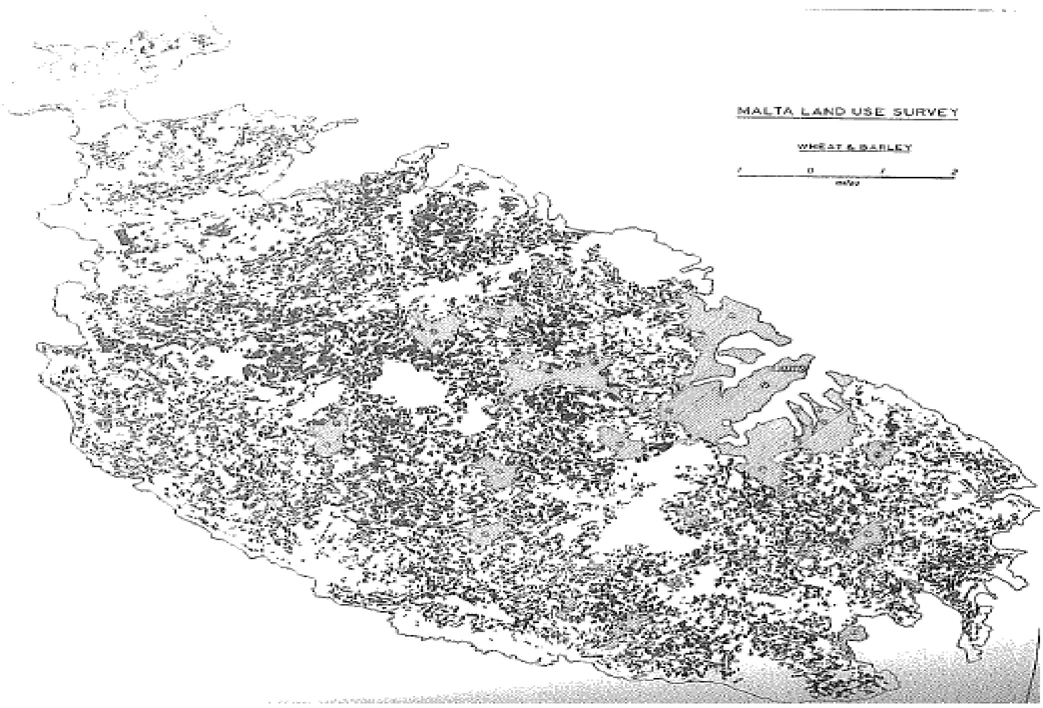

Figure 22: Bowen-Jones 1961 Tilled areas

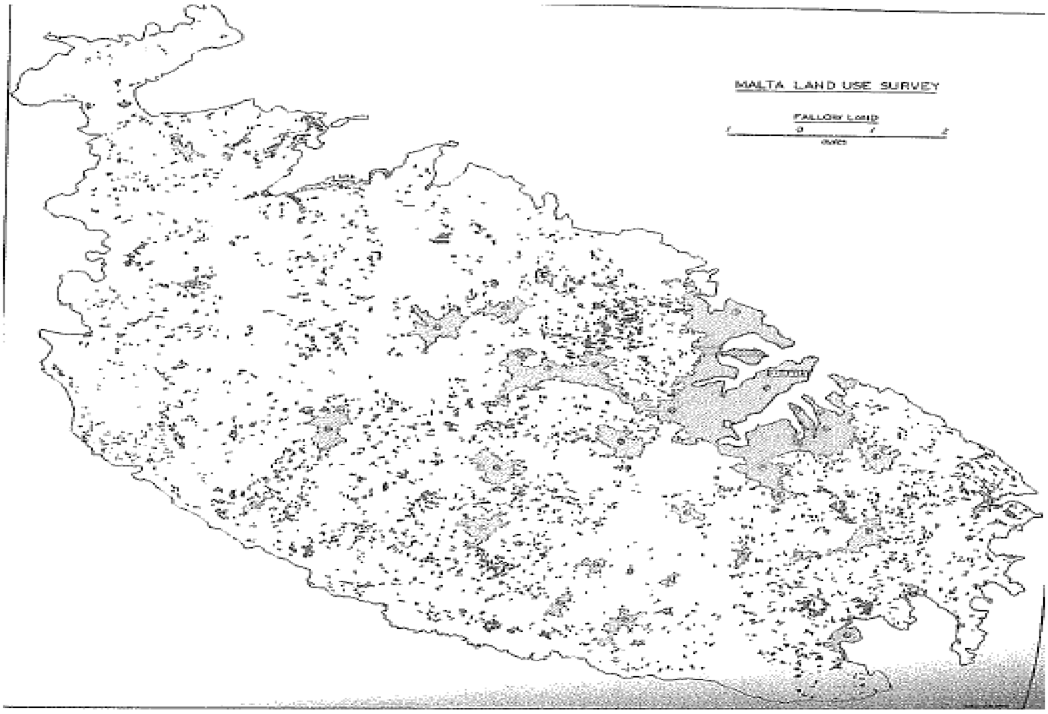

Figure 23: Bowen-Jones 1961 Fallow areas

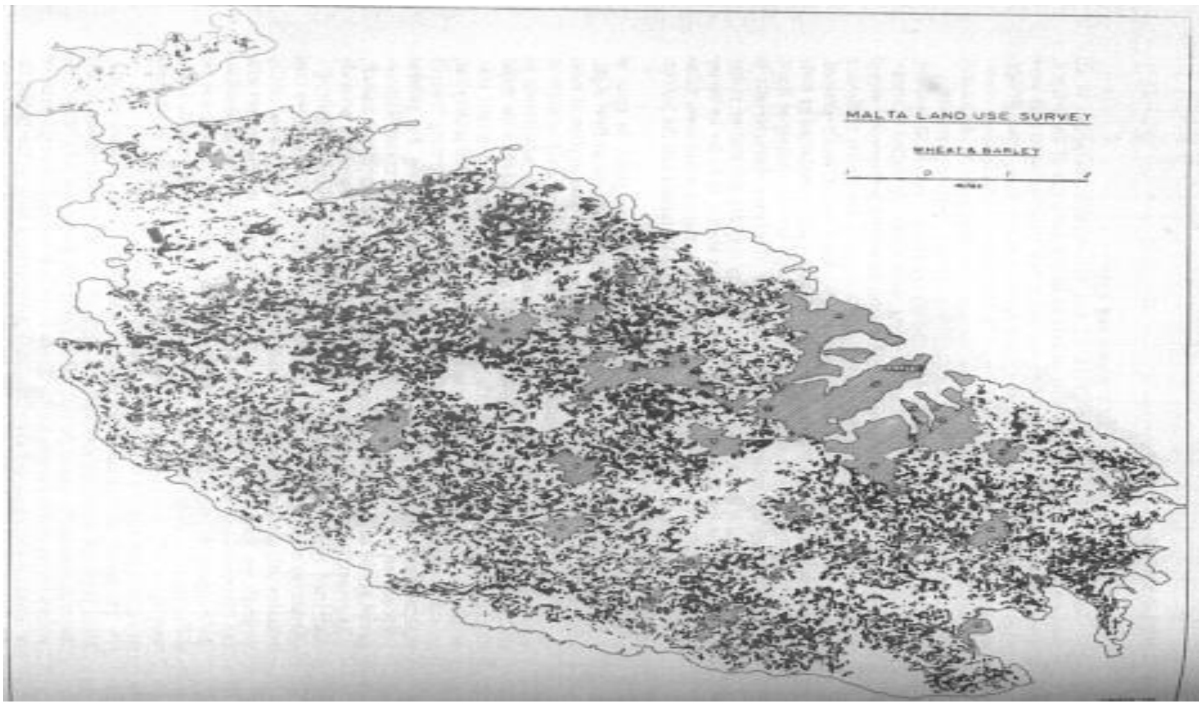

Figure 24: Bowen-Jones 1961 Malta wheat and barley cultivated areas

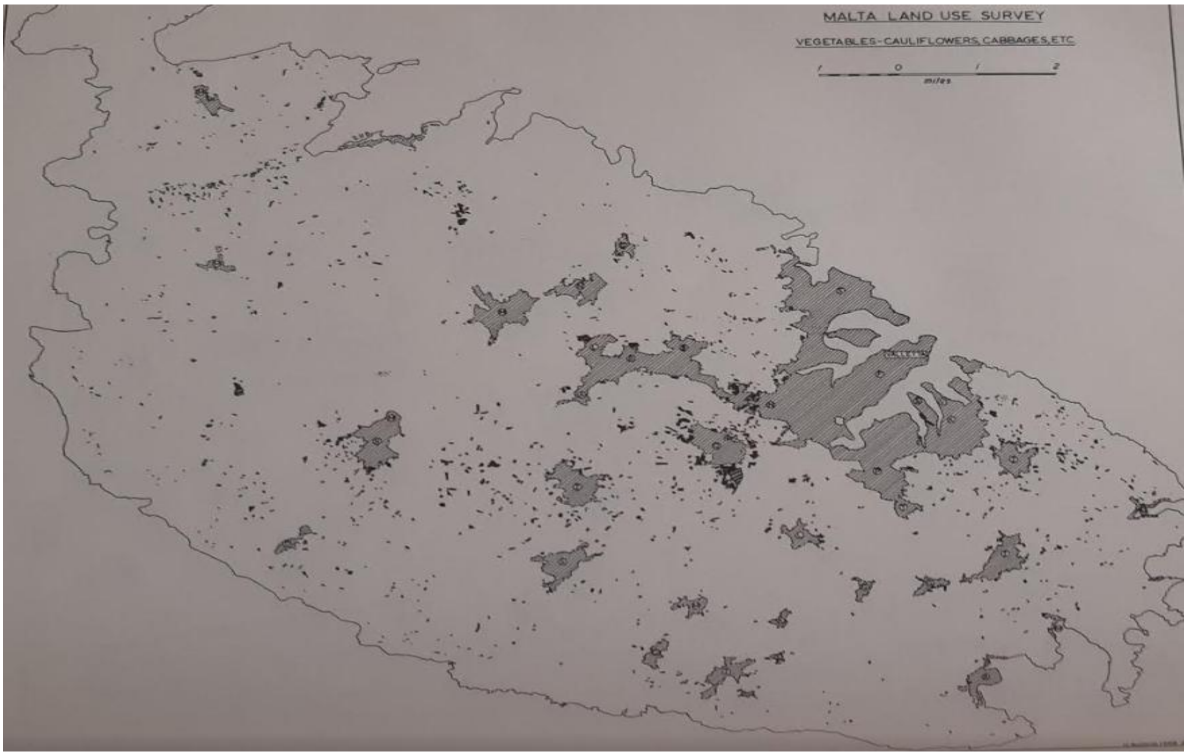

Figure 25: Bowen-Jones 1961 Malta vegetable growing areas

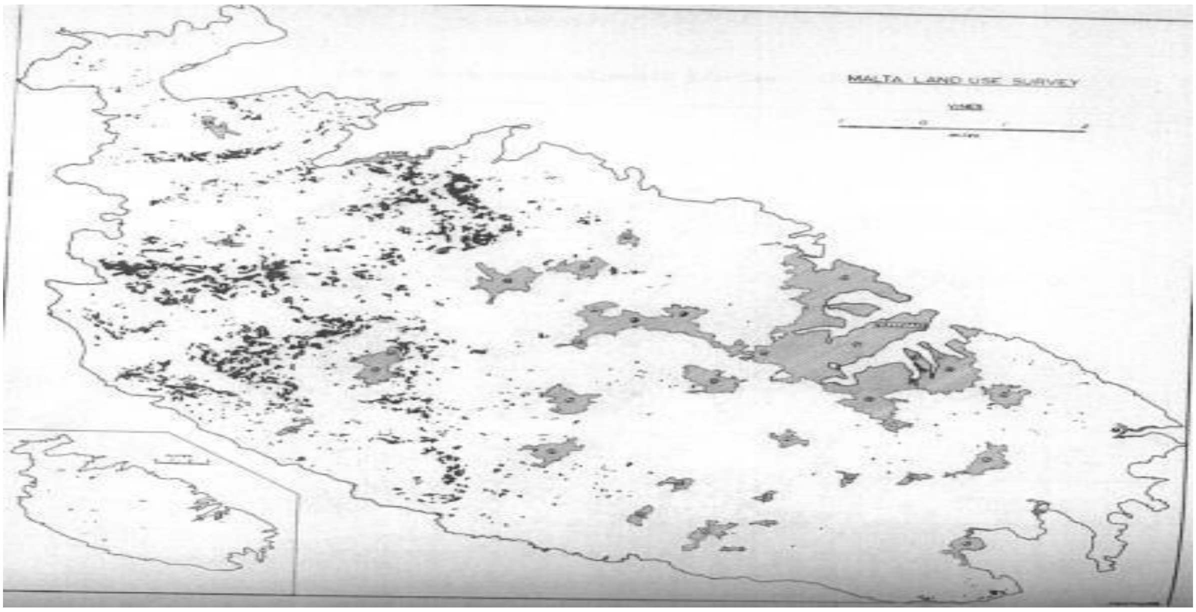

Figure 26: Bowen-Jones 1961 Areas with vines in Malta

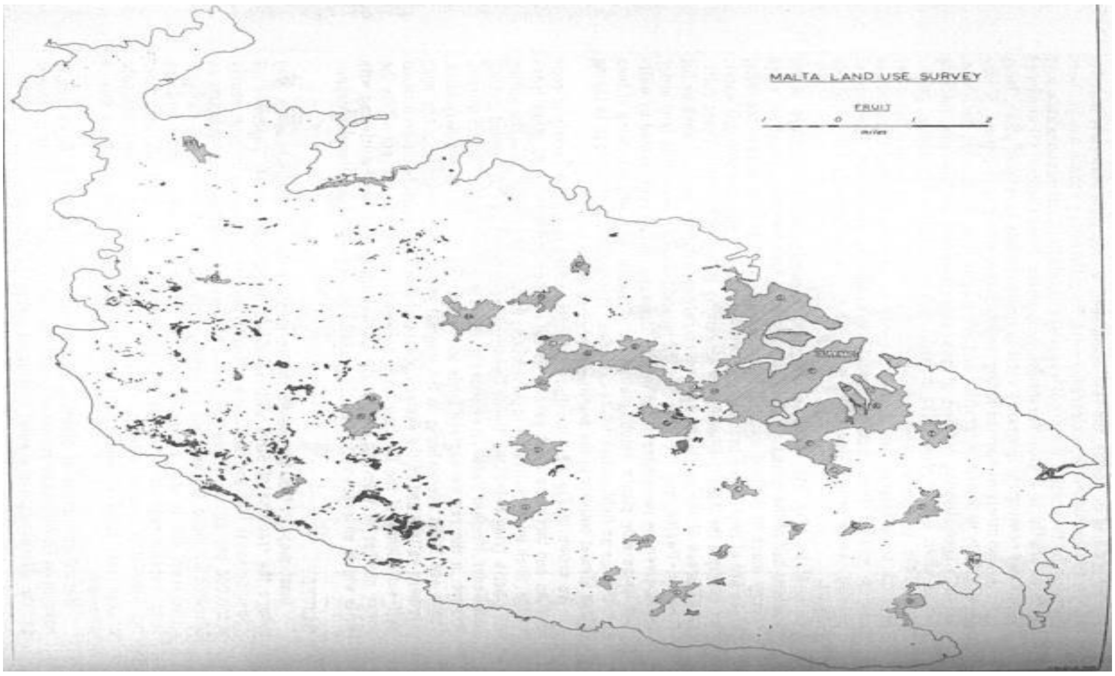

Figure 27: Bowen-Jones 1961 Areas with fruit trees in Malta

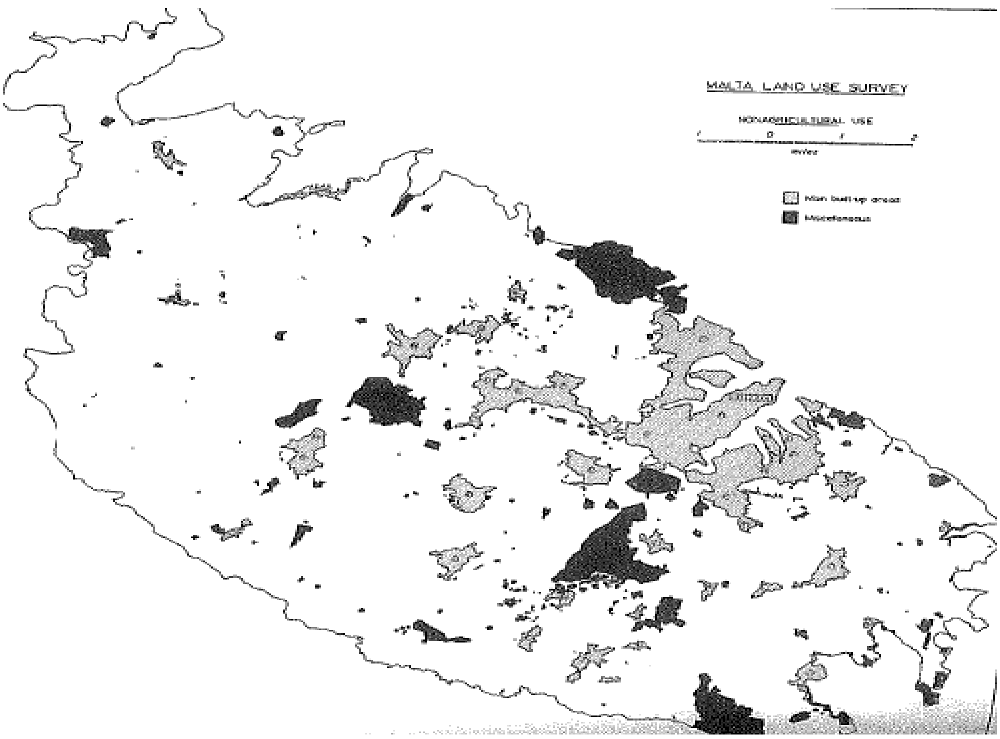

Figure 28: Bowen-Jones 1961 Non-agricultural Use

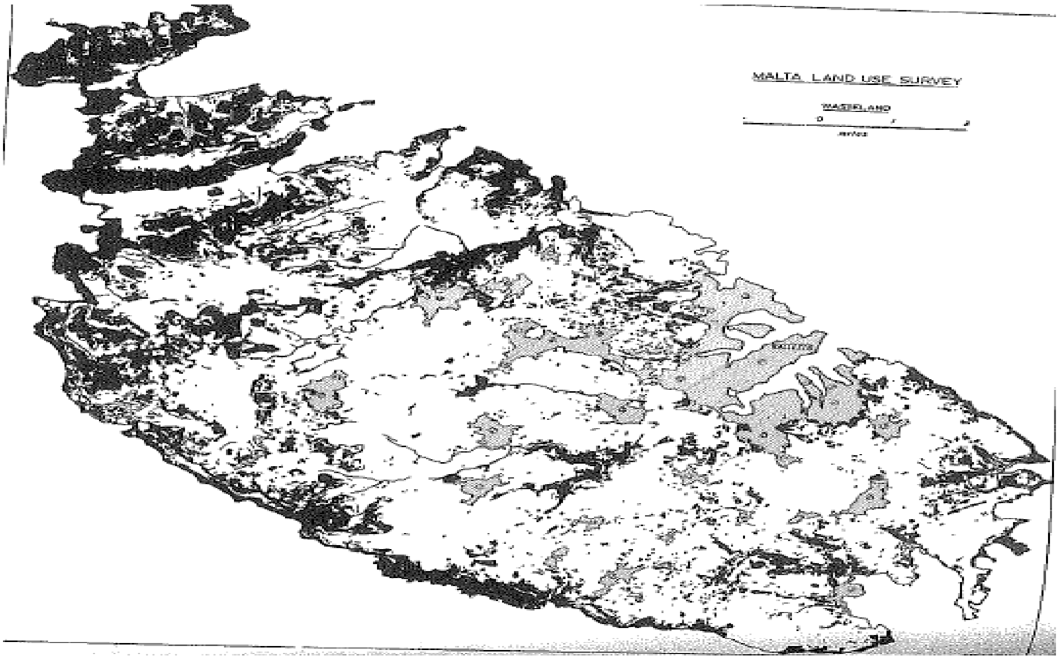

Figure 29: Bowen-Jones 1961 Wasteland

Reference to Bowen-Jones et al. (1961) indicates that, in the area under study, agriculture was, and still is, primarily governed by the prevalent lack of a water regime. Without irrigation the prevailing soils can only support cereal production in a year with adequate rainfall, and there is no evidence that vegetables or fruit trees were grown here. The added closeness to the sea even makes the succes of dry land cereal crop yield more questionable. Bowen-Jones et al. further indicate, in respect of the Għallis region, that the distribution of wasteland corresponded to the surface exposure of Lower Coralline rocks and the degree of exposure to northerly winds was the second factor controlling agriculture, however the less exposed inland depression at Magħtab facilitated a better farming pattern.

The absolute lack of water, combined with the occurrence of winds for over 90% of the year, plus the prevailing hours of sunshine create a marked evapo-transpiration factor. When considered in conjunction with available soil type this does not leave much of a choice for crops. The growing of cereals, wheat, and barley, has possibly been one of the few available options to eke out anything from this environment. And this is not always successful given that growth of cereals requires adequate follow-up rainfall to cater to the ‘break of season’ water requirement. Changing precipitation, temperature, and evapotranspiration are likely to have the largest impacts on crop production in locations that are already subject to heat and drought stresses, thus the area under study is typical of a dryland agricultural system continuously subject to climatic and economic uncertainty.

Evaluation of surrounding fields in the area of the study indicates that fields with adequate soil depth are still being cultivated, while shallower ones are abandoned. A striking feature is that along the rubble walls of the abandoned fields are a number of carob trees, and these all indicate the effect of northerly winds in that they are lower on the northerly side and more profuse southward. The fields are not irrigated and support cereal production. The size of the carob trees indicates that they have been present for a long time.

4. SOIL LANDSCAPE AND TYPE

The landscape is that of an undulating Globigerina hilly area typical of this northern part of Malta. The soils are typically mainly brownish with limited soil depth. Soils of Malta are currently classified using the WRBS classification system (MALSIS, 2003). Referring to this system, this location at Magħtab comprises an area of Regosols as per Figure. The landscape is that of a lower shallow moderate terraces on Globigerina limestone – GTm as can be seen in Figure .

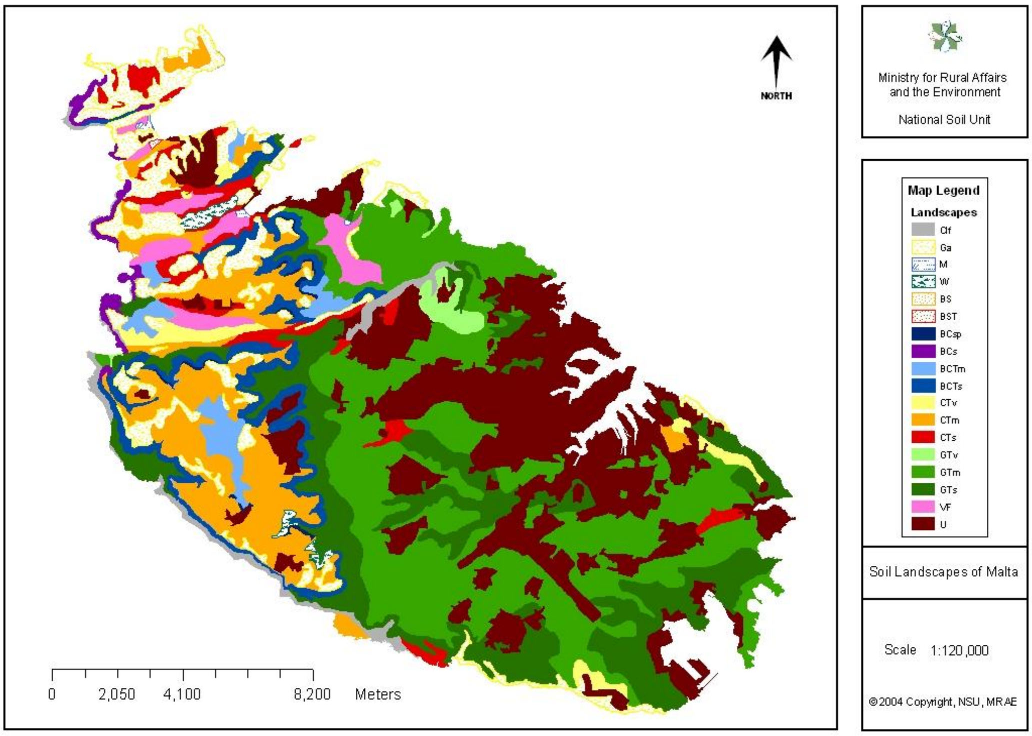

Figure 31: MALSIS Soil Landscapes (Source: MALSIS)

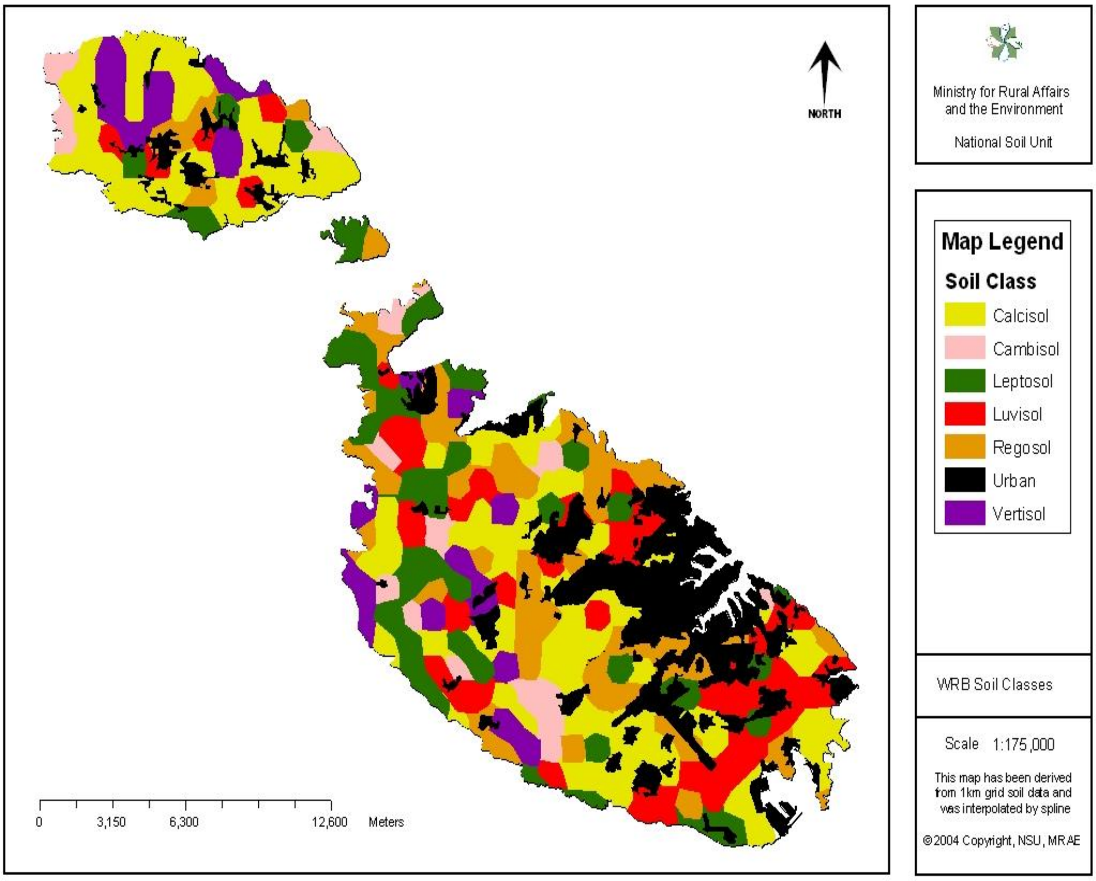

Figure32: MALSIS Soil Classes (Source: MALSIS)

Regosols (RG) constitute a group that includes 'other' soils, with very limited development in virtually unaltered parent material, showing no dark-coloured topsoil and no distinct subsoil horizons. The group of Regosols is a taxonomic rest group containing all soils that could not be accommodated in any of the other groups. In Malta, Spolic Regosols have been described; these soils are situated on made ground terraces overlying urban waste material. Regosols are characterized by shallow, medium- to fine-textured, unconsolidated parent material that may be of alluvial origin and by the lack of a significant soil horizon (layer). Regosols often show accumulations of calcium carbonate or gypsum in hot, dry climatic zones.

From an agricultural viewpoint, a Regosol is a very weakly developed mineral soil in unconsolidated materials with only a limited surface horizon having formed. Limiting factors for soil development range from low soil temperatures, prolonged dryness, characteristics of the parent material, or erosion. Ultimately, parent material and climate dominate the morphology of regosols, however, their low water-holding capacity and their higher permeability to water make them sensitive to drought. Thus quality and the low water-holding capacity of these soils would require frequent applications of irrigation water and fertilizer. Although this would result in better yields, it is rarely economical.

In 1960, a survey conducted by Lang, using the Kubiena classification system, placed these soils as complexes and designated them as the Inglin Complex soils. As many local reports, even recent ones still use the Kubiena classification system when referring to soils; it would be appropriate to also describe the soils of this locality using the system used by Lang (1960). According to Lang, the soils of this location have been classified as Inglin Complex. The soil is a pale brown to red, shallow to moderately deep, with light to heavy textured soil that resembles the Xagħra soil series from which it has been largely derived but is effectively more disturbed.

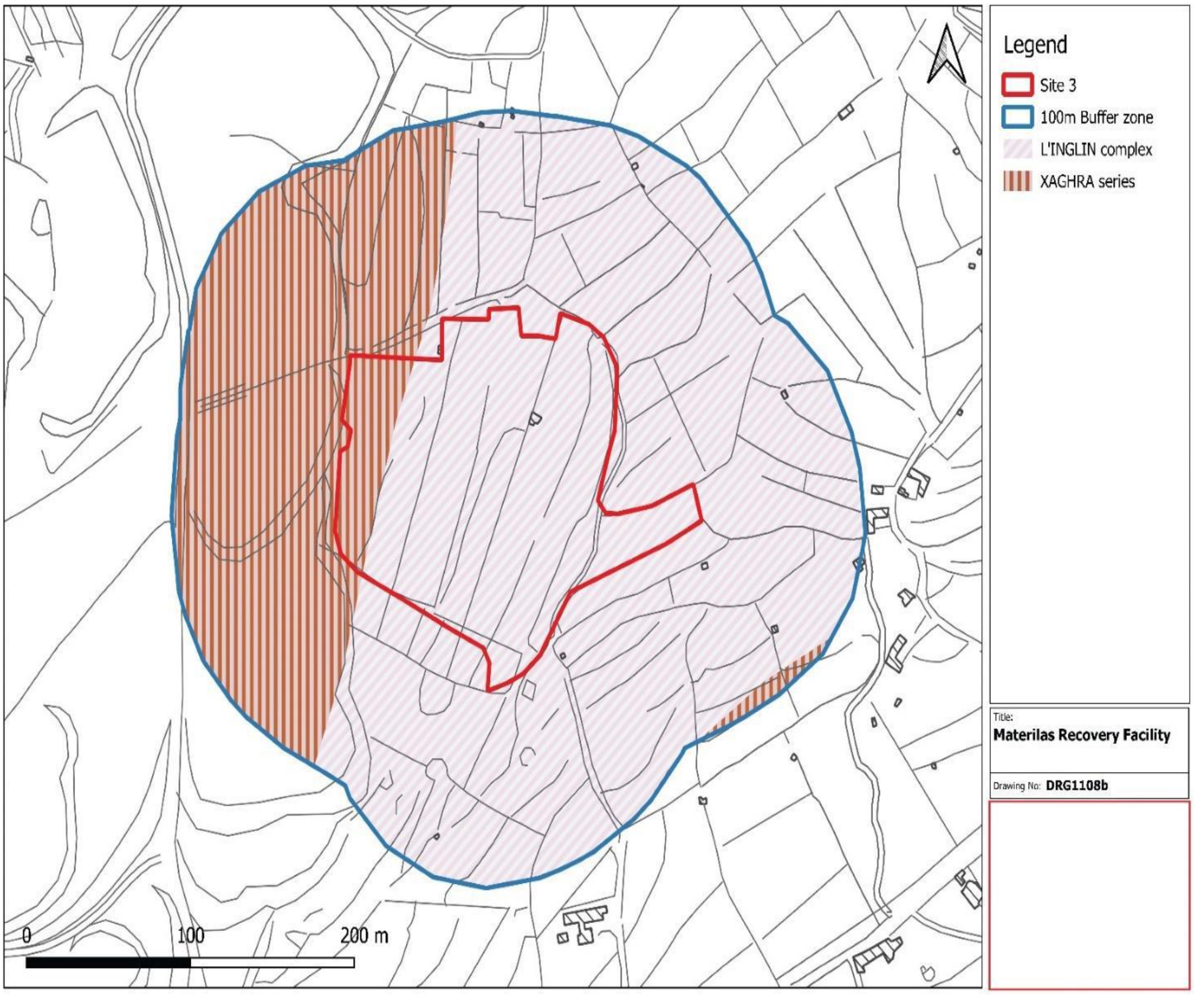

Figure 3033: Area of study (Source PDS report)

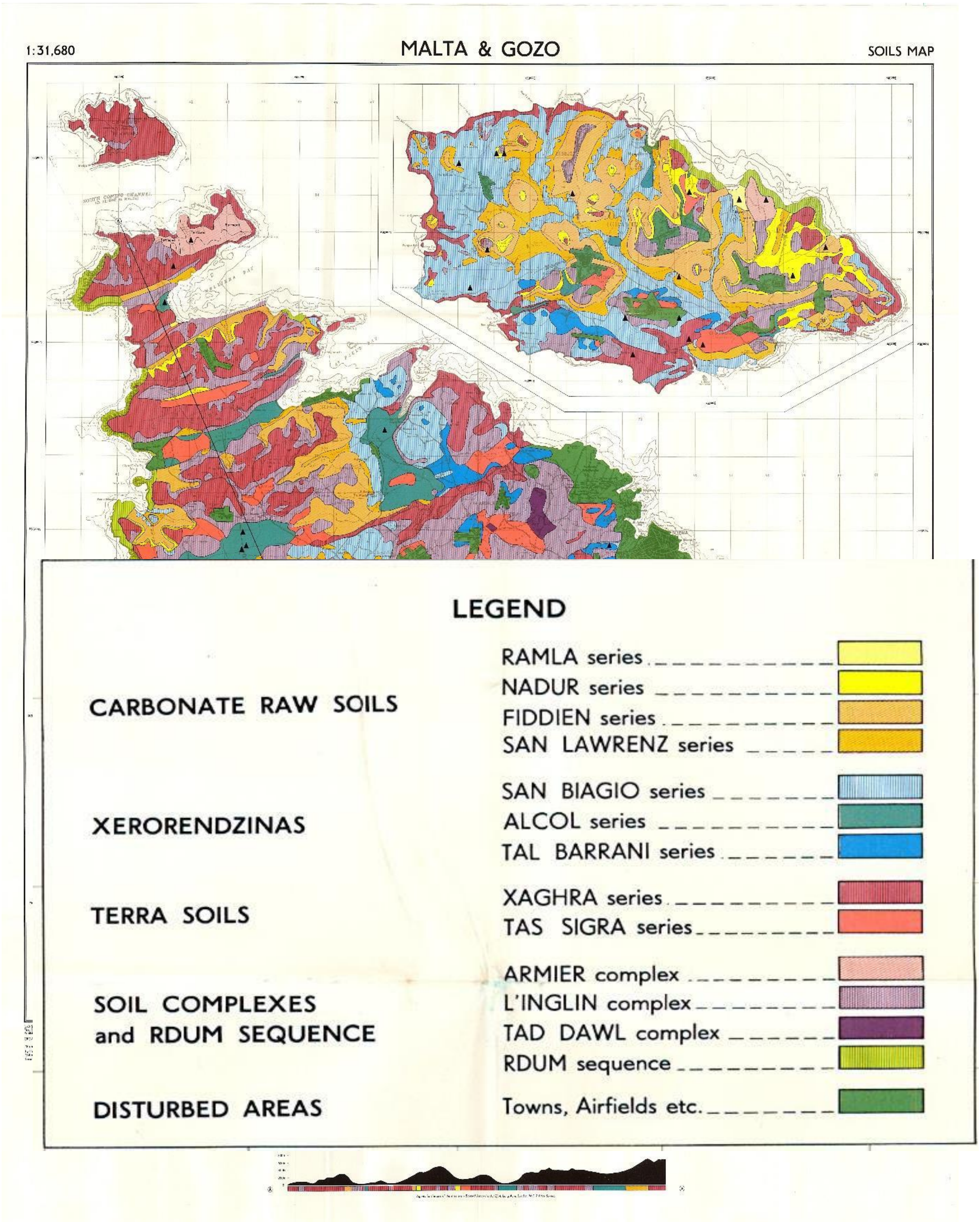

Figure 3134: Malta and Gozo soils (Source: Lang 1960)

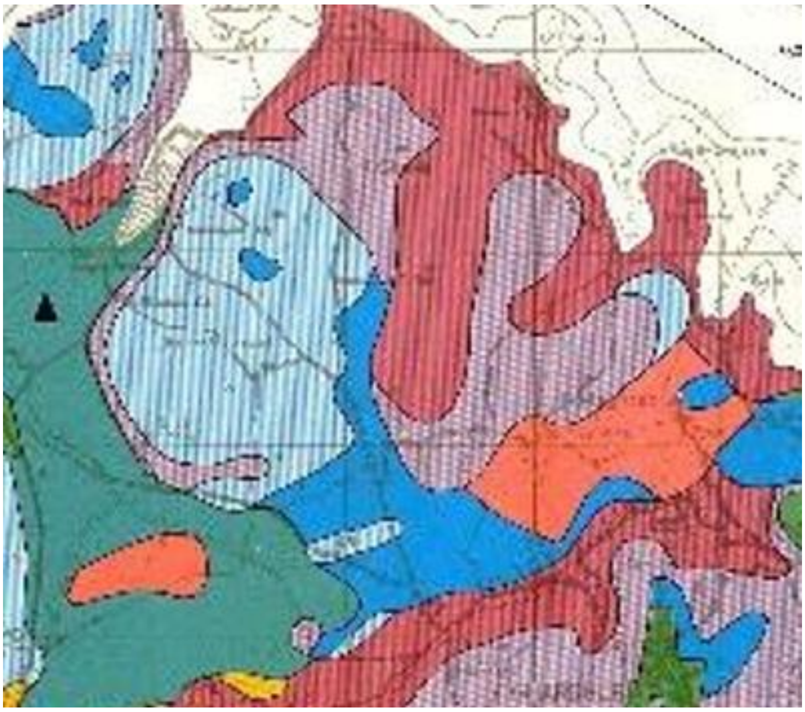

Figure 35: Enlargements from Lang's Soils of Malta and Gozo (Source: Lang 1960)

The Inglin Complex soils found in this location are typical anthropogenic soils. The rubble content, presence of broken rock surfaces, and lack of natural horizons typify this soil. These soils are mainly artificial, and this characterises their variability, being much disturbed and mixed in their formation process. Often the soil structure could be weakly developed, resulting in low fertility. Additionally, crops grown on these soils could be prone to pests and diseases, and the shallower soils would also be prone to erosion and drought.

5.0 AGRO-ECOSYSTEMS

In agroecosystems, agricultural management practices affect native soil biota through cultivation, irrigation, and application of agrochemicals. Soil is a critical component in the structure and function of agroecosystems, and the condition of the soil biological communities is important to both the structure and function of soils. Maintaining soil fertility is important to promote sustainable agriculture. Farmers' management approaches influence soil fertility. In natural ecosystems, soil minerals undergo limited change, however, through farming, the introduction of a crop and its harvesting before the minerals can be passed back to the soil creates imbalances. With good crop rotation and appropriate fertilizer application, such losses are minimised. An even more environmentally-oriented approach would be the practising of crop rotations that utilise inoculated legumes to increase nitrogen availability. The utilisation of different crops, as opposed to monoculture, would further help to ensure better mineral utilisation rather than loss of elements associated with a single crop. Farmers could also leave crop stubble or other residue on the field after harvest. In the case of cereal stubble, decomposition returns some minerals while limiting the effects of erosion. Retention of crop stubble is now a more common practice because of EU Rural Development measures.

Maintaining a sustainable agroecosystem will also necessitate balanced soil pH and salinity. Monocropping creates an artificial ecosystem that alters field pH. Changes in pH also influence soil organisms, and these, in turn, affect crop yields, but most relevant to plant growth, the pH of soil influences the availability of nutrients. The best range for nutrient uptake is between pH 6.0 and 7.0. At an average pH of 8.3, most Maltese soils indicate saturation with bases as the dry climate soils do not provide sufficient rainfall to leach away the bases, thus limiting the supply of nutritive elements.

This situation is further exacerbated during the dry period when evaporation exceeds precipitation with consequent limited water movement through the soil resulting in a high concentration of salts close to the surface. Very few species tolerate increasing salinity and crop plants growing in saline soil will have dwarfed root systems, reduced absorption, and transpiration with limited water resulting in a decrease in growth and yield. Salinization can be restricted by leaching of salt from the root zone, changed farm management practices, and the use of salt-tolerant plants.

The presence of water is the most essential component for ecosystem functioning and plays a key role in sustaining crop production. Daubenmire (1974) explains that water is retained by soils as films that coat the surface of particles, as wedges held in angles between the grains, and as moisture imbibed by colloids. In fine textured soils, there is a greater general propensity to hold water when compared to coarser soils. Yet although fine textured soils can comparatively hold more water, they hold much of it in the upper layers which are highly vulnerable to drying, and, furthermore,

1. do not admit water readily, so lose more by runoff,
2. retard root penetration so seedlings may not be able to reach deep moisture before the surface dries,
3. tend to be poorly aerated at lower levels, thus obliging shallow rooting and making plants susceptible to drought.

The porosity of coarse-textured soils and of heavy soils that are well aggregated tends to support a condition of equilibrium between the soil, the atmosphere, and temperature because of the lower moisture capacity and the freer gas exchange for which fine-textured soils are less favoured.

Since the Maltese Islands are characterized by a very high human population density and correlated high land use, most habitats have all been affected to some extent by anthropogenic factors and hence no part of the islands can be said to be in a truly natural state. The main vegetation assemblages are maquis, garigue, and steppe; minor ones include patches of woodland, coastal wetlands, sand dunes, freshwater, and rupestral communities. Human impact is significant. The present landscape is a result of the interaction of geology and climate, coupled with the intense human exploitation of the environment over many thousands of years, which has altered the original condition of the vegetation cover, principally through the diversion of vast tracts of land to cultivation, plus the development of land for buildings and industry. The scantiness of the soil, combined with the erratic rainfall and the periodic disturbance of the vegetation cover, has resulted in extensive erosion as well as loss of the original vegetation.

The agricultural landscape in this locality is one of very small parcels of land, frequently arranged in terraces and surrounded by rubble walls along which grow a variety of wild flora and fauna that contributes significantly to Malta’s biodiversity. There are no distinctive livestock activities taking place. There is also no evidence of water reservoirs and irrigation practices and all fields around the area of study indicate dryland agriculture. From an ecosystem standpoint, the principal threats to the soils in this locality may be described as erosion, soil sealing, decline in soil organic matter, soil contamination, and soil salinization although no specific data is available.

Effectively agroecosystems are ecological systems modified by farmers to produce crops. Unsuitable agricultural practices can cause a loss in soil quality and erosion to consequently increase or trigger desertification, particularly under Mediterranean conditions. Sustainable agricultural management will allow the soil to recover, and the use of straw mulching is a very effective management strategy in soil improvement both for increased water retention, nutrient recycling, and improved soil structure. The use of a cover, either through cropping, or even temporary fallow will contribute to reducing the risk of erosion and increase soil quality. Similarly, the presence of well-maintained rubble walls will not only help to contain soil loss but also serve as a niche for microflora and microfauna. However, at the same time, these would establish weed seed and pest banks near productive agricultural areas.

To ensure soil conservation, wherever soil deposits will be affected, all planned activities must be in line with:

- Cap 549 Environment Protection Act;
- Cap 236 Fertile Soil Preservation Act;

and also:

- S.L. 236.01 List of Places where Fertile Soil may be deposited Notice; and
- S.L. 236.02 Preservation of Fertile Soil Regulations

The extracted material (soil/rock) should be additionally examined paleontologically for fossils.

6.0 BASELINE ENVIRONMENTAL ISSUES OF AGRICULTURAL ACTIVITIES

Climate change and agriculture are interrelated processes, both of which take place on a global scale. Global warming is projected to have significant impacts on conditions affecting agriculture, including temperature, precipitation, and glacial run-off. These conditions determine the carrying capacity of the biosphere to produce enough food for the human population and domesticated animals. Rising carbon dioxide levels would also have effects, both detrimental and beneficial, on crop yields. On the other hand, agriculture has been shown to produce significant effects on climate change, primarily through the production and release of greenhouse gases such as carbon dioxide, methane, and nitrous oxide, but also by altering the Earth's land cover.

The adaptation of farming to maximize agricultural production because of climate or other environmental changes is not expected to occur in this area given the marginality of the land due to soil characteristics and limited availability of water. Any negative environmental developments would likely lead to land abandonment.

Land use changes such as deforestation and desertification that change the ability to absorb or reflect heat and light, together with the use of fossil fuels, are the major anthropogenic sources of carbon dioxide. Agriculture obliges deforestation to clear land for pasture or crops, so most of the original vegetation would have been removed. Therefore, control of all road runoff in this location should be effected to control erosion and other eco-system factors.

While irrigation can lead to a number of problems through depletion of underground supplies, and, on the other hand, under-irrigation can lead to increased soil salinity with the consequent build-up of toxic salts on the soil surface in areas with high evaporation. Additionally over-irrigation, because of poor waste management or chemical inputs, may lead to water table pollution. Irrigation with saline or high-sodium water may damage soil structure owing to the formation of alkaline soil.

A wide range of agricultural chemicals may be used and some become pollutants through use, misuse, or ignorance. In particular, pesticide drift can cause soil contamination, groundwater, and water pollution plus air pollution through spray drift. Some pesticides are particularly toxic to bees and pesticide residues may also end up in the harvested crop. While cereal production in the study area does not involve any chemical inputs – be they fertilizers, herbicides, or pesticides, irrigated crops would necessitate this. In the marginal fodder production areas, given the lack of application of pesticides, associated effects on soil contamination would be minimal while continuous cropping could mandate some chemical inputs albeit in not excessive amounts.

Given the marginal productivity of fodder crops in this locality, and also the government's position on GMOs, no developments regarding the use of genetically engineered crops are foreseen. The land management approach of continuous cereal cropping in this semiarid environment together with the usage of conventional tillage, disc ploughs, or chisel seeders will determine the presence of organic residues on the soil surface as well as conditions for crop emergence and growth plus erosion. Residue removal increases spikes per square metre, grain per spike, grain yield, and harvest index compared with other treatments, and additionally, weed interference and lack of uniform crop establishment also occur in the presence of residues. On the other hand, reduced tillage with discs has the incorporation of residues leading to a build-up of carbon in the soil, with lower grain yields compared with residue removal, but these yields would be higher than those of chisel-seeded plots. In the area under study, as well as in the greater part of Malta, conventional tillage is practised.

A sustainable agroecosystem is environmentally sound, economically viable, socially just, and meets the needs of the present without compromising the ability of future generations to meet their own needs. Agricultural land in this Maghtab site is predominantly utilised for dryland production of fodder or hay crops. The main agricultural systems in the study area, typified by the fields that were cultivated at the time of the survey, are those characterised by low-to-moderate intensity traditional farming, where yields are similarly expected to be low to moderate. Irrigated fields are conspicuously lacking. In the area under study, fodder production as practiced in all neighbouring fields involves a low input/output system.

The absolute lack of water, combined with the prevalence of northerly and south-easterly winds, plus the prevailing soil type, do not leave much of a choice for crops. The unavailability of stored rainwater in the greater part of this locality obliges a dry farming approach entirely dependent on winter rains that manages to exact a cereal crop - generally wheat. Thus, dry farming is extensive throughout.

Effectively the holistic land use approach of this area, according to the FAO land suitability classification, would typify this locality as S3, inferring that the land could be marginally suitable for agricultural production and that the main limitations are the shallowness of the soil leading to low water holding capacity and ensuing water deficit.

Table 1: FAO land suitability classification (Source: FAO)

Class S1 Highly Suitable:	Land having no significant limitations to the sustained application of a given use, or only minor limitations that will not significantly reduce productivity or benefits and will not raise inputs above an acceptable level.
Class S2 Moderately Suitable:	Land having limitations which in the aggregate are moderately severe for sustained application of a given use; the limitations will reduce productivity or benefits and increase required inputs to the extent that the overall advantage to be gained from the use, although still attractive, will be appreciably inferior to that expected on Class S1 land.
Class S3 Marginally Suitable:	Land having limitations which in the aggregate are severe for sustained application of a given use and will so reduce productivity or benefits, or increase required inputs, that this expenditure will be only marginally justified.

7.0 SUMMARY OF IMPACTS

Table 2: Impact types

Impact type and Source		
Impact type	Agriculture	
Specific intervention leading to impact	Dismantling of rubble walls Loss of agricultural topsoil and subsoil	
Project phase	Construction/Installation works	Operations
Impact Receptor		
Receptor type	Land	
Sensitivity and resilience toward impact	Construction/Installation works	Operations
	Total loss of land parcel	
Effect and Scale of Impact		
	Construction/Installation works	Operations
Direct/Indirect	Direct where agricultural land is lost	Direct where agricultural land is lost
Cumulative	Yes	Yes
Beneficial/Adverse	Adverse	Adverse
Severity	Extreme	Extreme
Physical/geographic extent	Correlated to take up area	Correlated to take up area

Impact type and Source		
Short/Medium/Long Term	Long term	Long term
Temporary/Permanent	Permanent	Permanent
Reversible/Irreversible	Irreversible	Irreversible
Probability – Significance – Mitigation – Residual Impacts – Other Requirements		
	Construction/Installation works	Operations
Probability of impact occurring	Inevitable	Inevitable
Significance Overall Impact	Loss of agricultural land	Loss of agricultural land
Proposed Mitigation Measures	Land loss minimization	Land loss minimization
Significance Residual Impact	Decrease of ODZ total area	Decrease of ODZ total area
Monitoring	N/A	N/A
Authorisations	Development Permission under the Environment and Development Planning Act (Cap 504)	Development Permission under the Environment and Development Planning Act (Cap 504)

8.0 Summary of impacts table

Table 3: Summary of impacts

Impact type and source			Impact receptor		Effect & Scale							Probability of impact occurring (Inevitable/ Likely/ Unlikely/ Remote/ Uncertain	Overall impact significance	Proposed mitigation measures	Residual impact significance	Other requirements
Impact type	Specific intervention leading to impact	Project phase (construction/ operation/ decommissioning)	Receptor type	Sensitivity & resilience toward impact	Direct/ Indirect/ Cumulative	Beneficial/ Adverse	Severity	Physical/ geographic extent of impact	Short-/ Medium-/ Long-term	Temporary (indicate duration) / Permanent	Reversible (indicate ease of reversibility)/ Irreversible					
Agriculture	Land taken up Wasteserv expansion	Construction & operation	Agricultural land	Moderate	Direct	Adverse	Major	Development area	Long-term	Permanent	Irreversible	Inevitable	Major	Adherence to PA and ERA regulations and instructions to protect surrounding areas	Major to moderate	None
	Clearing and building	Construction		High	Direct	Adverse	Major	Development area	Long-term	Permanent	Irreversible	Inevitable	Major		Moderate	None

Figure 32: Maghtab environs (Source: http://earth.google.com/web)

Effectively, the proposed site is mainly composed of marginal agricultural land fringed with disturbed habitats merging with maquis community outcrops. Surrounding this area are also some fields of similar agricultural value. In an agricultural context, the magnitude of the project shall create an irreversible impact due to the destruction of the agricultural land.

Malta's Planning Authority Outside Development Zone (ODZ) policy objectives are:

• To support development that is essential and genuine to the needs of sustainable agriculture and rural development to complement the competitiveness of the rural economy;

• To encourage farmers to diversify their main agricultural activities, whilst discouraging any proliferation of unnecessary new buildings outside the development zone boundaries; and

• To ensure proper conservation and management of the countryside for both present and future generations.

In this context, the Strategic Plan for Environment and Development ('SPED') for Rural Policy and Design Guidance 2020 states "that whereas 'urban' places are intended for people to 'live, work, play and interact', 'rural' areas are intended to sustain the farming community, while providing the general public with an escape from daily urban life to places which are 'visually pleasant and rich in biodiversity'. The countryside also supports most the Maltese Islands' biodiversity and natural heritage, and its landscape also includes various natural geomorphological features and traditional rural structures that individually and collectively form an important aspect of the Islands' distinctive cultural legacy and history." This would infer that planning should no longer be contemplated as a piecemeal approval or rejection of a project using solely a particular parameter, without evaluating all the holistic outcomes.

The eco-environmental effects of building expansion in Maghtab remain of contributing significance to rural sustainable land use. Losses of agricultural land and surrounding maquis and garigue pockets will further infringe on the remaining ecosystem. The conversion of agricultural land to buildings, other than reducing ecological space, will also create a series of ecological security issues like local temperature rise, runoff and flooding, and increased pollution other than fodder reduction. (2022, Zongfeng Chen, Yurui Li, Zhengjia Liu, Jieyong Wang and Xueqi Liu in Impacts of Different Rural Settlement Expansion Patterns on Eco-Environment and Implications in the Loess Hilly and Gully Region, China.)

Leapfrogging expansion patterns of development ultimately encroach rural areas and increase total built-up area and, in this part site, reduce animal fodder and carob pod production, dwindle the flow of rainwater to water tables, can limit full light availability, increase surface temperatures by heat reflection, diminish distinct habitats and biodiversity, lessen carbon storage potential and habitat quality. The overall continued loss of biodiversity and degradation of natural resources represents a significant threat for rural areas, as ecosystems produce ecosystem services, such as pollination, biological pest control, or the regulation of freshwater quality. The decline in biodiversity and landscape diversity may also impact both tourism activities, as rural areas become less attractive, and rural populations' mental health due to the loss of the land they and their families worked.

The associated environmental and socioeconomic benefits resulting from this Materials Recovery Facility may nevertheless be considered to offset the losses incurred in this rural area and thus appropriately tailored construction work is recommended to minimize impacts outside the development area.

An evaluation of agricultural land use around this locality will indicate a general practice of dryland agriculture with a small number of poultry, rabbit, cattle, and pig farms plus horse yards, mostly between the lower part of Naxxar and on the outskirts of Magħtab village. Towards Wardija and Għargħur there are irrigated parcels. In respect of livestock production, all animals are raised intensively in buildings. Crop production appears primarily oriented towards cereal production for fodder and this would constitute the primary crop in the marginal and non-irrigated areas around the Maghtab Environmental Complex. No particular spatial spread or extended zone of influence of the impact is envisaged other than the spread of particulate matter during the construction phase.

9. CONCLUSION

Appraisal of this particular site from an agricultural viewpoint categorises this site as being one that has severe limitations in respect of cultivation practices due to soil limitations, namely shallowness of the rooting zone, stones, very low moisture-holding capacity, and low fertility that all effectively limit agricultural productivity and can lead to abandonment. This is further exacerbated by the closeness to the sea with associated vulnerability to sea spray, as well as the presence of large amounts of particulate dust from the adjacent waste management complex. Given the unavailability of water, this land can be used for cereal cultivation for the production of hay as the dry shallow nature of this arable land limits returns particularly when rainfall would be insufficient.

The inter-relationship between location, aspect, topography, geology, and soil characteristics in this particular site has created a status of relative bleakness that severely limits land use potential, as the area appears unable to support crop production without adequate rainfall. In this respect, it can be concluded that the proposed development is considered to generate loss of agricultural land, though, given the limited area and quality of agricultural land involved, this is rather limited.

Anthony Meli B.Bus.(Agric.)(W.A.I.T.), P.G. Dip.Env.Mgmt.(Melit.), M.Phil.(Dundee)

10.REFERENCES

Bowen Jones, H., J. C. Dewdney, and W. B. Fisher, eds. (1961). *Malta: A background for development*. Durham: Durham University Press.

Daubenmire R.F., (1974). *Plants and Environment.* John Wiley & Sons

DTR, (2023) *PDS for Materials Recovery Facility For submission to the Planning Authority*

FAO, 1976. FAO Soils bulletin 32. *Soil resources development and conservation service land and water development division.*FAO AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, Rome.

Google:http://earth.google.com/web

Lal, R., G. F. Hall and F. P. Miller, 1989, Soil degradation1.Basic processes, Land Degradationand Rehabilitaion, 1, 51 – 69.

Lang, D.M., 1960. Soils of Malta and Gozo. HMSO, London.

MALSIS, 2004. A Soil Information System for Malta. Ministry for Rural Affairs and the Environment.

MEPA, 2005. State of the Environment Report 2005.

Natura 2000: http://natura2000.eea.europa.eu/#

Panning Authority: http://geoserver.pa.org.mt/publicgeoserver

Zongfeng Chen, Yurui Li, Zhengjia Liu, Jieyong Wang and Xueqi Liu, 2022, *Impacts of Different Rural Settlement Expansion Patterns on Eco-Environment and Implications in the Loess Hilly and Gully Region, China.)*