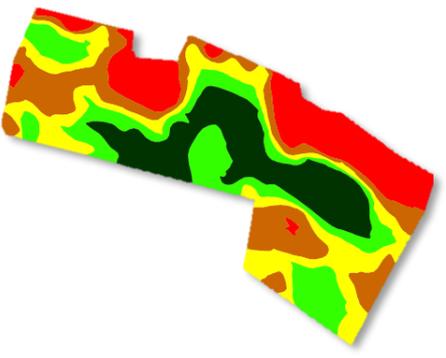
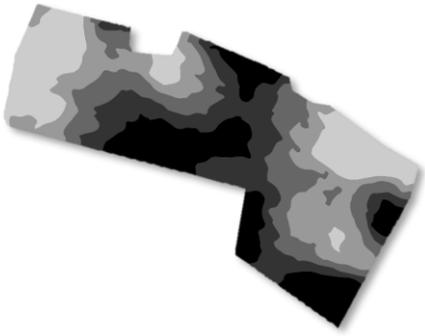




Soil Management & Environmental Plan



CONTENTS

If you are viewing this electronically the below contents are interactive. By clicking on the underlined sections, you will be taken to them automatically.

1. [HMC - business introduction](#)
2. [Soil - measurements and decision making](#)
3. [Reducing compaction](#)
4. [Cultivations & Drilling](#)
5. [Rotation](#)
6. [Improving organic matter](#)
7. [Maps](#)
8. [Soil Risk Records](#)
9. [Spray Records and Agrochemical Use](#)
10. [Environmental Hazards and Action Plans](#)



HMC – Business introduction

HMC is a cooperative of over 30 farmers producing top quality 150-minute vining peas for freezing. We grow vining peas on about 5,000 acres of land with varying soil types and characteristics. HMC supplies the seed, harvesting equipment, labour and management of the harvest whilst the farmer provides the land, inputs and management of the crop whilst growing.

This means HMC does not have any direct impact of how the soils are managed and maintained outside of the pea crop although HMC can, and do provide information to the growers and advice on how to improve soil health and structure if issues are found in the pea crop.



Soil measurements and decision making

The soil is one of the biggest factors in yield and is intrinsically linked to the sustainability of UK farming. Without the topsoil nothing would grow, and at HMC we understand and appreciate that soil health and management is vital to maintain and improve.

Looking after and managing our soils correctly will mean healthier soil fauna which is needed to help improve structure, nutrient holding, water holding and exchange of nutrients.

By implementing a number of policies and recording where high-risk areas of land, HMC are committed to reducing soil erosion and run off, leaching and compaction, whilst trying to educate our growers about ways to improve soil health.

HMC invests heavily in new technology with aims of reducing our carbon footprint, reduce inputs, reduce driver fatigue, increase soil health and reduce compaction as laid out in this soil management plan.

Soil measurements are taken during the farm rotation for general nutrition and characteristics like P, K, p.H and Mg along with other micro nutrients. These are done once every 4 years by the farmers and are given to HMC before a pea crop is planted so accurate decisions can be made about nutrient applications to the soil.

As well as general soil nutrient tests being done HMC are now rolling out a plan to accurately map our fields we look after to aid decisions on seed inputs, soil health and general improvements.

This is done in one of 3 ways.

EM Scanning

EM (electromagnetic) scanning is a non-invasive soil scanning technique which sends a magnetic pulse into the soil. Sensors on the machine detect how long the signals take to reach one end to the other and from that, they can determine the soils texture (light, heavy etc) This is valuable information as from this we can tailor seed inputs to utilise the establishment on each bit of land. It also means we can better understand leaching characteristics of the soil. The heaviness and lightness of a soil will sometimes determine how nutrients will react in the soil and how easily they can be stored and used for the crop.

Veris U3 Soil Scanner

The Veris U3 soil scanner measures a number of soil characteristics in one pass. It can then give useful management maps.

It measures;

- Soil texture via EC (electro conductivity.)
- Organic Matter content
- p.H
- Slope
- Curve

It can then produce;

- Water capacity
- N leach risk
- Yield potential

These maps combined give a real insight into a soils health and how nutrients will behave and be stored. It also gives us greater understanding of how we can improve our soils.

When we overlay yield maps of our peas, we can see which factors in the field are having a negative impact on yield and look to improve them in future crops.

We can also make variable rate seed maps and input decisions from these maps.

The data collected is shared with our growers so they can see where improvements can be made.

Below is an example of EC (soil texture), Organic matter and p.H



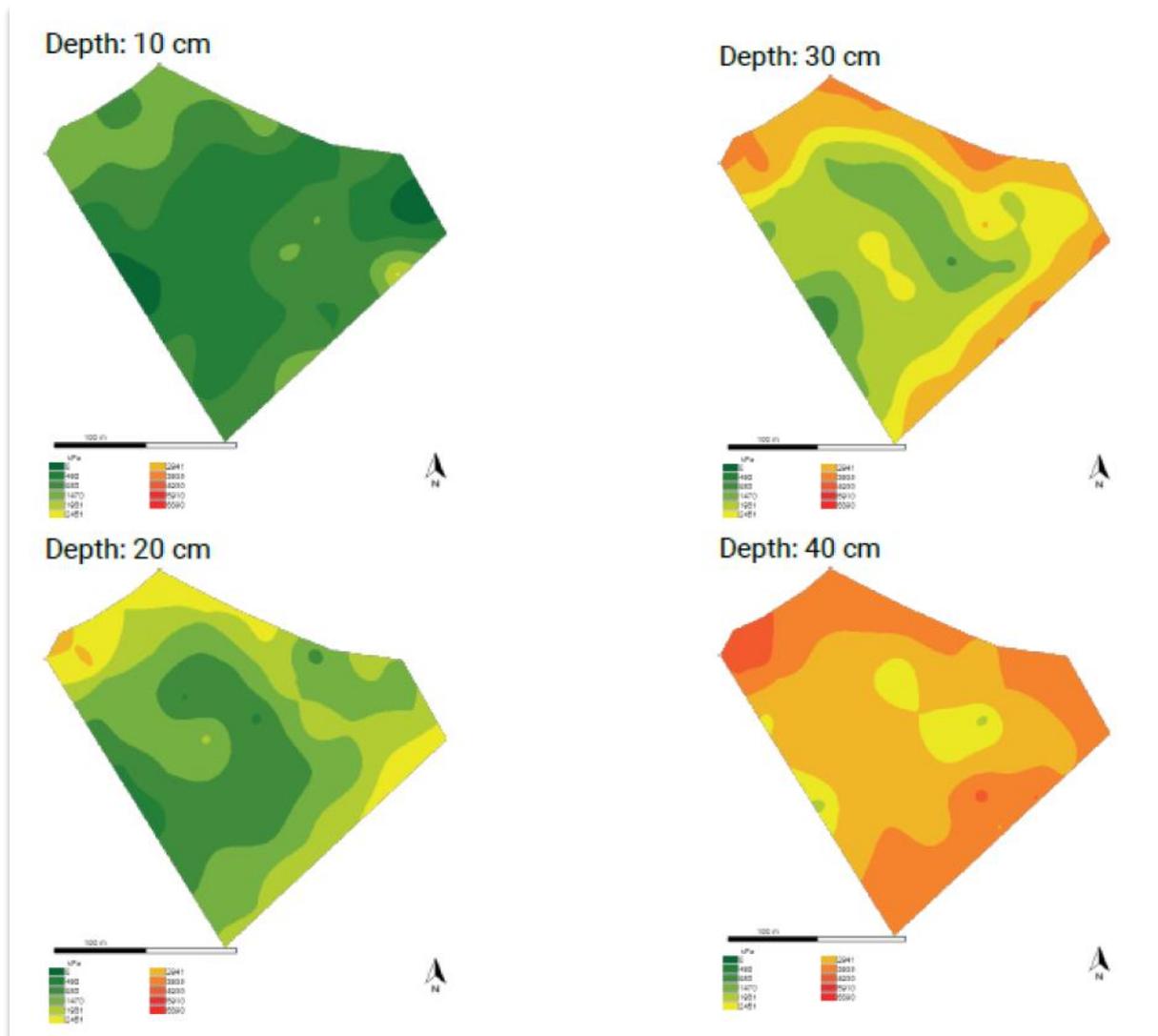
Smart Penetrometer

A penetrometer measures soil compaction which is a very useful tool as it can show where soil structure is damaged and where run off could occur.

HMC has invested in a smart penetrometer which means we can measure compaction at a variety of depths and also with a location attached to the results.

This means we can create compaction maps of fields and share with our growers, giving them a good tool to fix these issues with the use of cover crops, cultivations or improved traffic situations in field.

Below is an example of a map which can be produced to show compaction in fields.



Reducing compaction

Compaction in the soil indicates poor structure and not ideal living conditions for soil life like worms, fungi and bacteria.

Water cannot move freely and easily and in wet conditions can create run off situations and anaerobic conditions in the soil.

HMC are committed to soil health and were the first pea group to introduce tracks on all their pea viner to reduce compaction of the soil. The tracks come into their own when the soil is wet as wheeled machines often spin and sink creating very bad conditions for the soil life. The tracks allow the weight of the pea viner to be spread over a wider area.

The pea viner are also fitted with low pressure floatation tyres on the rear axles and the pea kart tractor runs low pressure tyres to keep compaction down to a minimum.

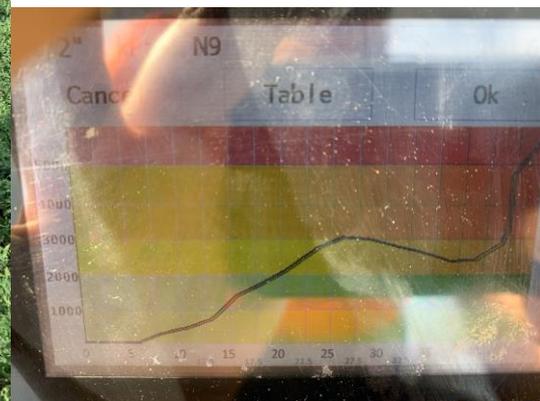
The pea viner are not the only machine to enter the fields. We run the tractor and trailer tyres low pressure to reduce compaction. The managers trucks are kept on harder areas to help when moving equipment and people around the fields. We check this using our penetrometer.



Image showing testing of compaction after tractor and trailer (left) and managers truck (right)



Heavily trafficked area of field from previous crops (left). Raw data from penetrometer (right) showing compaction at 5cm depth.



Penetrometer test completed in main field with low traffic (left). Raw results (right) showing no compaction until 25-30cm depth.

HMC have also invested in the latest autosteer technology which allows the pea viner to steer themselves and communicate with each other.

This means once one machine is going in a straight line, the other 3 will follow. This is great for soil health and also the environment because the pea viner are running with 1cm of each other.

With this autosteer system we have seen a reduction in;

- diesel use
- soil compaction due to overlapping of machines
- driver fatigue

We can measure compaction in season with our penetrometer and we also scan the crops to find areas of interest which could be improved during the rotation.



Cultivations and Drilling

Where possible HMC tries to advise farmers to grow peas in a suitable place in the rotation which will allow as little cultivation as possible.

Sometimes this cannot be avoided and due to the location of our land and the high value salad and potato crops grown, ploughing and sub soiling is often used to alleviate compaction caused by growing these crops.

HMC are continuously evaluating the use of direct drilling and minimal till systems to implement. We are currently trying to establish where best to advise growers to use these systems in their rotations, according to their soil type and when they will be drilling as on some occasions yields can be negatively impacted. We have also seen yield improvements from direct drilling.

By using a direct drill, soil movement is reduced which lowers CO₂ loss to the atmosphere, diesel use is reduced as the tractor only goes over the land once, not multiple times, compaction is reduced due to reduced traffic on the fields and trials show that cultivating the soil can have a negative impact on worms in the soil and soil fauna.



Rotation

As part of a good soil management plan, reduction in soil borne diseases and bad foot rots should be managed.

Part of this management is how the rotation on each farm is managed.

The general rotation for a pea crop according to the PGRO is 1 in 5 years. At HMC we aim to increase this to at least 1 in 8 years. We are trying to give the soil lots of rest between pea crops and also more variety of crops.



Improving organic matter

Organic matter is a good measure of soil health and a soil with higher organic matter content has better ability to store and exchange nutrients, drain water, aid root development, break down stubble and other materials.

One of the ways to improve organic matter is to use organic manures or biosolids from AD plants or other places.

HMC has growers who are using these materials to try and improve soil health. The peas grown on this land is usually better yielding. Samples of peas are closely looked at to make sure MRL levels are not breached.

HMC has also used cover crops to improve soil structure and organic matter in soils. Often our vining peas are grown after winter wheat which is often harvested in August. The vining peas are then planted from March onwards which means the soil is bare for over 6 months.

During that time many nutrients could be lost due to leaching and soil erosion. By planting a cover crop between the wheat and peas we are able to capture nutrients in plants over winter, maintain a root structure in the soil and also improve soil organic matter as when the cover crop is destroyed in the spring the nutrients and plants are broken down and return to the soil ready for the pea crop.

Maps

HMC have invested in a high-end mapping system to record multiple elements and measurements we are making with our soils as well as crop scans and yield maps of peas.

Moving forward we will be recording and mapping high risk maps with slopes for run off, high risk of compaction with our penetrometer and also soil texture maps which can be used as a risk management tool.

This means we can see exactly which fields are classed as high risk and should have extra attention to improve soil health and manage the soils better.

These maps will be continually updated in our mapping software system.

Maps which are identified as high risk for compaction/run off/low OM content will be monitored closely and efforts made to improve any and all factors which are affected.

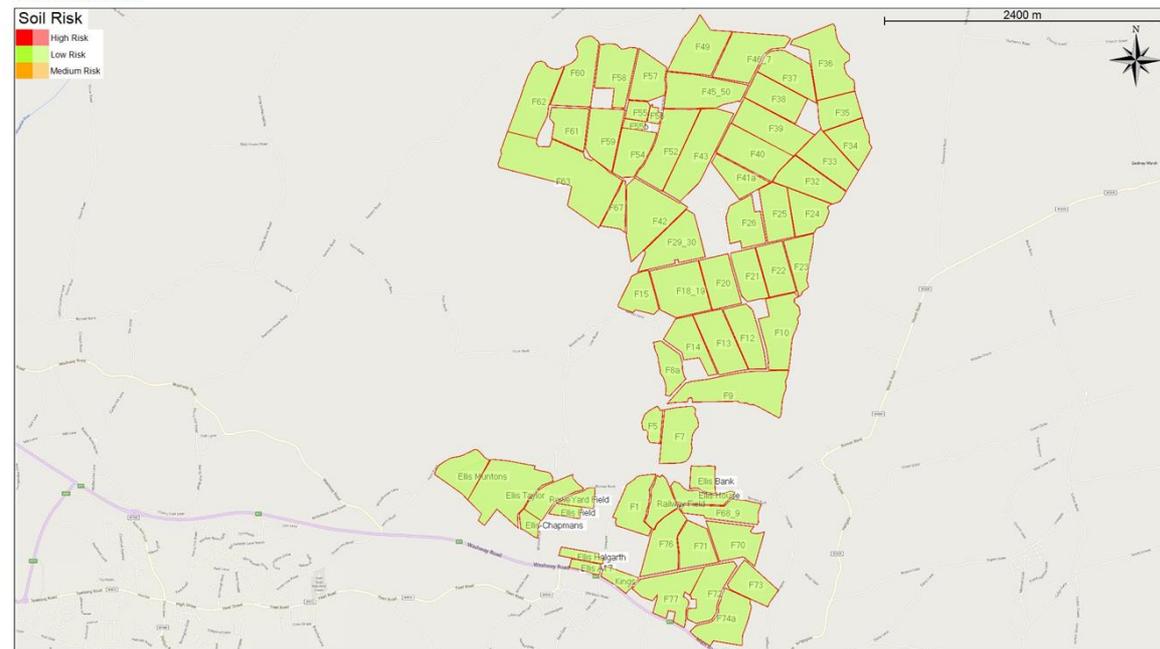
Map Layers Landscape

Main Business: HMC Peas
Year: 2019

HMC Peas
Jack Harris
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Worthing Fleet Estate



Soil Risk Records

HMC completes soil risk records each year for fields at the point of selection. These are recorded and data saved in our mapping system.

These will show where we have found compaction, risks to soil health, erosion, poaching, wind erosion and low organic matter. The records also show soil types.

Below are examples

Table A

	YES	NO
Compaction due to cultivations and mechanical damage	X	
Runoff or water erosion from arable land	X	
Runoff or water erosion from grassland		X
Poaching by livestock		X
Low organic matter – soils that cap, slump, or are difficult to cultivate	X	
Waterlogging		X
Wind erosion	X	
Please add any other soil issues not mentioned		

Table B

Highlighted in yellow are the two main categories HMC customers are based in.

Soil Type	Risk Rating	List Field names under relevant soil types and risk ratings. The baseline risk rating should be used unless a higher rating is justified. In this case please explain in the relevant box the reasons for higher rating	Examples of degradation threats likely for your soil types.
Sandy and light silts	High		Compaction, runoff or water erosion, soil organic matter loss, wind erosion
Heavy	High		Compaction, poaching, runoff, waterlogging
Peaty	High		Compaction, runoff or water erosion, soil organic matter loss, poaching, wind erosion
Medium	High		Compaction, poaching, runoff, waterlogging,
Medium	Moderate		Compaction, runoff of water erosion, poaching, soil organic matter loss, waterlogging
Chalk and Limestone	High		Compaction (surface), runoff or water erosion, wind erosion
Chalk and Limestone	Moderate		Compaction (surface), runoff or water erosion, wind erosion
Chalk and Limestone	Low		Compaction (surface), runoff or water erosion, wind erosion

Spray Records and Agrochemical Use

All HMC assured growers who apply agrochemicals are trained in the relevant standards for sprayer operators and must prove this to HMC before being allowed to grow peas for the group.

Every year HMC holds a technical meeting in which all growers attend and are given technical updates by industry experts about new chemicals coming into the industry and also chemicals which are being withdrawn. This ensures best practices and the most current laws are upheld.

It is HMC's goal to apply as little herbicide, insecticide and fungicide as possible and we encourage growers to only apply chemicals where it is absolutely necessary and when thresholds have been met.

All agrochemicals applied on each field are recorded and collected before harvest. This ensures only approved chemicals have been applied and also no harvest intervals have been breached. HMC also produce a PPU list of approved products which growers can use.

Crop: Pea - vining
 Situation: Outdoor
 Harvest Year: 2018
 Country of Origin: UNITED KINGDOM

Product	Apps	Reg Code	Active Ingredient	MRL	Chemical Group	HI (Days)	Comments
Alert	1	16785	Alpha-Cypermethrin	no MRL data	Insecticides	1	
Amega Duo	1	14131	Glyphosate	0.1*	Herbicides	1	
Amistar	1	18039	Azoxystrobin	3	Fungicides	14	
Amistar	1	10443	Azoxystrobin	3	Fungicides	14	
Aphox	1	17401	Pirimicarb	0.7	Insecticides	7	
Basagran 5g	1	08360	Bentazone	0.05	Herbicides		
Belimac Straight	1	14448	Mcpb	0.1	Herbicides		
Benta 480 SL	2	17355	Bentazone	0.05	Herbicides		See label referring split dose for 2 treatments
Biscaya	1	15014	Thiacloprid	0.2	Insecticides	7	
Bianco	1	16704	Clomazone	0.01*	Herbicides		
Butoxone	1	14406	Mcpb	0.1	Herbicides		
Caramba 90	1	15524	Metconazole	0.02*	Fungicides	14	
Centium 360 Cs	1	17327	Clomazone	0.01*	Herbicides		
Centium 360 Cs	1	16237	Clomazone	0.01*	Herbicides		Old MAPP number, can be used until 2018 see label
Centium 360 Cs	1	17327	Clomazone	0.01*	Herbicides		
Centurion Max	1	17911	Clethodim	0.5	Herbicides	30	Copy of EMAU must be with any spray records from CRD
Chamane	1	15922	Azoxystrobin	3	Fungicides	14	
Cleancrop Corsair	4	14124	Lambda-Cyhalothrin	0.2	Insecticides	25	
Clinic Ace	1	12980	Glyphosate	0.1*	Herbicides		
Contest	1	16764	Alpha-Cypermethrin	no MRL data	Insecticides	1	
Credit Dit	1	14066	Glyphosate	0.1*	Herbicides		
Crestler	1	16555	Glyphosate	0.1*	Herbicides		
Decis	1	16124	Delta-methrin	0.2	Insecticides	7	
Derrox	1	15351	Ferric Phosphate	no MRL data	Molluscicides		
Digital	1	13561	Flumioxazine	0.02*	Herbicides	42	
Dual Gold	1	14649	S-Metolachlor	0.05*	Herbicides		
Eribea	2	17270	Alpha-Cypermethrin	no MRL data	Insecticides	1	
Etna	1	14674	Glyphosate	0.1*	Herbicides		
Fastac	1	16761	Alpha-Cypermethrin	no MRL data	Insecticides	1	

Part of PPU list

Environmental Hazards and Action Plans

HMC runs 4 pea viners, tractor and trailer, mobile workshop and mobile office. All have the possibility of producing leaks and environmental issues if not dealt with correctly.

As a result of this HMC has a thorough action plan for all outcomes of spillages. This is reviewed every year by staff and engineers to reduce risk and also update any plans which may be outdated.

All staff are trained before harvest to deal with any spills and environmental issues which may arise.

HMC Oil Contamination Policy

Potential Risk	Contamination from engine oil of harvesting machinery and carting machinery
Control Measures	All engine oil top up/oil changes to be carried out away from harvesting area. Care should be taken not to spoil any oil on machinery when filling or draining engine oil by use of correct oil jugs/funnels and draining equipment.

HMC Handbook 2020

Page 16 of 37

Action Plan	Any oil that is spilt should be washed off the machine in a suitable area. Before being peer washed the contaminated part of the machine should be sprayed with an approved degreaser/detergent, which is kept with the water bowser. Waste oil should be stored in an appropriate container and taken back to Top Farm, Holbeach Hurn reads for collection by a registered company (Evergreen Environmental Services). Any used oil filters should be stored in an appropriate container and taken back to Top Farm ready to be collected by a registered company.
Potential Risk	Contamination from burst hydraulic hose on harvesting and carting machinery.
Control Measures	All hydraulic hoses to be checked routinely for wear and damage.
Action Plan	Any hydraulic hoses that are showing signs of wear and damage should be replaced immediately. This operation should take place away from the harvesting area. After hose or hoses have been changed any surplus spilt oil on the machine should be sprayed with an approved degreaser /detergent and then the whole machine thoroughly washed and hygiened. If hose has burst whilst machine is in use, any peas that are in the machine that may have been contaminated should be dumped in a suitable area. The machine will need to be repaired where it broke down therefore crop immediately surrounding the broken down machine will need to be properly marked out and discarded. All broken or damaged pipes should be disposed of in the appropriate skip at Top Farm, Holbeach Hurn.
Potential Risk	Contamination from diesel oil spillage by harvesting and carting machinery
Control Measures	All diesel oil refilling sure to take place away from harvesting area. The appropriate fittings should be used for each machine that is being refilled. Fuel tanks, engines and fuel pipes should be inspected routinely for lates and wear. Care should be taken not to overfill field tanks.
Action Plan	Any fuel that has been accidentally spilled on the machinery should be sprayed with an approved degreaser/Detergent and then power washed in an appropriate area. If any leakage has resulted in any unharvested crop of being contaminated, the area should be clearly marked hands left unharvested. Any peas that may have been contaminated should be dumped in a responsible manner. After any worn or broken fuel pipe has been changed any surplus spilled fuel oil on the machine should be sprayed with unapproved degreaser/Detergent and then the whole machine thoroughly washed and hygiened.
Potential Risk	Contamination from hydrostatic oil.

Extract from oil contamination policy found in harvest handbook

As well as environmental hazards such as oil spills and leaks, HMC also has a HACCP which outlines possible risks to the food chain and contaminants in the pea crop. This is also reviewed on a yearly basis.

All of the documents are available for member growers on our website and are also available for staff in the harvest handbook.