

1 **INTERVIEW TRANSCRIPT**

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4 FARM LOCATION (NUTS3): UKH14 (Suffolk)

5 *(First questions are based on the online survey we sent to UKIA members in*
6 *December 2014)*

7 **Interviewers (I)**

8 *Grower (G)*

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10 **I: Could you give us a brief description of your business here?**

11 G: 1500 of that is high-level grassland. The remaining is divided into approximately
12 1000 acres of irrigated root crops, which includes parsnips, onions, carrots,
13 potatoes. The remaining portion is sugar beet and what is left is probably equally
14 divided into barley, wheat and oil seed rape. So, combining all the crops, sugar beet
15 and then irrigated root crops is the principle of the farming operation

16 **I: What is the proportion of the total farm size that can be irrigated?**

17 G: About 65% can be irrigated.

18 **I: What was the proportion irrigated last year, 2014?**

19 G: 1300 acres.

20 **I: Which crops are rainfed and which ones are irrigated?**

21 G: Maincrop potatoes are irrigated, early potatoes irrigated, vegetables (carrots and
22 parsnips) irrigated, cereals rainfed, sugar beet is a mixed, grass is all rainfed. We
23 don't have any soft fruit or top fruit.

24 **I: Could you tell me the average yields for these crops?**

25 G: Yes, maincrop potatoes 20 t/acre, something like that; earlies 14 t/acre;
26 vegetables 16 t/ha; cereals is actually 3.5 t/acre (wheat) and barley is probably 3
27 t/acre and oil seed rape 1.5 t/acre. Sugar beet is 28 t/acre at 70% sugar.

28 **I: Is this for irrigated sugar beet?**

29 G: Good point. Yes, it is. Both can be the same cause it is based around land type.

30 **I: And for grass?**

31 G: We don't make any measure of dry matter. It is a very extensive grass system

32 **I: What are the water sources that you use for irrigation and the proportion?**

33 G: Surface water, we have abstraction licences that account for 180 million gallons,
34 and then we have a groundwater source of 45 million gallons. So that is 4/5 and 1/5
35 roughly.

36 **I: What type of abstraction licences do you have?**

37 G: Time limited. The surface water ones are all-year around but based around river
38 flow rates. And both of those, they have about 12 years left on the licences. The
39 groundwater one is an all-year around abstraction, time limited and it has been
40 extended for 3 years.

41 **I: What irrigation method do you use?**

42 G: Principally rain gun. 95% rain gun, and we have got one boom irrigated.

43 **I: How do you decide when and how much to irrigate?**

44 G: Well I am not the best person to answer the question on this, but irrigation
45 scheduling and all of the most...

46 **I: What is the final destination of your products?**

47 G: Processing and supermarket for the maincrop. Early is supermarket and we have
48 done a little bit of exports. Vegetables processing, supermarket; cereals processing;
49 sugar beet processing.

50 **I: We would like to know how droughts have affected your business in the
51 past. If you could tell me in those periods, if your production was affected or
52 not and the level of impact.**

53 G: The issue here is really the investment and the granting of the licences has only
54 really been over the last 10 years. That is why there is such significant concern over
55 the reform right that are on their way now.

56 Until 9 years ago the area that was irrigated was only 200 acres from the
57 groundwater borehole, so there was no storage or anything like that. And then, 9
58 years ago we invested in 105 million gallons reservoir and in the 9 years between
59 then and now we have put 48 km of new underground main in, and we have just
60 completed the building of 80 million gallons reservoir. So the groundwater licence
61 was buried probably 10-12 years ago to allow us to get the surface water
62 abstraction licence. And then we took a new one out which is based on high river
63 flows. And this was 4 years ago, just when I arrived here.

64 So 1976, the drought probably had very low impact in terms of... Well, the drought
65 has significant impacts in terms of the farm profitability because cereals basically
66 failed. And the irrigated root crops at that time, it was plenty of water through the
67 groundwater abstraction but it was very limited in terms of the amount of area that
68 was farmed at that time.

69 And probably the same hold straight away until the 2010-2012 period because the
70 area was very small. That it was I was concerned about reference periods...

71 **I: I think it is best to say that we are interested in impacts on agriculture, not**
72 **just irrigation**

73 G: OK. Well 1976, I looked back through the records and yields here felt 25% of
74 what it has been in the average year and that is because the drought was
75 significant.

76 1988-1992 I would suggest those figures probably felt to 50%. The 5 year rowing
77 wheat average here is about 7t/ha. We have now increased that to close 9 t/ha
78 through different farming practices. In 2011 we achieved 3 t/ha. So again, half the
79 yield in 2011. So it was highly significant in terms of profitability of those crops. And
80 I think that would be the same for sugar beet in most of those times. 2003 I don't
81 think it was that bad, and the 2010-2011 the sugar beet crop actually exceeded the
82 average by something like 30 % because the rain started in June in 2011, so that
83 was just timely enough to boost the crop. So sugar beet, I would suggest,
84 throughout all of those drought periods, because when the rain tended to come it
85 was the back end of the year, the impact was low to medium for sugar beet. Except
86 for this 2010-2012, when the impact was high, but not adversely high. So it is based
87 on rain patterns. The 2011 drought here we had 26 mm of rain fell from 9th March to
88 the 19th of June, which particularly cereals needed it, and then from the 19th of June
89 to September we managed to get something like 250mm which sorted the sugar
90 beet out and made its yield exceptionally well. So the impacts on the business
91 would have been high in those years generally because equally, the same as the
92 root crops [...] in 2006, the area of sugar beet grown was considerably less that it is
93 now as well. So a drought just has significant financial damage to this farm. There is
94 the soil type of 60% of...

95 **I: What was the trigger for moving in a big way into the irrigation side, was it**
96 **triggered by a drought event or it was a pure business decision to enter into**
97 **the market?**

98 G: It was triggered by a drought event because in those drought years the losses
99 associated to the farm were highly significant and it was very apparent that in this
100 business here it couldn't continue on those grounds. So this very light land without
101 irrigation was challenging enough but it was only forced to be re-emphasized by the
102 drought years when the yields drop by 50% and the farm made substantial losses in
103 those periods. It couldn't be overcome by event the better years based on no
104 irrigated cropping on that land.

105 **I: You had licences for a while. The just...**

106 G: Well, the groundwater one is an old one and I think, from memory, that was a
107 licence for right. That was traded in...and then negotiation was change to time-
108 limited on that one. And given a surface water abstraction time limited one, which I
109 think it seems to be fairly common. There is quite a few people have those
110 negotiations in the 90s...

111 **I: And that was sort of underpinning the 2-3 hundred acres that you irrigated**
112 **this year**

113 G: Yeah, that was 3 hundred...that was taking a massive element of risk probably.
114 So you are exactly right. The reason for the investment in water was that we
115 couldn't continue and it was only sort to be emphasized by those droughts, yes. And
116 looking back I have found 40 years weather data here, and it appears that 1 year in
117 5 rainfall drops to 175 mm or below. So it is not sustainable to grow anything...And I
118 found that data that was only reinforce my time here in 2011.

119 **I: What is the long term average rainfall here?**

120 G: It is around 500-550 mm. But if you follow the pattern right away through that
121 period, at least 1 every 5 years it drops significantly.

122 **I: What were the impacts of prices during the most recent drought period?**

123 G: The most recent drought period, I think the prices don't vary from the year before
124 for any of the commodities particularly. It is so difficult to tell in terms of the
125 market...So I don't think maincrop potatoes increase or decrease significantly from
126 the year before, nor the other potatoes, nor the vegetables, cereals certainly didn't
127 from memory...sugar beet probably didn't either...

128 **I: Do you think that potatoes it was because there were many forward
129 contracts?**

130 G: Potentially, but I think the 2011 drought was localized to the East. So I remember
131 there was [...] yields in South Wales and all the way down the West Midlands there
132 were phenomenal yields. So I cannot remember how the national yield data looked
133 like but I am fairly confident that it was no decreasing yield across the country...

134 And the prices, because we have substantial irrigation in the last drought, we
135 manage to ensure that we have marketable quality, because we have enough water
136 to maintain the crops in the 2011 period.

137 In the 2012 period we did have to reduce our area by 25% because of the threat.
138 Because we chose not to take the risk of growing rainfed crops, because of the
139 ability to get the quality and this sort of thing.

140 **I: Did you experience any contractual problems with supermarkets during or
141 after a drought?**

142 G: Yes. Not for any of the root crops because as I said we had enough water to do
143 that and we had sufficient warning during the 2012 season not to get in contract
144 situation with any of the irrigated crops. The cereals, we had to default on our
145 forward contracts and it was very costly to buy ourselves out because the market
146 went against us. So we sold wheat forward at 210 £/t and the market at that time
147 went to 150-160 £/t. So we were quite forgiven some of them and allow us to roll the
148 contracts on. And we were still selling wheat at 100 £/t the same day we were
149 selling wheat at 200 £/t because the market went against us in that period. And
150 equally we bought ourselves out so we gave recompense to the merchant of 30-40
151 £/t because we couldn't ... a 100 £/t contract in the market, 140-150.

152 So that had considerably impact and we had to manage that. Very fortunately it
153 wasn't a massive proportion. The general marketing policy was to market 35-40% of
154 the average crop price to harvest and we thankfully stop and 40% because we knew
155 that things were going wrong. But we only manage to achieve 30% of our average
156 yields, so we were 10% wrong. So we had to buy ourselves out or equally roll them
157 out for the following year. So that had substantial financial impact. We managed to
158 purchase one out and rolling some. We manage to spread it over in 2 years rather
159 than taking the full financial impact in one year. But that took a little bit of
160 management and probably cost us, just for the cereals part of it, 50-60 thousand
161 pounds. So quite substantial.

162 **I: Now we are going to talk about water abstraction restrictions during**
163 **drought periods. So, during the past drought periods, have you experienced**
164 **any abstraction restriction?**

165 G: I don't have any record from any particular restrictions for that licences or
166 groundwater right here at any time. With the exception of 1996, when there was a
167 mechanism by which we had to pump water into the river to help the river in 1996.

168 **I: And it was voluntary or mandatory?**

169 G: That was... I don't know. And in 2012 drought we obviously subject ourselves to
170 the voluntary restriction of 50%. But it rained anyway so we didn't have to worry
171 about that.

172 **I: Are you in a WAG?**

173 G: Yes, we have a very small group. I think there are about 7 of us.

174 **I: Is it an informal group or..?**

175 G: It is a very informal group. We had a couple of meeting in early 2012. It has been
176 active prior to that and that was probably the 1996 when it was pulled together.

177 **I: So it was the drought what crystalized the activity of the WAG?**

178 G: Yes, yes. Exactly, that was just to get together and try to sort it out. And actually
179 in terms of surface water abstraction we managed to trade water with somebody
180 further up with the EA consent. They had a certain volume left on their licence,
181 traded it with us and when we were allow to start abstracting we abstracted a
182 proportion of their volume (because we have to leave something for the
183 environment) and the proportion of our volume as well. So that was in 2012.

184 **I: And you wouldn't be able to do that without the WAG?**

185 G: Probably not. Because there is only 6 or 7 so it is relatively easy. But in a large
186 scale you need a group to formalize it. And equally we had a neighbour on the other
187 WAG and we had an agreement in place with them. They have a licence of right on
188 surface water, very low flow rates. And we had an agreement with them that the
189 infrastructure associated with getting the water from there or even the temporary

190 pumps it was going to cost us...but it started raining in April so we didn't need to
191 worry about putting that in place, but we had this agreement.

192 **I: Could you tell me what sources of information do you use when there is a**
193 **drought?**

194 G: Yes, it is principally the trade organization, so the NFU. The EA in the last period
195 of drought they were extremely helpful sending us information, having regular
196 meetings...The WAG, the informal contact between the members of the group...But
197 the NFU principally and the engagement with the EA.

198 **I: Do the Levy Boards get involved at all?**

199 G: No...

200 **I: Should they?**

201 G: I think there are enough mechanisms in place now the EA that is considerably
202 more proactive in getting the information out. And you know, it was very much they
203 ring up and say: you can switch on today. And they will ring you again in the
204 morning during the 2012 period just to whether you can continue or you have to
205 switch off. So they worked incredibly hard. Whether that was because as an
206 organization the NFU made sure that they work hard.

207 I think a lot more can be done in terms of mechanisms by which we can engage
208 with the metering. We can go onto the website and make this data available. Our
209 measuring point is just down in the village here but of course it is not internet ready
210 at all. I think there is a lot of potential to do that. There is even potential to allow
211 them to switch our pumps on. Lots of infrastructure which have to go in behind that,
212 but it wouldn't be impossible.

213 **I: Some years ago we were involved in a project setting up mobile phone**
214 **alerts. Farmers will get an alert saying conditions are OK you can spray today.**
215 **There are a lot of ways that technology could make this process much more**
216 **...**

217 G: The EA was so good. They were sending us an email to reinforce we make sure
218 we turn on the pumps when the flow rates were above a certain level. To make sure
219 the pumps were on during rainy days. And they still do it now. The rain over
220 Christmas, there were high flows...In reality now everybody check their emails so
221 they just need to send an email...And not everybody does, so they are very good.
222 So full prize for them on that respect.

223 **I: I have here a list of strategies that could be applied when there is a drought**
224 **and abstraction restrictions are likely. So, if you could tell us which ones do**
225 **you apply and what would be the most important for your business?**

226 G: We principally are storage based. 80% of the water is stored so that has really
227 changed our thinking of all these things now.

228 Abstract to a maximum to get the soil water content up. I think this depends on the
229 scheduling and the land area...We don't tend to operate in that basis.

230 Irrigate a reduced area (to the full irrigation schedule). Yes, that is quite important,
231 and that is the 2012 model we followed in that one.

232 Irrigate at night...well, we have to irrigate all the way around anyway. So we do
233 anyway. When the maximum demand for irrigation we have to run everything 24h
234 anyway, so the cost associated with just irrigate at night would be more pipes,
235 bigger pumps...

236 Renegotiate existing supply contracts. I don't think that is a strategy for handling
237 droughts... We took that in 2012, we did take that option but we fortunately haven't
238 committed to supply contracts. We wouldn't really want to try and go and
239 renegotiate with somebody we promise to supply...

240 Develop a drought management plan. Yes, interesting... What do you do when
241 there is no water? You don't irrigate. So that is the drought management plan
242 effectively. So it is all those things you talk through...

243 Evaluate water resource position. Yes, this is something we do almost constantly. I
244 think most farmers ... they got in their minds how much they are gonna need,
245 when...

246 Personally negotiate with EA. Yes, this is a strategy, but working with local
247 abstractors group is also important. So I would suggest both.

248 Seek informal water trades. Yes, definitely, this is definitely I highlight.

249 So in terms of the top 2, I would think it would be work with WAG to negotiate with
250 EA, and depending on the drought that has been declared...seeking informal water
251 trades.

252 **I: When you want to buy water from other farmer, I can imagine it could be a**
253 **long process... do you have to wait a lot until you get the approval from the**
254 **EA?**

255 G: In the last drought, I think the formal procedure is supposed to take 6 weeks or
256 something like that

257 **I: Oh, it is not that long...**

258 G: Well, it is if you don't have water for your potatoes...But in the 2012 they were
259 turning them round in a week.

260 **I: That is quite fast**

261 G: Yeah, you cannot ask for any more. Whether that in an abnormally season they
262 will put a lot of resource to be able to do that...

263

264 **I: After the last drought episode, did you do any change in the farm**
265 **management in order to cope with future drought periods?**

266 G: Yes, we built a new reservoir.

267 **I: And that was since the 2012 drought?**

268 G: Yes.

269 **I: And it was on your cards as a...long term strategy and the drought**
270 **reinforced it?**

271 G: Very much, yes. It gave me the justification to commit to that level of capital
272 investment, which it would have been a great struggle. I have been talking about it
273 since I built the first one about whether we should have an extra one. 2011 really
274 highlighted it, when we had this week in June when the reservoir was nearly empty.

275 **I: So it was the gravity of the situation?**

276 G: Yes, yeah

277 **I: What water management aspects could be changed to reduce the impact of**
278 **droughts on UK agriculture? We have here some options but maybe you can**
279 **think of any other...**

280 G: I think 2012 taught us a lot in terms of considerably...the EA gave us a lot of
281 forward notification. They were forecasting about if we have average rainfall we will
282 need to have this level of restriction...And that was extremely helpful. It gave us the
283 ability to plan our risk. So that was very important.

284 Removal of section 57, I think this is tied in with that. If we have prior warning that
285 they were likely to impose these section 57 restrictions, we would ensure we did
286 something about it. What I would suggest is rather than having the voluntary
287 restrictions it might have been better if we had a mandatory restriction in that period
288 across the board rather than individual S57. We had a 15% reduction in volume that
289 was notified in plenty of time in advance. And I know it is not easy to do that but that
290 was the situation we faced during the last drought. We had plenty of notification, we
291 chose to make voluntary restrictions as our group did. But, who would have actually
292 stuck to them if there has been another drought season? This would be very
293 interesting to see...Probably the majority of them would just reduce the area but this
294 would be too risky for the business.

295 Insurance I think it would be too costly. It would be very useful but I don't know...

296 Encourage water trading within the agricultural sector, most definitely. These
297 informal trades that people do anyway I think it is a good example of how that works
298 and I think there is a lot that goes on anyway...

299 Information and forecasting, most definitely.

300 I think there is a lot that can be done in terms of working with other organizations.
301 We have a classic example here in this catchment, that one water company

302 abstracted a massive volume of water from our aquifer and send it all the way to
303 Cambridge, another water company pumping equally from all around us...So I think
304 a great level of engagement...which we did have in 2012. We started to engage
305 with all these water companies was really useful. They appreciated our position as
306 well as we appreciated theirs. One thing that we did start negotiation with one water
307 company in 2012 and that was purchasing water from their system to put it in our
308 winter storage reservoirs. We had actually a plan for the interface between our
309 two...their water main and our system, almost committed to the capital...but then
310 they certainly realized they have a time limited licence and they were going to lose
311 their headroom very soon anyway so they back off. And we got down to real
312 financial negotiations about how much is gonna cost us, and it was gonna costs us
313 considerably more than what it costs us for water now, but as insurance policy it
314 was certain worthwhile and they would just taking away of the headroom anyway
315 so. We got down to sort of given them something like 50% margin of the pumping
316 costs...

317 **I: Do you think that option may re-emerge?**

318 G: I think it very much could do depending on the outcome of their time limited
319 licence renewal, which would be in 3 years time. We proposed to purchase the
320 volume of water on an annual basis to demonstrate our level of commitment and we
321 were pumping into our reservoir although prefer to use directly from their main when
322 we wanted.

323 **I: Yes, double pumping?**

324 G: Yeah. And there were a lot of things that were on the table at that time until
325 almost a year ago, and then the WFD, potential restrictions kept in. I think that could
326 relatively easily be resurrected. They seem very kind to utilize their boreholes to that
327 maximum so...

328 **I: Taking about the EA forecast, you said it was based on their projections of
329 what would happen if you have average rainfall, below or above average...But
330 there is no probability or likelihood assigned to those...**

331 G: Since 2012 we get monthly water situation reports, which are really interesting
332 and give us the opportunity to make some judgement for ourselves. I think maybe it
333 wasn't necessarily written in those reports, but certainly individuals were given
334 estimates of probability of one scenario or the other occurring.

335 **I: I guess it is probably the type of question that the answer is depends, but
336 for a probabilistic type of projection or forecast really, how much notice or
337 how far forward would it have to look and how much confidence there have to
338 be and the quality of the projection for actually make a difference?**

339 G: Given that the fundamental principle of forecasting is based around weather
340 forecasting, which I don't believe is any good. So that is the fundamental starting
341 point. The EA they are only working with the information that they are given from the
342 forecast. So we don't have any capability to predict the weather long term.

343 In terms of timeline, we farmers need a minimum of 2 months before we want to
344 plant the crops. So we need to be knowing by January-February time what the
345 predictions are for that season. Obviously, ideally we need that 6 months before that
346 date as well so we know what contracts to take. So there is an element of free-
347 market or commitments to contracts that only take place just prior the point to
348 planting so I would need to know then. But to give us longer term ability to plan our
349 business we would need them sort of 8 months before planting, because that is
350 what some of our customers are demanding. And you can manage that depending
351 on how much risk you want to take in the market and what are the economics of the
352 contract. So offer at that time it just varies considerably if the price is enough offered
353 at that time or it might get left, and it can play to you in favour or go against you. But
354 that was the beauty of the 2012 scenario. They were predicting the likelihoods of
355 groundwater restrictions and voluntary restrictions coming in, we knew that...I
356 mean, surface water, our reservoir was 20% full in March because we haven't been
357 able to pump for almost a year.. And we only got it to about 35% by the end of
358 March. So we were still running on a [...] but having reduced our cropping area by
359 25% it was still...there is a lot of risk in there but we had to commit something and
360 thank God it rained also. So we still filled up our reservoir anyway. But the flexibility
361 that they introduced at that point to allow us to pump what is in effect summer water
362 based on high flows was fantastic, and they gave me the incentive to vary our
363 licences to pump high flow summer water as well as the winter water. So that is why
364 I said I had our licences varied and they varied them for a 2 year period initially and
365 subsequently we had...

366 **I: In the 2012 drought, what was your state of mind?**

367 G: Concern. I was concern about the ability of managing the financial impact that
368 the drought had produced from previous years. We managed to mitigate most of
369 that, except for the cereals. And then it was about how to manage the relationship
370 between our purchases going forward. The last thing you want to do is build the
371 business based around making certain assumptions how to cut your overhead
372 costs, because there is still the manpower and machines around here, they are
373 gonna have less volume to shift, to move through their hands and sell at the end of
374 the day. So that was a considerable concern.

375 **I: What was the relationship like, was sort of two-way information flowing up
376 through the supply chain? Were they aware of the gravity of the situation?**

377 G: Yes, as a grower, my responsibility is to make my market very much aware of
378 where I am placed at this time. There is an understanding and they move to the
379 west to cover themselves. Because obviously they have to cover themselves and
380 we couldn't expect them to do anything else. They have to be sure that there is food
381 in the supermarket.

382 We were probably oversupplied by the end of 2012. So in terms of this business,
383 there was a great concern about the financial impact that that was going to have.
384 And that reinforced the capital spend on the reservoir that we have made to ensure
385 that we don't face with that scenario again.

386 But even with only 20% of our water coming from groundwater, still concerned
387 about the potential risks from the WFD, and equally some of the spinoffs that that
388 will have in terms of the surface water and what they might do in terms of increasing
389 the flow rates over you can take water. So it is a big concern after spending close £
390 million 2.5 in 9 years, if we are gonna get a return on that investment. And I think we
391 are OK, it is been certainly justified in that time.

392 **I: In a scale from 0 to 10, how do you rate drought risk to your business?**

393 G: Speaking in terms of capital investment, it is considerably less than a risk now.
394 But that being said, if we don't get surface water abstraction for a period like 2011-
395 12, drought does have a 10 risk to this business. So it depends on the length of the
396 drought. We can cope with transient, even 1 season weather drought, with probably
397 a 7 because it will impact only on rainfed crops. But it moves to a 10 the moment it
398 is extended beyond 12 month period. And the capacity of the reservoirs we have
399 now, we do have the ability to carry certain volume of water from one season to the
400 other. So if we fill all our reservoirs now, we probably can do 1.2 seasons ...so
401 carrying 20% of water from one season...

402 **I: Was that factored in when sizing the reservoirs?**

403 G: Yes, it was. We purposely went out to achieve that objective of being able to
404 carry water from one season to the next to give us an element of security if the
405 drought period was prolonged. So it is 10, depending on the length.

406 **I: Do you think drought and water scarcity will become more frequent in the
407 future here?**

408 G: Given what I said about 1 year in 5 threat over the last 40 years, I don't certainly
409 think they will increase in frequency. I am not sure I would suggest. I think severity
410 of drought in one season may be more extreme, but...And that is why we have built
411 the tolerance of the reservoirs.

412 **I: On that question you can see drought and water scarcity in different ways.
413 One could think of it as the way you described it, every 5 years historically
414 you get a drought. But the way that drought is managed in the future, it could
415 mean that the risk and the impact become more frequent if an increasingly
416 precautionary approach was taking, of if demand for other sectors keep going
417 up**

418 G: Our planning is very much based around the volume of water we are licenced to
419 abstract at the present time. At the moment that shift to one way or the other, then
420 our opinion with regards to drought will shift. And if we lose 20% of our water or a
421 proportion of that, then we lose the insurance of carrying the water from one season
422 to the other so...this is very much based around abstraction, and the abstraction
423 reform as well as the WFD.

424 **I: Now we are going to go in more depth in some issues. You said that you
425 suffered some restrictions in the past. Well, not in groundwater...**

426 G: The 1996 was mandatory in position of supporting the river. And then 2012 it was
427 voluntary restriction over groundwater that we...

428 **I: We want to know more about the process of S57 restrictions. What is the**
429 **information that you get from the EA, if you get full information, which are the**
430 **triggers to impose these restrictions...**

431 G: It is principally, because our licences are time limited, based around flow rates in
432 the river anyway so... We are very clear that when the river flow rate flow below
433 certain levels or certain flows...we can't abstract so it is very clear. Whether you like
434 it or not it is very clear

435 **I: What about groundwater?**

436 G: Yes, I think the level of trust increased significantly during the 2011-2012 based
437 on those forecast that the EA came up with giving us what groundwater levels were
438 at the time, and what the forecast they were heading and...they were forecasting
439 that it would take fully 14-16 months to recharge the groundwater, but of course it
440 did in about 3 months but...So I am fairly confident that they pass all the information
441 they receive, and they give us the ability to manage our businesses so I think we get
442 all the information they can share with us

443 **I: What about the relationship between the level of restrictions of S57 and**
444 **ecological impacts?**

445 G: Yeah...I am bit sceptic towards that. In 2011, I have never seen any information,
446 any data that show any form of environmental damage caused by a drought in
447 effect. So, you know, drought that occurs naturally...There is no data that I have
448 seen that indicate any form of environmental damage. And there is certainly no
449 information I have seen that demonstrates that flow rates or aquifer levels formula
450 certain that it would be a proportion of damage and how it caused that
451 proportionality. If water levels fall to this level what is the damage that this is gonna
452 caused? I haven't really seen anything that is very clear about this. The EA just use
453 the term environmental damage and I don't know if they know what that means.

454 **I: When talking about different strategies to cope with droughts, could you tell**
455 **us a little bit more about how is the decision process? If you guess that you**
456 **are not having enough water for your crops in that season...How do you**
457 **choose among the alternatives?**

458 G: I suppose that decisions are based around what are our commitments with the
459 market at that stage, but equally we have tried to manage that by no becoming
460 overcommitted too far in advance so then we have the option to remove some of
461 our irrigated crops for being grown. That is how we will manage that, as we did in
462 2012.

463 In terms of what we plant after that, or in place of those crops, depends on how far
464 in advance we are aware of the situation. Finding a replacement at the time that
465 depends on the market of the other crops that we could potentially grow. So, in
466 2012 what we did was we found some high-value milling wheat contracts and we

467 grew that quite successfully. But the other thing that I have done in this business
468 when trying to mitigate the damage that drought would do is building an anaerobic
469 digestion plant

470 **I: Is it crop [...]?**

471 G: Yes, so we moved the focus from our wheat and barley cereal crops to forage
472 maize because it doesn't need that much water to get reasonable dry matter yield
473 per hectare. So that has been part of the driver behind building the anaerobic
474 digestion plant as well. So that is how we have done better drought planning

475 **I: Which crops did you knockout?**

476 G: That is taking out the cereals at this stage. Here now we don't plant any wheat or
477 barley after the first week of October, and that is why we boosted the wheat yield
478 from 7 to 9 t/ha.

479 **I: So no spring cropping?**

480 G: No spring non-irrigated cropping other than the sugar beet. So that is the shift,
481 how we have changed thing fundamentally here. So we try to choose the crops that
482 don't need too much water. But the problem is when they get a lot of water they
483 don't necessarily grow as well, but they do on this type of ground

484 **I: If you have spare capacity, would you irrigate cereals in a dry year?**

485 G: If the price was around 200 pound a tonne we would irrigate wheat, but no 150 or
486 less. And equally the volume of water in a dry year that we have available surplus to
487 irrigate those crops. We haven't... this would be the first season that we will be able
488 to do that because we have this 20% buffer. It is very easy to start saying I am
489 gonna irrigate our wheat in June when it needs it and then if the drought continue
490 from June into July and you need water for the crops to lift them, we would have rid
491 of our buffer stocks. So the economic justification is a bit difficult to say that...Unless
492 we have a very good forward market for the wheat crop.

493 **I: Can you tell me a little bit more about how governmental agencies and
494 associations help farmers during droughts? So what is the role of the EA,
495 NFU, WAG?**

496 G: All three of those are pure essential in terms of being able to manage the drought
497 situation

498 **I: In your opinion, what can be learnt from previous drought? What are the
499 lessons from the past and what things could be done better?**

500 G: I think the last one from my perspective demonstrated how effective the EA could
501 be in assisting with this process. And I think it highlighted early on that it could be
502 more integrated systems so our pumps know that the river flows have increased
503 above a certain level so they can switch themselves on automatically. So
504 maximizing the ability to get the water when it is available. I think automatic systems
505 could be used in a more effective way.

506 If we work in strict flow rates this is not going to cost any environmental damage if it
507 comes at 3 in the morning, well the pumps just switch on, pump for an hour or two
508 and then switch off again. Whether that is an arbitrary figure but all the thing we
509 should look at is the ability to have a [great to take?] and potentially not damage the
510 environment...But that measure that is in place that says that environmental
511 damage is going to occur at certain point...is that real? What is the evidence to
512 support the models that show that there will be environmental damage? And I am
513 not certain that is enough being done on that...So does it matter if the river runs dry
514 1 year in 20? Well, fish might die but...But where is the evidence behind that?

515 **I: Taking about adaptive management, one of the problems is that with the**
516 **WFD you can't do anything that deteriorates the quality, so you cannot do**
517 **anything to find out at what point do you have a negative impact...And that is**
518 **a very important point.**

519 G: The other thing is the impact on better river management...I think lots of farmers
520 will be prepared to put capital into restoration works in water bodies if there was an
521 ability to trade off against more water in particular situations. If you do something to
522 actively manage the river and the trade-off is we allow you to take extra water in a
523 period of drought, I think that is something that could be useful.

524 We have done all this; we are improving the habitats associated with all these river
525 banks. We don't want to run it dry. But surely the work we have done in improving
526 that to make the river more sustainable cost us a lot of money, so where are the
527 economic benefits from that? I think this is something to look at. And equally it is the
528 size of the catchment or the river body, so it is the ability to break it down. So our
529 river through here is healthy, what they do further up or further down...what are the
530 impacts of that? If we make our river healthy through all sort of things that we can
531 do and take more water, and next door they don't do anything...is that right? So I
532 think there should be a little of trade-off there and that is not necessarily only
533 drought situation, that is sort of actively managing the environment as well so...