Pure Fresh

March 2nd, 2018

Attention: Jia Hao Wu

We are a juice manufacturer that wants to improve how we import frozen concentrated orange juice (FCOJ) for making our products, particularly in the off-season when there is limited local supply in Australia. We currently ship into the ports of Brisbane, Melbourne and Adelaide. Each of these ports feed our local factories and we can predict the demands (barrels) and costs ($/barrel) involved for each of the next eight quarters:

Quarter	Brisbane	Melbourne	Adelaide	Cost
Q1	1400	1900	2500	$890
Q2	1850	2700	2200	$972
Q3	2950	2550	850	$978
Q4	2100	1450	2300	$882
Q5	1750	2900	2850	$865
Q6	2300	3400	2150	$815
Q7	3150	2500	1200	$826
Q8	2900	1450	2300	$979

Each quarter we use a single ship for imports with a capacity of 10,000 barrels. We currently have 3200 barrels of frozen concentrated orange juice in Brisbane, 4000 barrels in Melbourne, and 3800 barrels in Adelaide. We can store any concentrate on hand at the end of a quarter for a cost of $35 per barrel.

Please provide us with the optimal cost for delivery over the next eight quarters:

$37339200

Communication 2

Thank you for your initial estimate. We noticed that your schedule will leave us with no frozen concentrate in storage at the end of the eight quarters. We feel it would be desirable to end up with at least 3000 barrels in storage in each port. Could you take this into account in your proposal?

Please provide us with the optimal cost for delivery over the next eight quarters:

$46454850

Communication 3

Thank you for your revised estimate. We have realised that the storage amounts you have suggested actually exceed the capacities of our facilities in each port. We have a maximum storage capacity of 3700 barrels in Brisbane, 4300 barrels in Melbourne and 4500 barrels in Adelaide. Could you ensure that we do not exceed these capacities?

Please provide us with the optimal cost for delivery over the next eight quarters:

$46491750

Communication 4

Thank you for your advice on how to minimise the cost of purchasing our frozen concentrated orange juice for the next eight quarters. We are now looking at our processing operations in Brisbane and would again appreciate your help.

In each quarter we will be using the FCOJ delivered to Brisbane to produce our signature range of Pure Fresh juices, made with fresh local fruit. Each barrel of concentrate can be reconstituted to make 1000 litres of orange juice. We can sell this directly as orange juice or blend it to make other juices, as shown in the following table:

Regular Juices	
Orange Juice	100% Orange
Orange and Mango Juice	90% Orange, 10% Mango
Breakfast Juice	55% Apple, 28% Pineapple, 15% Orange, 2% Mango
Tropical Juice	65% Apple, 30% Pineapple, 4% Orange, 1% Passionfruit
Gourmet Juices	
Guava Delight	80% Apple, 10% Pineapple, 10% Guava
Orchard Medley	50% Apple, 45% Orange, 5% Mango
Strawberry Surprise	90% Apple, 8% Strawberry, 2% Guava

Thanks to your previous work, the average cost of reconstituted orange juice is $901 per thousand litres (kL). Taking into account purchasing and processing, the costs of the local fruits are as follows:

Fruit	Cost ($/kL)
Apple	620
Mango	1300
Pineapple	800
Passionfruit	1500
Guava	710
Strawberry	1370

The amount of orange juice is limited by the demand we noted for our original shipping schedule into Brisbane. (We reconstitute it and will use it for other products as well, so you do not need to

restrict amounts to whole numbers of barrels.) We can obtain any amount of the local fruits at the above prices.

In each quarter we anticipate being able to sell at most the following amounts (kL) of each juice:

Quarter	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Orange Juice	669	859	1340	955	787	933	1689	1404
Orange & Mango Juice	286	387	593	400	377	401	611	601
Breakfast Juice	466	746	1266	900	571	757	1121	1054
Tropical Juice	455	531	802	671	499	620	946	946
Guava Delight	316	462	508	375	306	464	509	417
Orchard Medley	1197	808	603	995	1111	760	632	800
Strawberry Surprise	677	714	548	323	622	786	489	407

We sell all juice produced for $1.50 per litre. Please provide us with the optimal profit from producing our juice range over the next eight quarters:

$28427394

Communication 5

Our transport division have advised us that their delivery trucks must always bring full loads of a single local fruit, equivalent to 10 kL of processed juice per truck. Could you take this into account in your cost calculations?

Please provide us with the revised optimal profit from producing our juice range over the next eight quarters:

$28228655

Communication 6

Due to staffing difficulties in manufacturing our gourmet juices (Guava Delight, Orchard Medley, and Strawberry Surprise) we would like to only produce two of these juices each quarter. Could you revise your blending schedule accordingly?

Please provide us with the revised optimal profit from producing our juice range over the next eight quarters:

$25491433

Communication 7

We have realised it is not desirable to have a gourmet juice out of production for more than one quarter in a row. Could you revise your blending schedule accordingly?

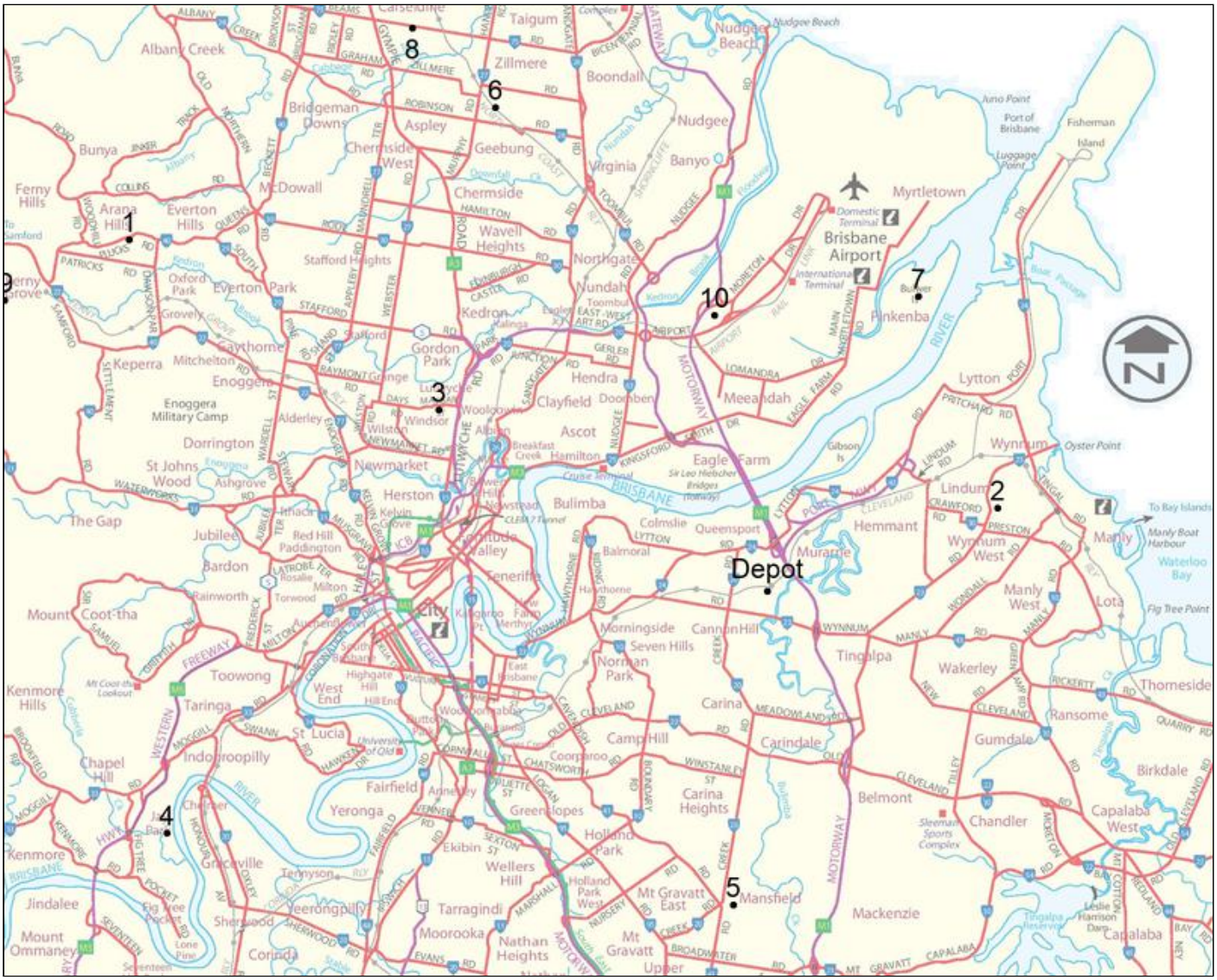
Please provide us with the revised optimal profit from producing our juice range over the next eight quarters:

$25125359

Communication 8

Thank you for your help in planning our production schedule. Based on the excellent profits you have achieved for us, we are now looking at taking more direct control of our deliveries.

Below you will find a map showing the proposed location of our main depot for Brisbane and ten of the locations where we will need to deliver each day.



We have estimated the following travel costs ($) between each pair of locations:

	D	1	2	3	4	5	6	7	8	9	10
D	—	192	65	99	172	84	146	87	175	216	73
1	192	—	241	94	157	238	103	210	94	37	156
2	65	241	—	150	236	126	170	60	200	269	91
3	99	94	150	—	133	152	81	130	101	119	77
4	172	157	236	133	—	151	211	244	223	147	199
5	84	238	126	152	151	—	220	168	247	251	156

6	146	103	170	81	211	220	—	123	30	140	80
7	87	210	60	130	244	168	123	—	152	242	54
8	175	94	200	101	223	247	30	152	—	130	110
9	216	37	269	119	147	251	140	242	130	—	188
10	73	156	91	77	199	156	80	54	110	188	—

Please provide us with the minimum cost for travelling from the depot to visit each of the locations and then return to the depot:

$

Submit