

CLIFTON HOUSE FARM– BOUNDARY RISK ASSESSMENT

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SUMMARY	<p>To assess the potential risk of cricket balls being hit into a proposed new development adjacent to the cricket field at Clifton House Farm, Labosport Ltd has reviewed the site including distances to ascertain the risk of balls landing in areas towards the area for development; and advise on the type and level of mitigation recommended to provide a suitable level of protection.</p> <p>This report forms the bases of a risk assessment and if required a recommended mitigation strategy to minimise potential risks.</p> <p>This report supersedes that issued on the 12/07/2018.</p>
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INTRODUCTION

To assess the potential risk of cricket balls being hit into a proposed new development adjacent to the cricket field at Clifton House Farm, Labosport Ltd has reviewed the site plan including distances to ascertain the risk of balls landing in the adjacent areas and advise on the type and level of mitigation recommended to provide a suitable level of protection. Mitigation options taken into consideration where applicable include; fencing, location and orientation of the cricket square and wickets, player ability, location of junior and senior wickets, development type.

Using a ball projectile model and supporting data from research undertaken, based on professional level cricket, by Labosport for the England and Wales Cricket Board (ECB) the following risk assessment has been produced. As with any model and sensible risk assessment the proportionality linked to risk (comprising likelihood and severity) are included in this report.

This report supersedes that issued on the 12/07/2018 following the issue of a revised plan following consultation by the client with Sport England and the ECB.

Note: This is a desk study, Labosport have not visited the site, taken measurements or carried out a visual inspection. All measurement information has been provided by the client and any errors in measurements are not the responsibility of Labosport and this assessment is undertaken on the basis of accurate data.

SITE SPECIFICS

The below diagrams illustrate the layout of the cricket square in relation to the proposed development area. The client has provided the dimensions to the proposed boundary. The client has informed that the wickets are orientated in an East to West direction.

Site overview



Site Measurements



Orientation of Risk

The focus on the boundary assessment is based on the shortest distances from the edge of the cricket square to the proposed boundary of the development and hence worst-case scenario. This can be identified in the above site plan as the South orientation.

SITE MEASUREMENTS

The above diagram illustrates the minimum measured distances from the cricket square to the proposed development boundary. Note as this is a risk assessment the worst case scenarios are considered; consequently the shortest measured (and calculated) distance is used for the study.

Measured Distance	Shortest Boundary (m)
South – Edge of the cricket square to the proposed site boundary.	Circa 38.0 m

ESTIMATED BALL HEIGHT (USING THE PROJECTION MODELLING TOOL)

Previous work undertaken for the England and Wales Cricket Board (ECB) led to the development of a model used to estimate the distance a ball would travel and its trajectory given a specific velocity and angle.

Model limitations:

The size of a cricket ball and its estimated drag coefficient has been added to the model, this in combination with classical Newtonian Physics for the influence of air resistance and gravity have been used to predict the projectile path. However, for simplicity, there

are some limitations to the model including but not limited to bat/ball restitution, atmospheric conditions, wind (speed and direction) and spin of the ball. Due to these limitations the model is regarded as an indicative prediction tool.

The below table highlights the total estimated distance a ball will travel for typical shots (angles and velocities) taken from assessment of in-game action ranging from 20 degrees to 50 degrees and 20 m/s (45 mph) to 50 m/s (112 mph).

Total Estimated Distance (m)		Angle (degrees)						
		20	25	30	35	40	45	50
Velocity (m/s)	20	20.70	23.24	25.82	27.22	28.04	27.84	27.10
	25	28.82	32.8	35.29	37.01	37.95	37.66	36.25
	30	37.32	41.99	44.91	46.31	47.34	46.51	45.27
	35	45.95	50.48	53.80	55.40	55.96	55.04	53.15
	40	53.71	58.79	61.82	63.62	63.73	62.73	60.24
	45	60.50	66.15	69.52	70.93	70.62	69.17	66.53
	50	67.88	73.23	76.29	77.88	77.15	75.62	72.09

Note: the trajectory for the above distances will be very different depending on the angle and velocity of shot as can be seen in the assessment below.

The hit angles and velocities are estimated from in-game action to cover a range of 'typical' shots ranging from 20 degrees to 50 degrees and 20 m/s (45 mph) to 50 m/s (112 mph).

The following distances have been used to calculate the height of the ball for different shot conditions as specified below:

Measured Distance	Shortest Boundary (m)
South – Edge of the cricket square to the proposed site boundary.	Circa 38.0 m

South Orientation

Estimated Ball Height @ 38.0 m		Angle (degrees)						
		20	25	30	35	40	45	50
Velocity (m/s)	20	0	0	0	0	0	0	0
	25	0	0	0	0	0	0	0
	30	0	2.7	5.3	7.5	9.8	11.2	11.3
	35	3.7	6.5	9.6	12.4	15.2	17.8	19.8
	40	6.0	9.1	12.3	15.6	18.9	22.2	25.3
	45	7.6	10.8	14.2	17.8	21.5	25.2	29.1
	50	8.7	12.1	15.5	19.3	23.4	27.5	31.8

See Appendix A for example trajectories.

To assess the potential risk of cricket balls being hit into a proposed new development adjacent to the cricket field at Clifton House Farm, and advise on the type and level of mitigation recommended to provide a suitable level of protection. Mitigation options taken into consideration where applicable include; fencing, location and orientation of the cricket square and wickets, player ability, location of junior and senior wickets, development type.

The exact frequency of shots resulting in a cricket ball being hit into the adjacent area is unknown and impossible to predict with certainty (player skills, type of game and many other factors can influence this) hence a proportionate approach needs to be taken to provide safety to these users. In reality there will always be a “freak” shot that will result in a further than expected trajectory, however, the implications of planning for this type of worst case approach would result in the closure of hundreds of cricket grounds across the country hence a balanced risk mitigation strategy needs to be implemented that is proportionate. Indeed, there are risks associated with many everyday activities, but plans need to be developed to reduce risk following good practical health and safety principles including a combination of likelihood and severity.

Labosport Ltd have undertaken this type of assessment for other cricket grounds over the past 3 years when there have been perceived problems with cricket balls exceeding the boundary or the influence a new development may have on an existing club.

The basis of the shot velocity (50 m/s) is calculated on professional (1st class and international) players. Typically for community cricket clubs we undertake the assumption that 40 m/s is a suitable speed given the speed of bowling and batsman’s skill when contrasted with elite players. It is on this basis that the below recommendations have been made.

Risks Overview/Mitigation Approach - South Orientation

The shortest distance from the edge of the cricket square to the proposed development area in the South orientation is 38.0 m. At 38.0 m all but the fastest shots for community/amateur level cricket will be stopped by a 19 m high mitigation system. A 19 m high system will not stop all shots from landing beyond the boundary but it is believed from the assessment of ball trajectory it will significantly reduce their frequency. In order to almost completely remove the risk of cricket balls landing in the area beyond this boundary a mitigation system greater than 25 m high would be required which is unlikely to be practical or proportionate.

Based on the height calculations of the ball trajectory combined with the experiential information regarding shot scenario, direction of play and site specifics it is recommended that a 19 m high mitigation system will be required. At this height the mitigation may not stop all shots from landing beyond this boundary but it is believed from the assessment of ball trajectory it will significantly reduce their frequency. It is suggested however, that this level of mitigation may not be practical and an alternative solution may need to be sought.

To reduce the recommended height of mitigation increasing the distance from the edge of the cricket square to the proposed development area could be considered if viable.

As the distance from the edge of the cricket square to the development boundary increases the height of recommended mitigation would be as follows;

- @ a distance of 40 m – minimum recommended height 18.0 m
- @ a distance of 45 m – minimum recommended height 15.0 m
- @ a distance of 50 m – minimum recommended height 15.0 m
- @ a distance of 55 m – minimum recommended height 11.0 m
- @ a distance of 60 m – minimum recommended height 5.0 m

RISK ASSESSMENT DISCUSSION

@ a distance of 65 m – at this distance a good level of protection for community level cricket should be provided.

Note: At these heights the fencing mitigation may not stop all shots from landing beyond the boundary, but it is believed from the assessment of ball trajectory it will significantly reduce their frequency.

Amended Design

Following on from the initial assessment the client has revised the plan following consultation with Sport England and the ECB to include a surveyor to accurately pick up the position of the cricket square. The below plan provides a 65m distance line (green dashed line) from the edge of the cricket square and proposed the erection of a 5m high mitigation netting at a distance of 60m from the nearside edge of the square. The netting will be erected along the blue dashed line and connect to the existing netting erected to the rear of the existing houses. The revised proposal relocates the proposed housing back to provide a 65m buffer between the nearest cricket wicket and proposed housing/gardens with the buffer categorised as ‘agricultural land’. It would be recommended that the client discusses plans with the relevant stakeholders to aid in any redesign and how the area designated as agricultural land would be managed. This would need to be a permanent or enforceable solution.



Further notes:

This report does not recommend the specific design of a mitigation system, however options could include;

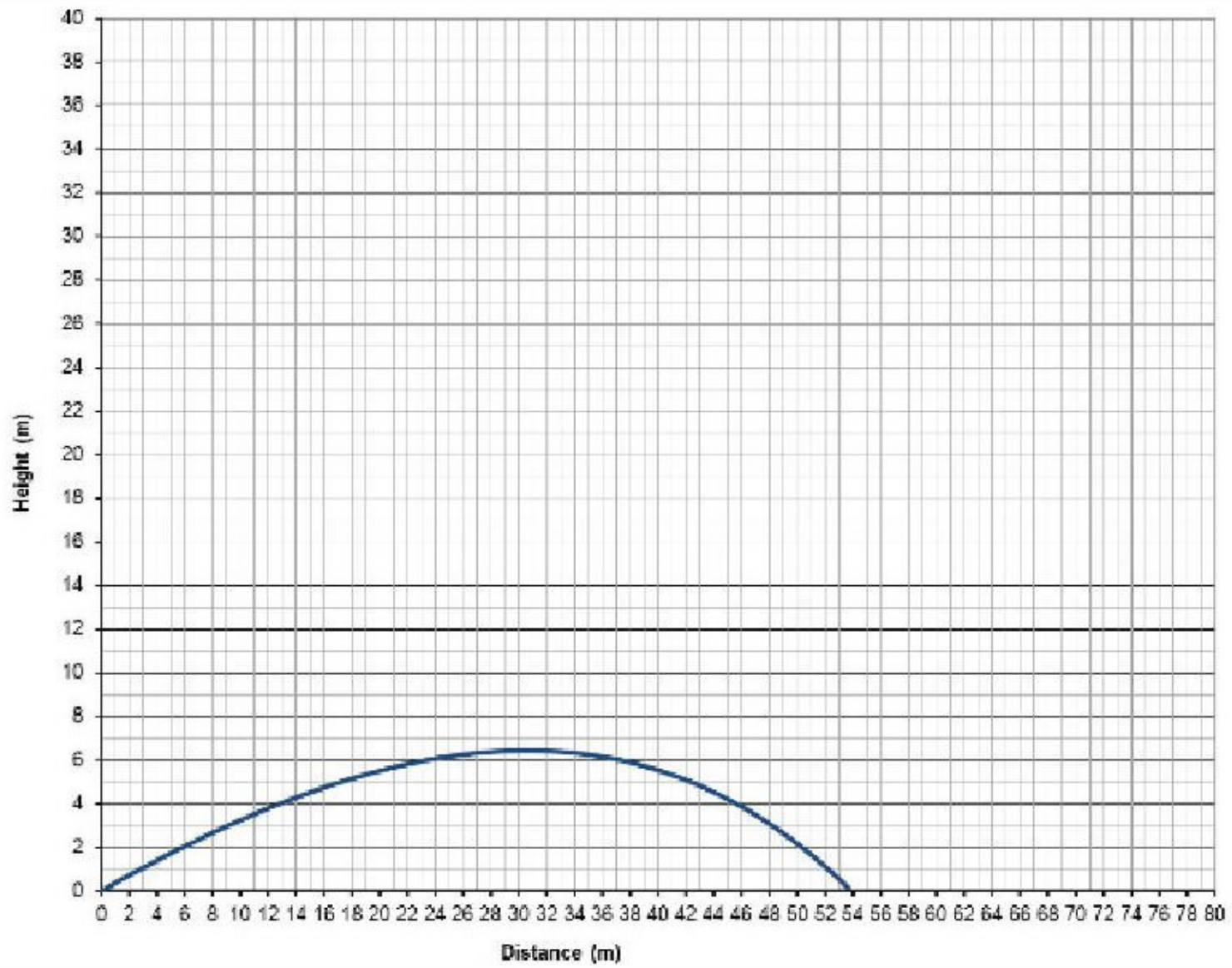
- Ball stop netting
- Rigid panel fencing
- Closed board fencing
- Permanent or temporary fencing structures

It is recommended the client discuss design options with the relevant stakeholders including the LPA, Sport England, the ECB and the cricket club.

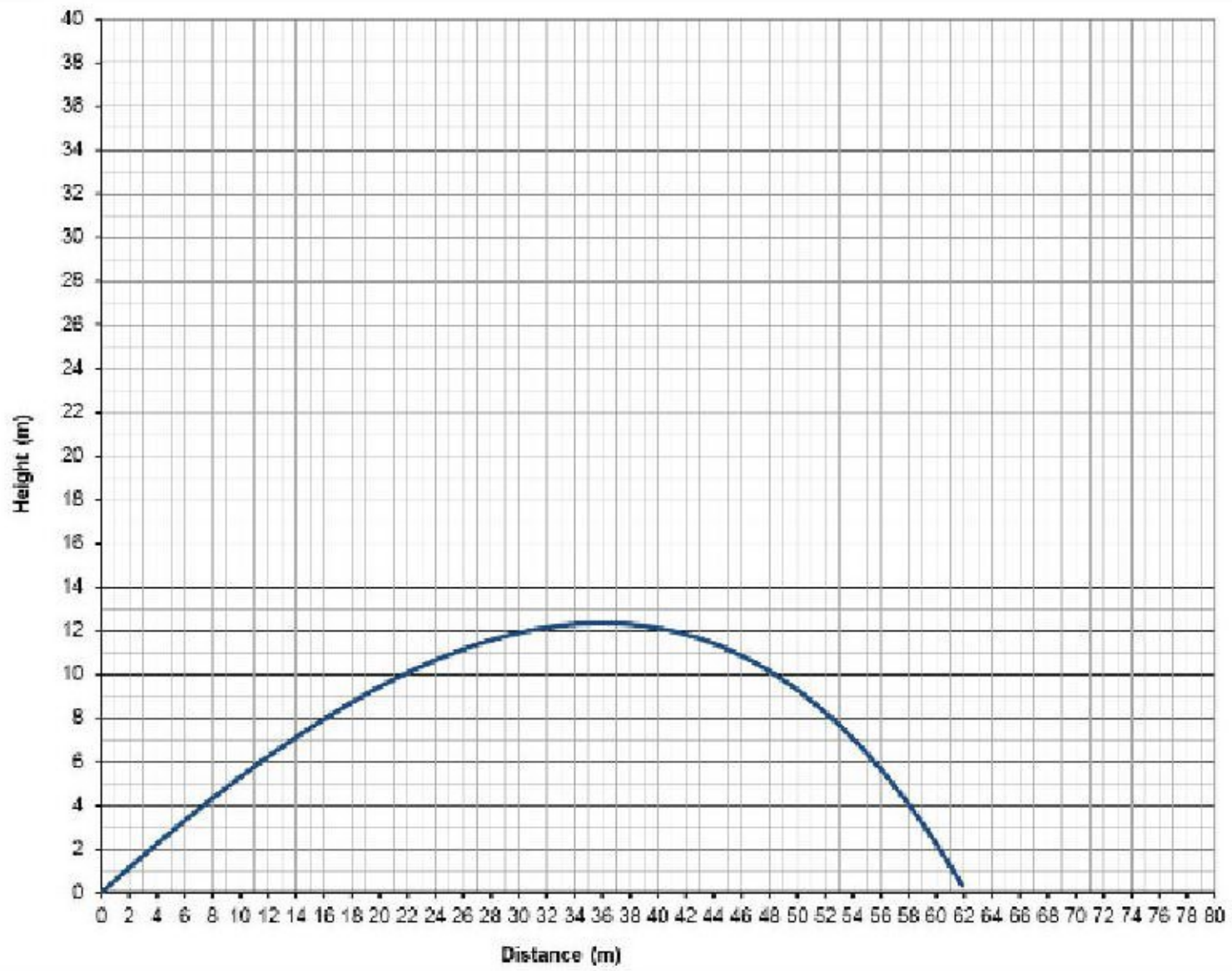
It is recommended the client discuss the plan with the England and Wales Cricket Board (ECB) or other relevant organisations such as Sport England along with the club to ensure whatever system if proposed is both suitable in mitigating the risk but also practicable for the cricket club's day to day use.

APPENDIX A – TYPICAL EXAMPLE TRAJECTORIES

20 ° @ 40 m/s



30 ° @ 40 m/s



40 ° @ 40 m/s

