



TECHNICAL REPORT

Boundary Risk Assessment:
Swallow Lane, Golcar

Report Number LSUK.18-0039

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Date 10th January 2018

This report contains 12 pages including 1 appendix.

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SUMMARY

To assess the potential risk of cricket balls being hit into the proposed development off Swallow Lane adjacent to a cricket pitch at Golcar Cricket Club, Labosport Ltd have measured and reviewed the site including distances to ascertain the risk of balls landing in the adjacent area.

This report forms the bases of a risk assessment and if required a recommended mitigation strategy to minimise potential risks.

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1. INTRODUCTION

To assess the potential risk of cricket balls being hit into the proposed development off Swallow Lane adjacent to a cricket pitch at Golcar Cricket Club, Labosport Ltd have measured and reviewed the site including distances to ascertain the risk of balls landing in the adjacent area.

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.

Note: All measurements were taken by Labosport in situ based on information provided by the client prior the site visit. The site visit took place on the morning of 09/01/2018.

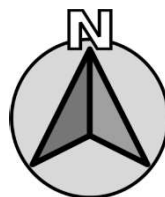
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2. SITE SPECIFICS

The below diagrams illustrate the layout of the cricket field in relation to proposed development, including the distances measured during the site visit.

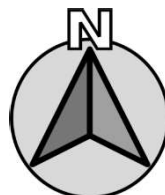
Site Plan of Development

SWALLOW LANE | GOLCAR



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Overview of Cricket Pitch and Measurements to Boundary



Orientation of Risk

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

No proposed mitigation has been proposed to date.

The below photograph shows the existing site boundary to the West of the cricket pitch. The approximate height to the top of the dry-stone wall from the playing field level is 3m to the South West, increasing to approximately 5m to the North West.



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3. SITE MEASUREMENTS

The above diagram illustrates the minimum measured distances from the cricket square to the existing boundaries. 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)
Shortest distance from the edge of the cricket square to the boundary of the development site	22.5 m

4. 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)
Shortest distance from the edge of the cricket square to the boundary of the development site	22.5 m

West Orientation

Estimated Ball Height @ 22.5 m		Angle (degrees)						
		20	25	30	35	40	45	50
Velocity (m/s)	20	0	0.6	1.6	3.6	4.7	5.3	6.3
	25	2.3	4.1	6.0	7.8	9.7	11.5	13.1
	30	4.1	6.0	8.1	10.3	12.4	14.8	17.2
	35	5.2	7.2	9.3	11.6	14.1	16.8	19.7
	40	5.8	8.0	10.2	12.6	15.0	17.9	21.4
	45	6.4	8.4	10.7	13.2	15.8	18.9	22.2
	50	6.5	8.8	11.3	13.7	16.6	19.4	23.2

See Appendix A for example trajectories

5. RISK ASSESSMENT DISCUSSION

This report has been prepared to assess the potential risk of cricket balls being hit into the proposed development off Swallow lane adjacent to a cricket pitch at Golcar Cricket Club and the height and/or design that a mitigating system would need to be in order to provide a suitable level of protection.

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 ground 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. Labosport have undertaken assessments where the minimum boundary has been in the region of 35 to 40 m yet the cricket club and neighbours have been able to collectively identify a mitigation strategy to reduce risk. This indicates that based on past experience the below recommendations are feasible.

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

West Orientation

The shortest distance from the edge of the cricket square to the development boundary is 22.5 m. At this distance, all but the fastest shots for community/amateur level cricket will be **stopped by a 15 m high fencing system**. A 15 m high fence 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 the boundary a fencing system 21.5 m high would be required but this may not be practical or proportionate.

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The height of the existing mitigation ranges from 3 – 5 m currently. The height calculations of the ball trajectory combined with the experimental information regarding shot scenario, direction of play and site specifics indicate that the existing mitigation is not suitable and should be increased. A minimum mitigation height of 15 m is recommended to the full length of the West orientation of the development. 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.

Alternatively, if there is a desire to reduce the recommended height of mitigation increasing the distance from the edge of the cricket square to the boundary could be considered if viable. This could include moving the cricket square or limiting the use of the external wickets to junior players only.

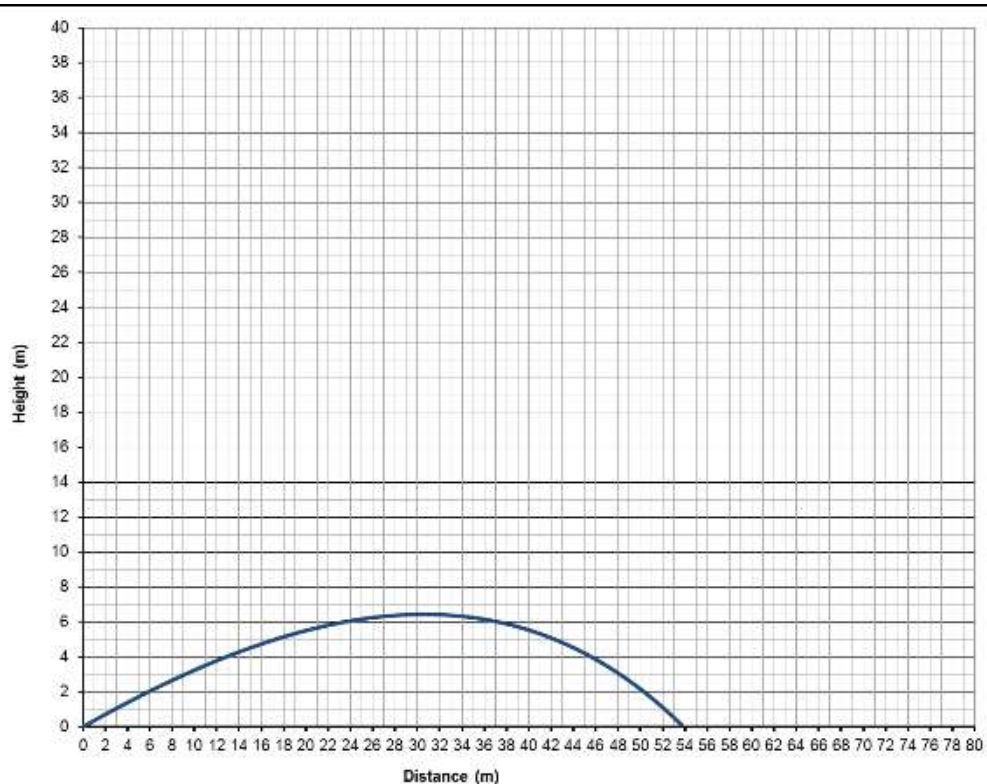
Further notes:

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.

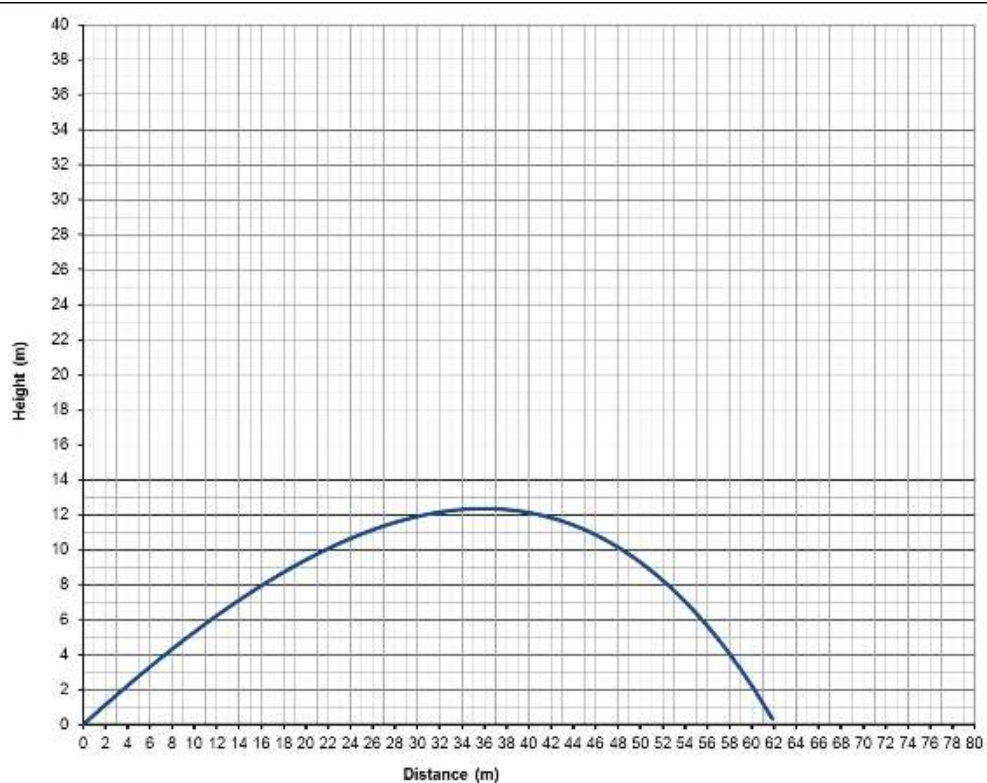
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APPENDIX A – EXAMPLE TRAJECTORIES

20 ° @ 40 m/s



30 ° @ 40 m/s



40 ° @ 40 m/s

