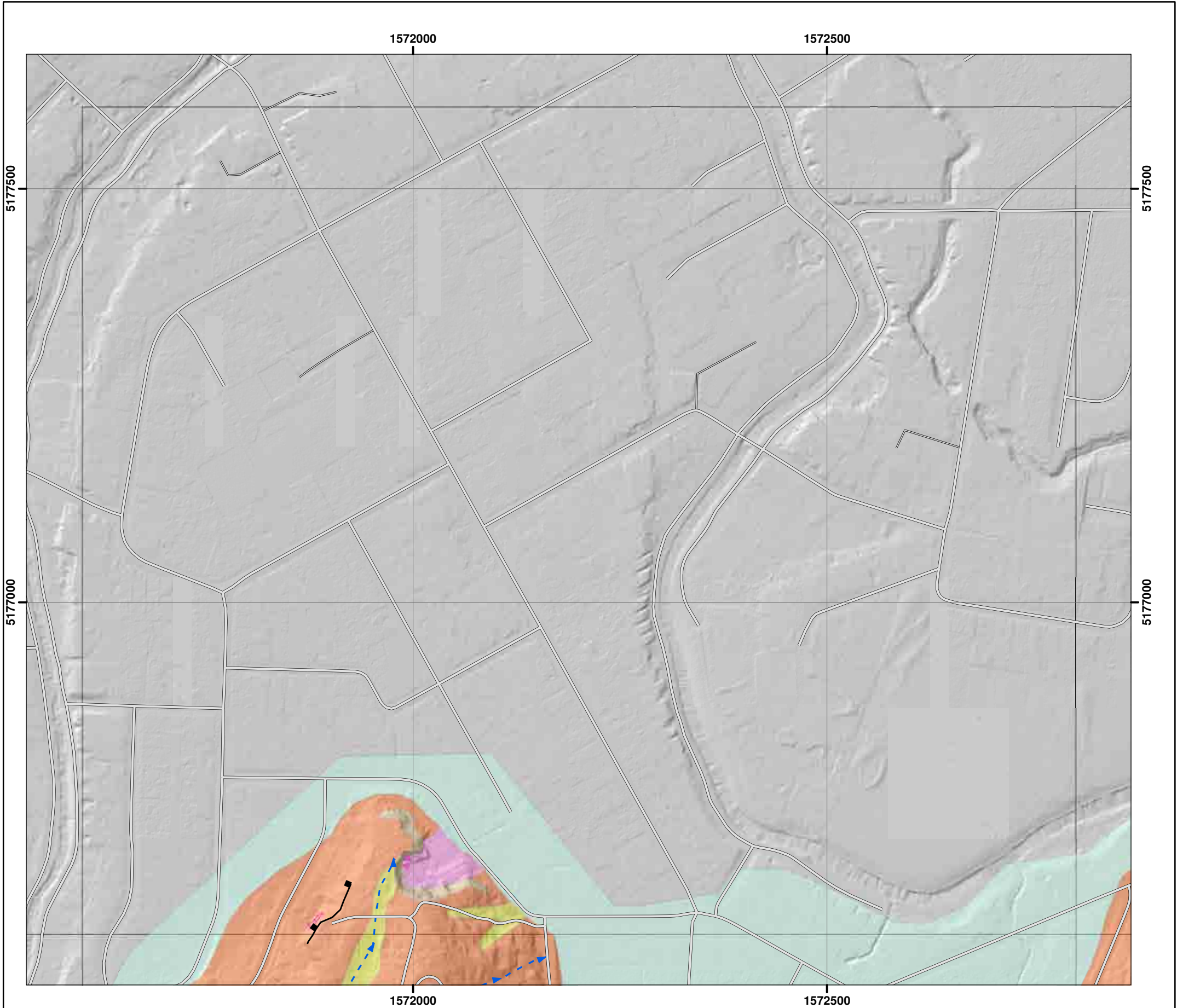
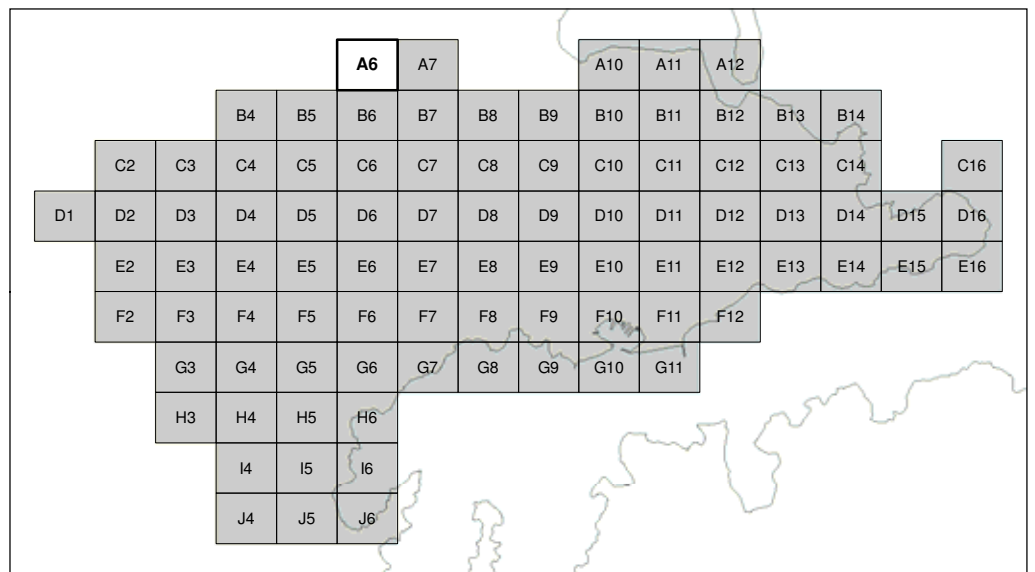


**APPENDIX 4: GEOMORPHOLOGY MAPS**



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



**GEOMORPHOLOGY MAPPING FOR  
ROCKFALL RISK ASSESSMENT**

**Port Hills  
Christchurch**

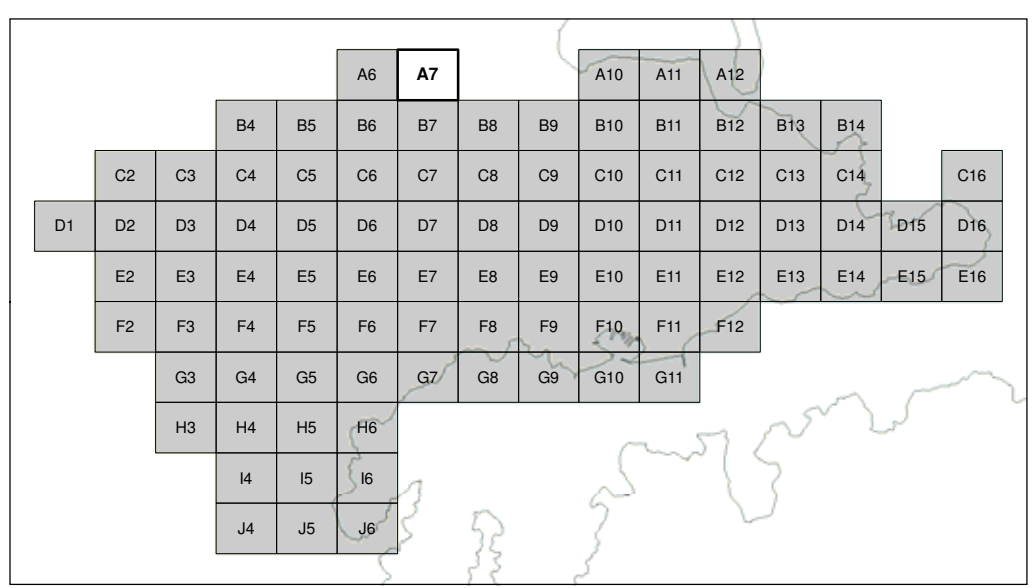
APPENDIX 4  
Map A6

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
 DBT  
 CHK:  
 CM

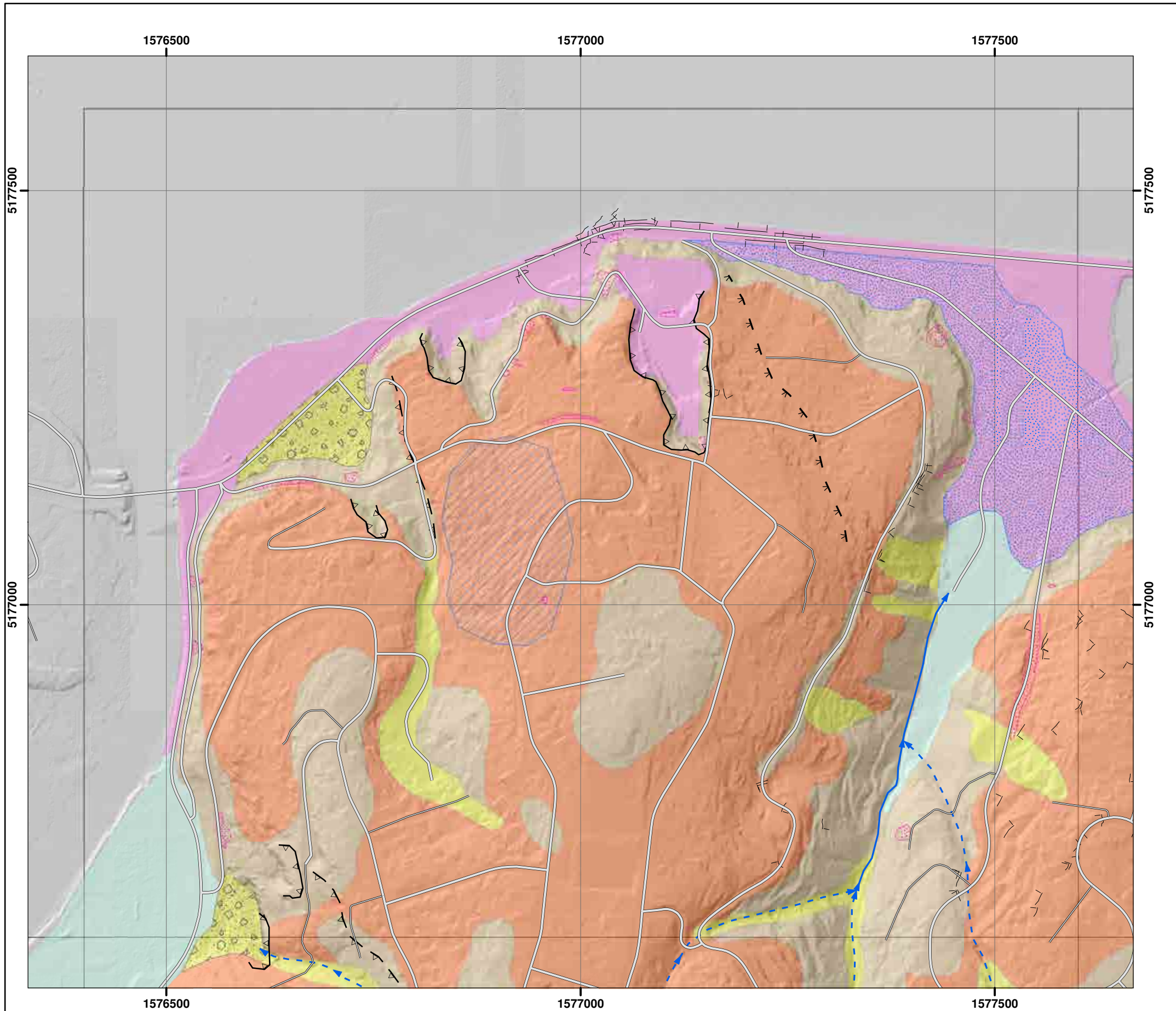


**GEOMORPHOLOGY MAPPING FOR  
 ROCKFALL RISK ASSESSMENT**

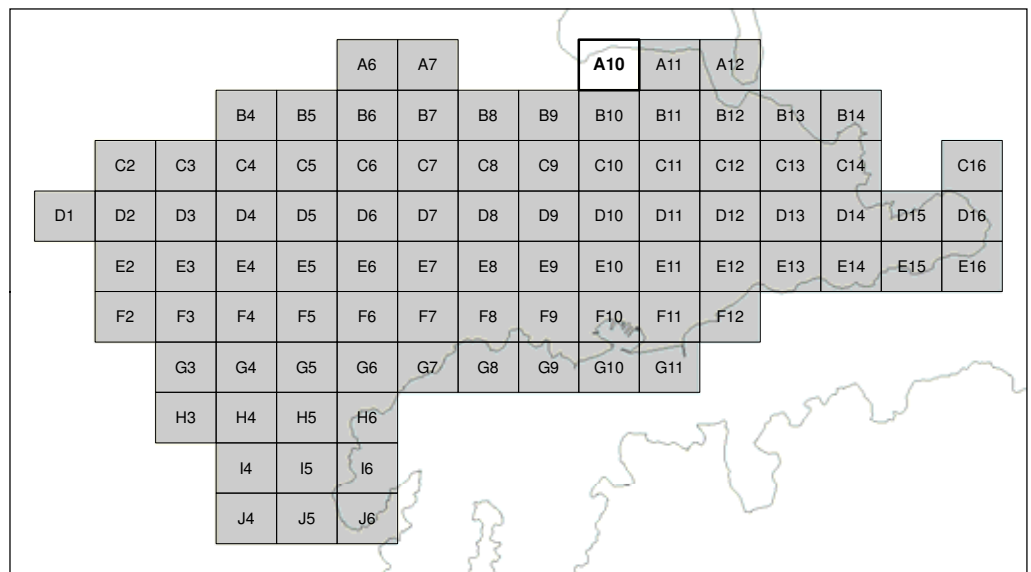
**Port Hills  
 Christchurch**

APPENDIX 4  
 Map A7

**FINAL**  
 REPORT: CR2012/15    DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



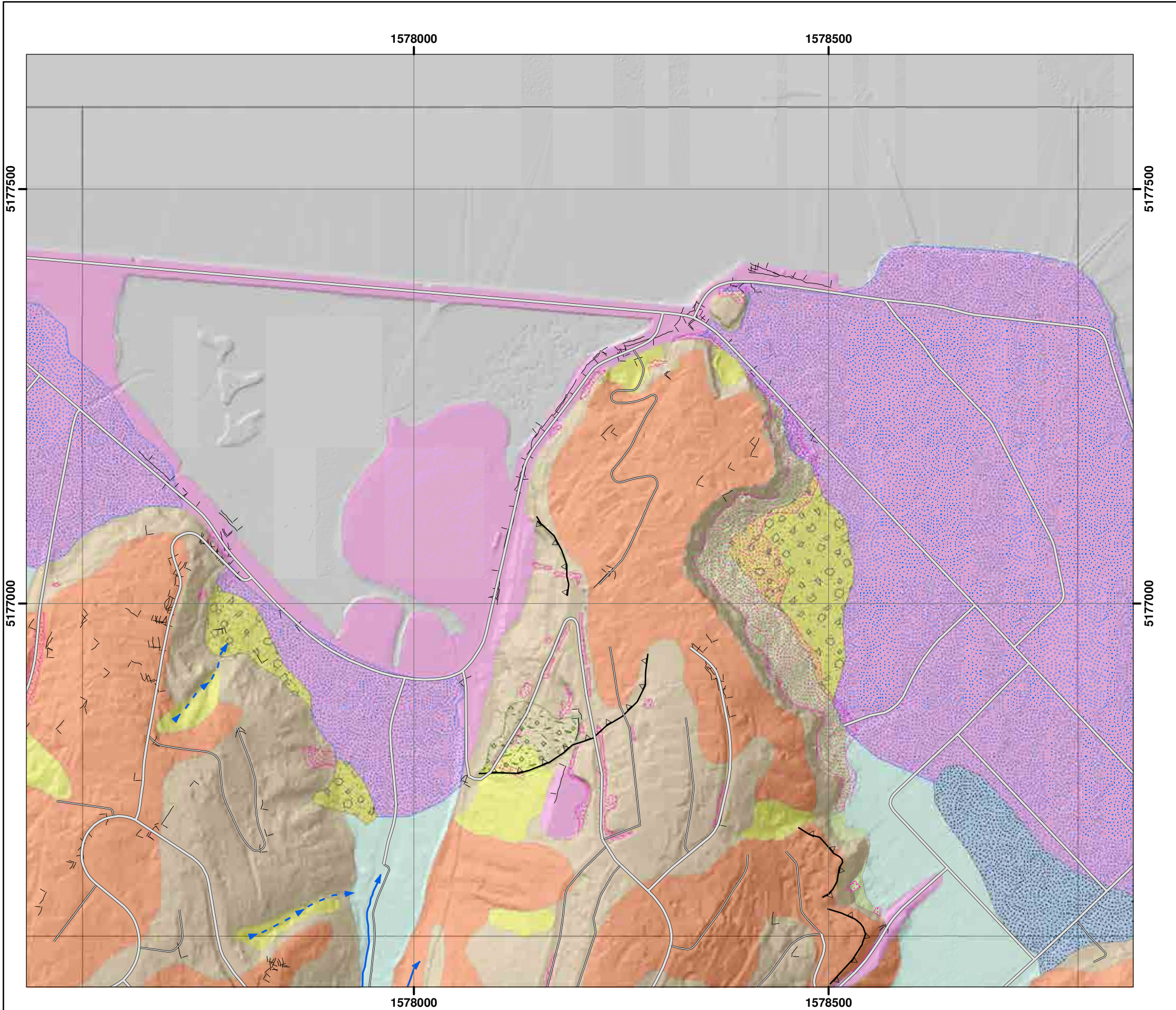
**GEOMORPHOLOGY MAPPING FOR  
ROCKFALL RISK ASSESSMENT**

**Port Hills  
Christchurch**

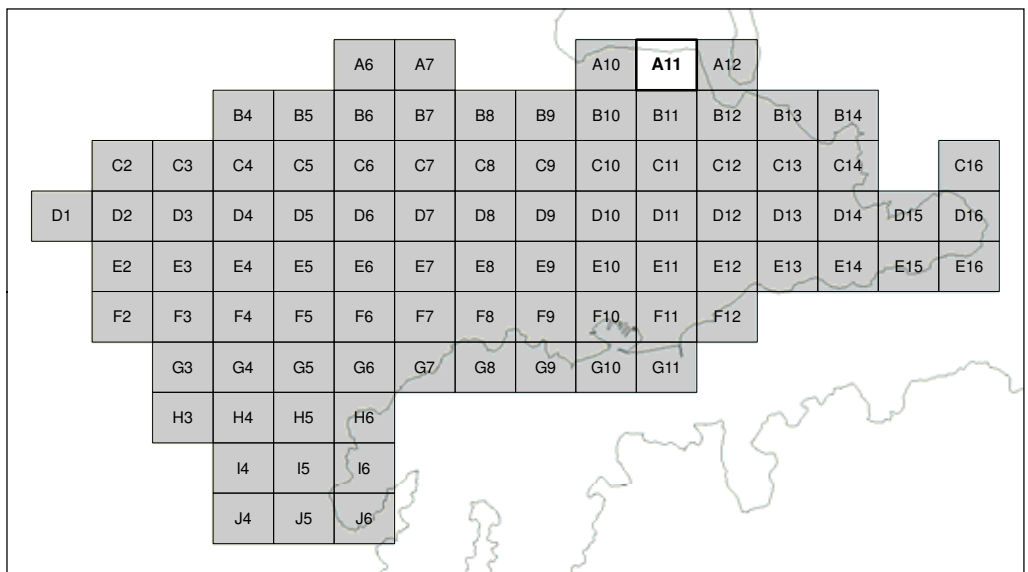
APPENDIX 4  
Map A10

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



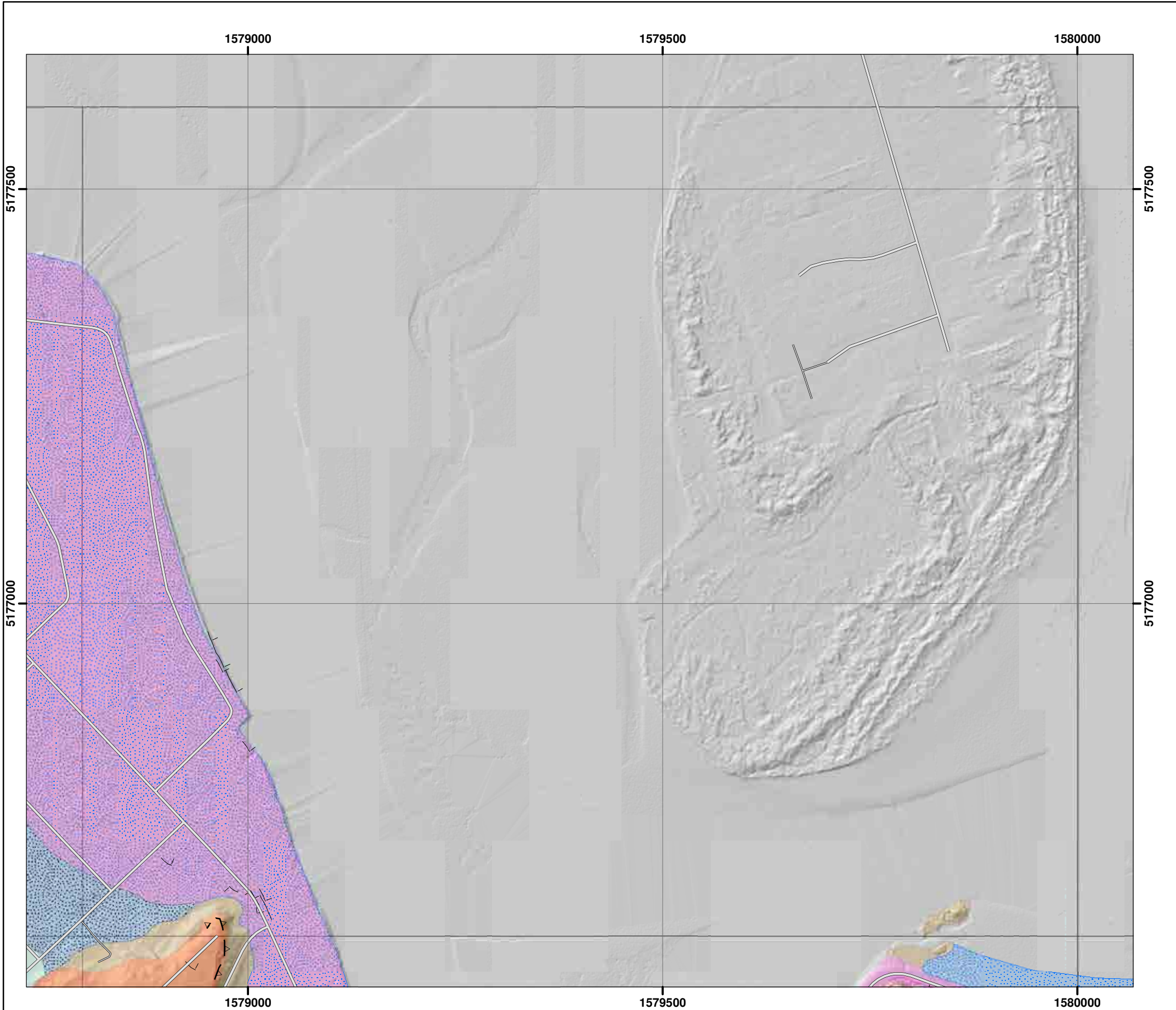
**GEOMORPHOLOGY MAPPING FOR  
ROCKFALL RISK ASSESSMENT**

**Port Hills  
Christchurch**

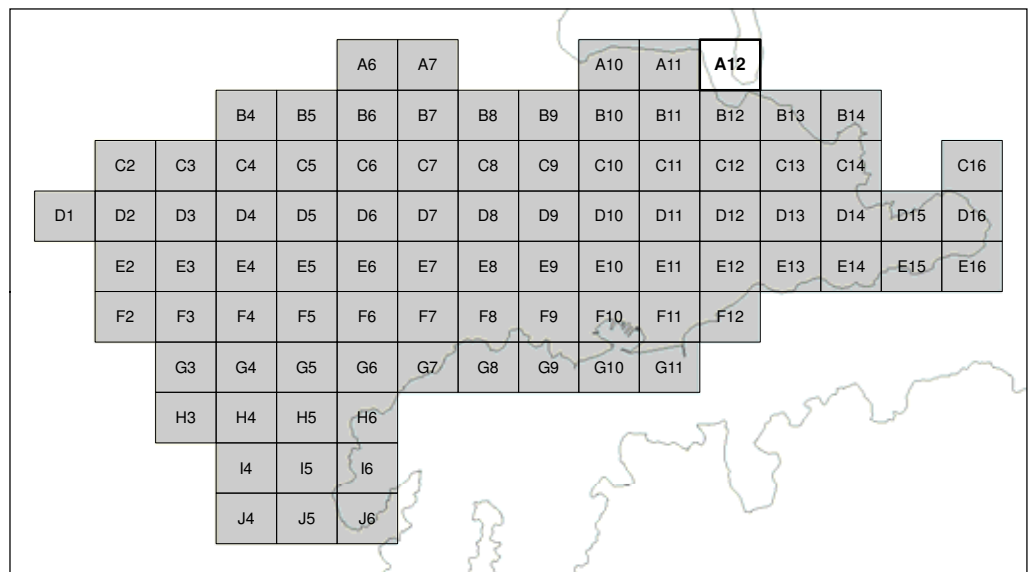
APPENDIX 4  
Map A11

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



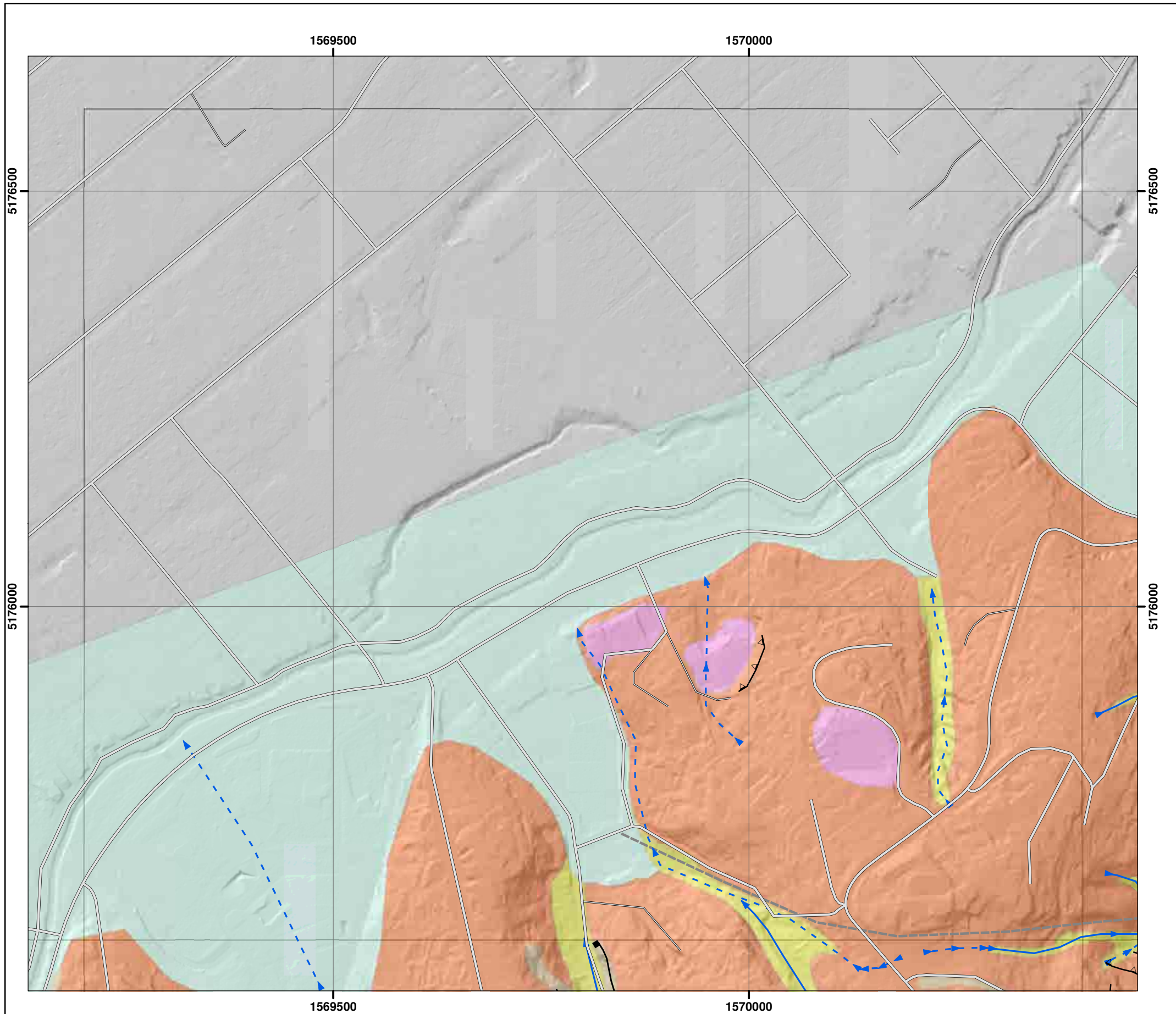
**GEOMORPHOLOGY MAPPING FOR  
ROCKFALL RISK ASSESSMENT**

**Port Hills  
Christchurch**

APPENDIX 4  
Map A12

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

**Port Hills Christchurch**

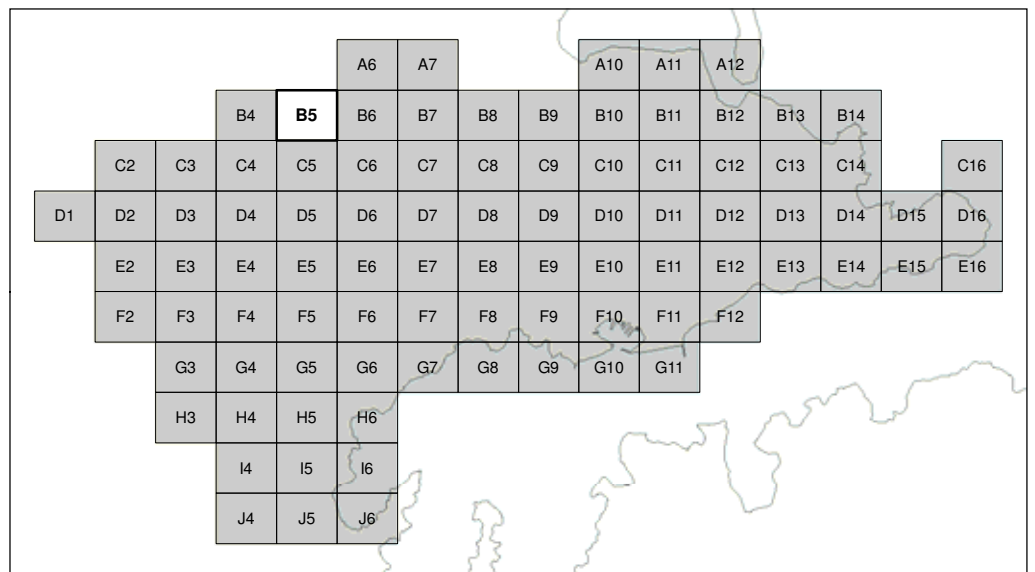
APPENDIX 4  
Map B4

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1:5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

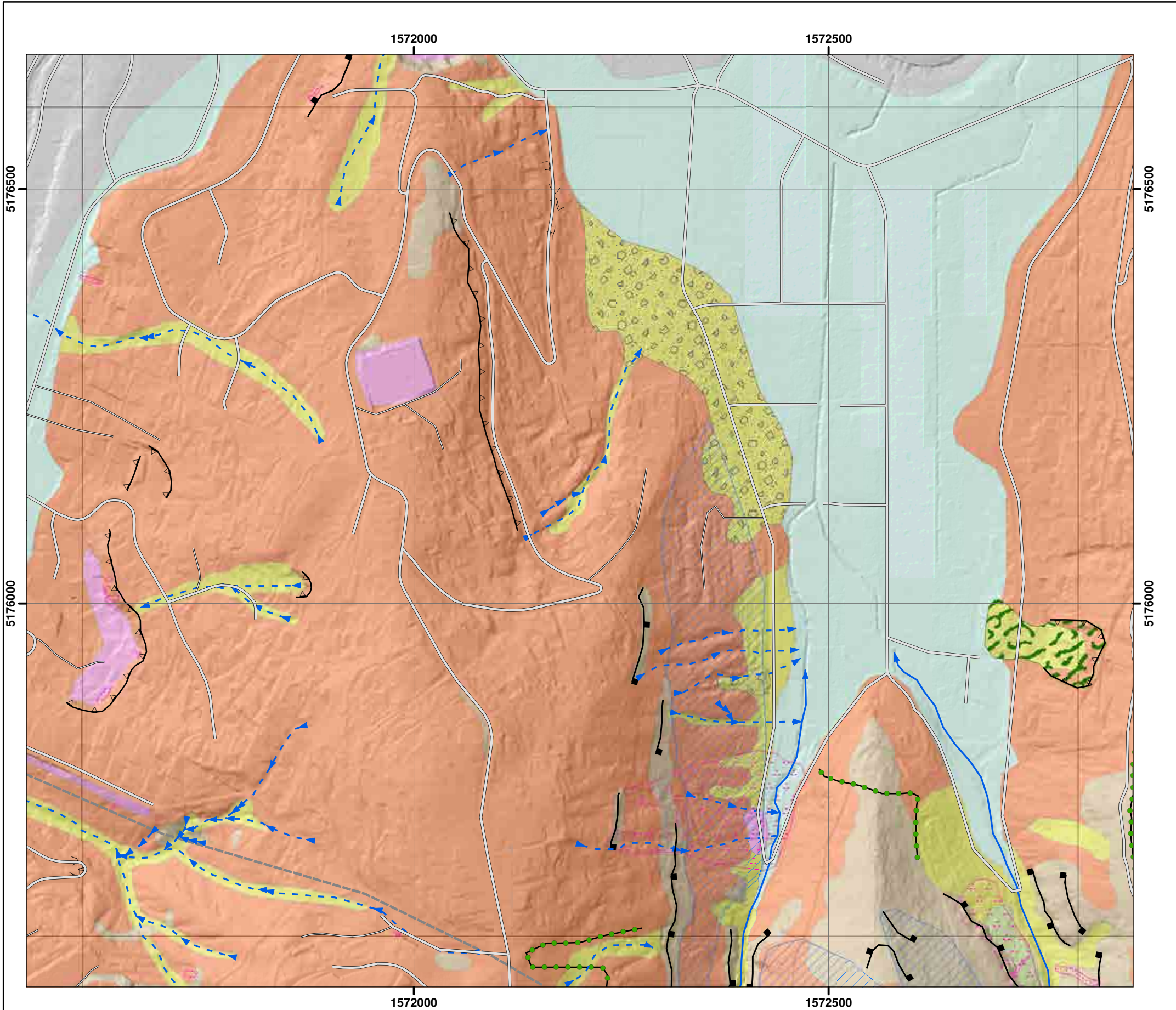
**Port Hills Christchurch**

APPENDIX 4  
Map B5

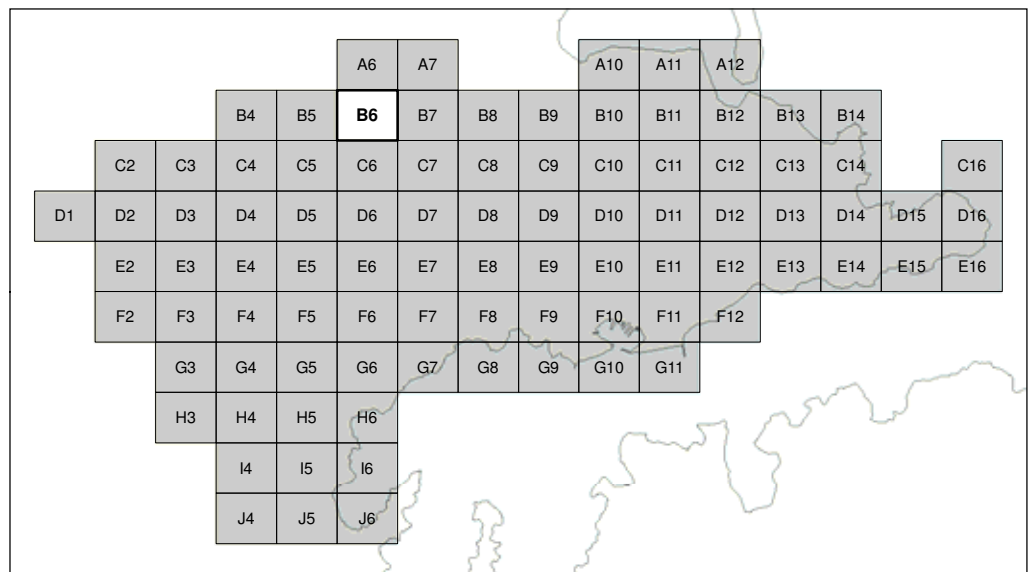
**FINAL**

REPORT: CR2012/15 DATE: Sept 2012





Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



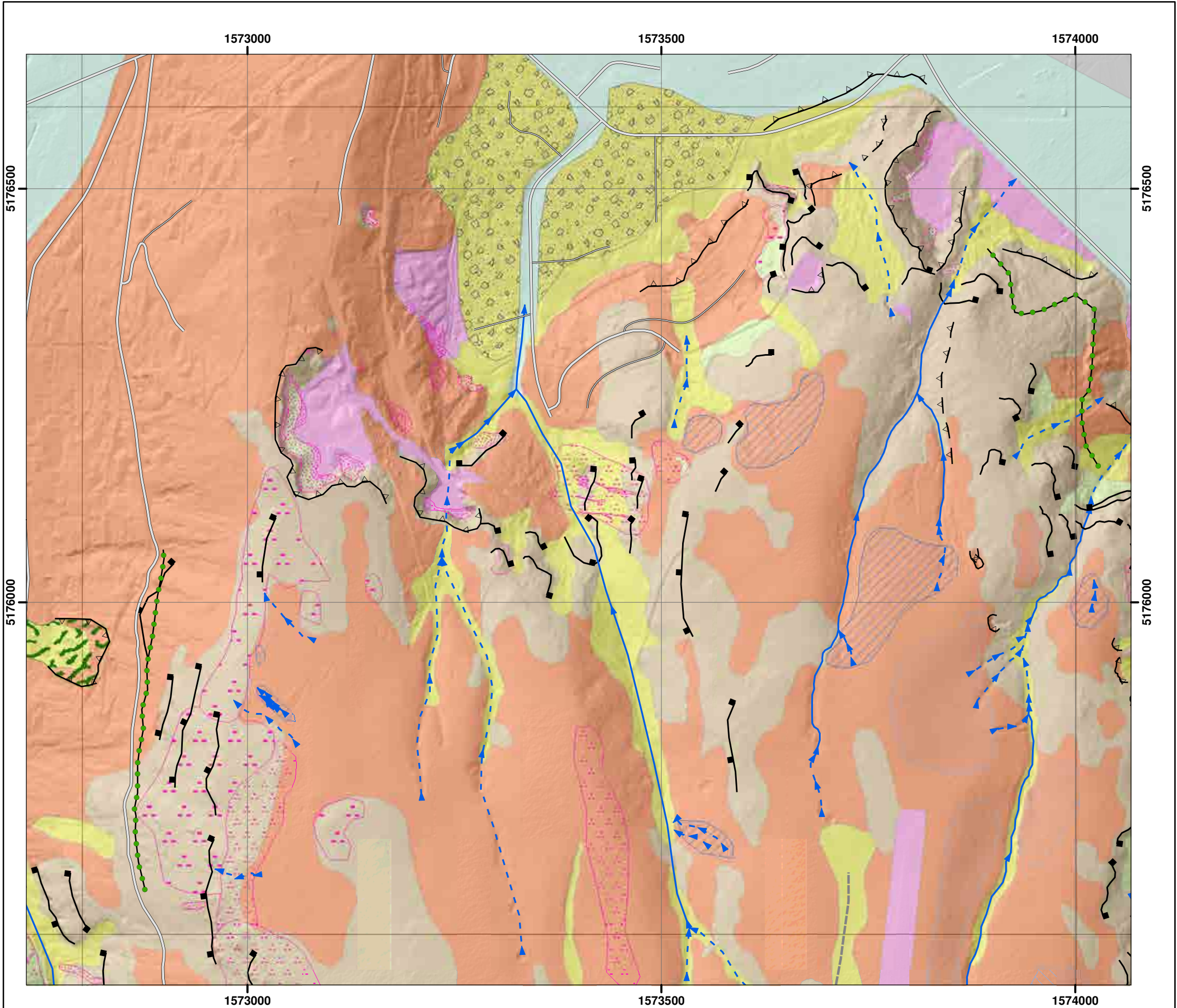
**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

**Port Hills Christchurch**

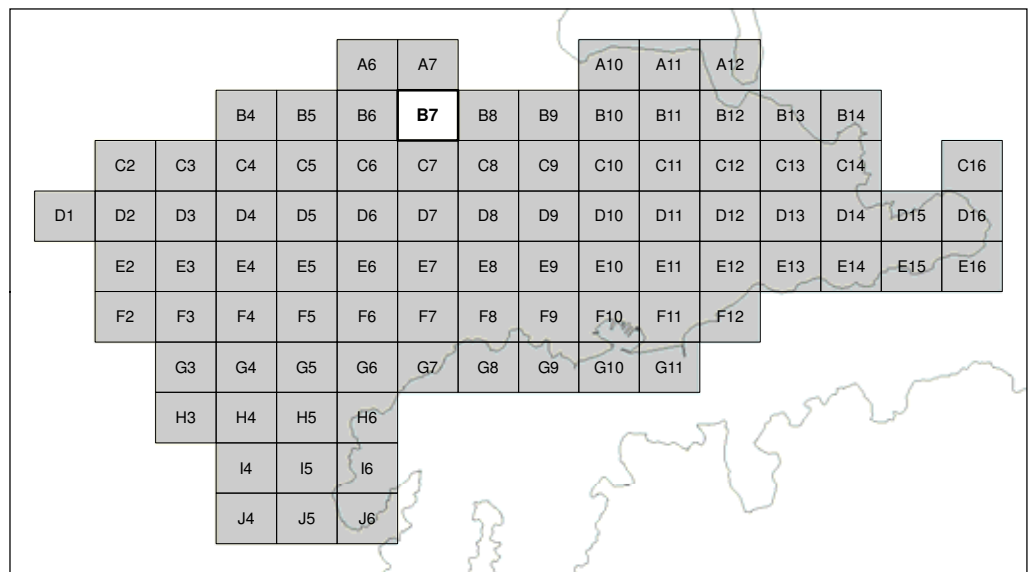
APPENDIX 4  
Map B6

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1:5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



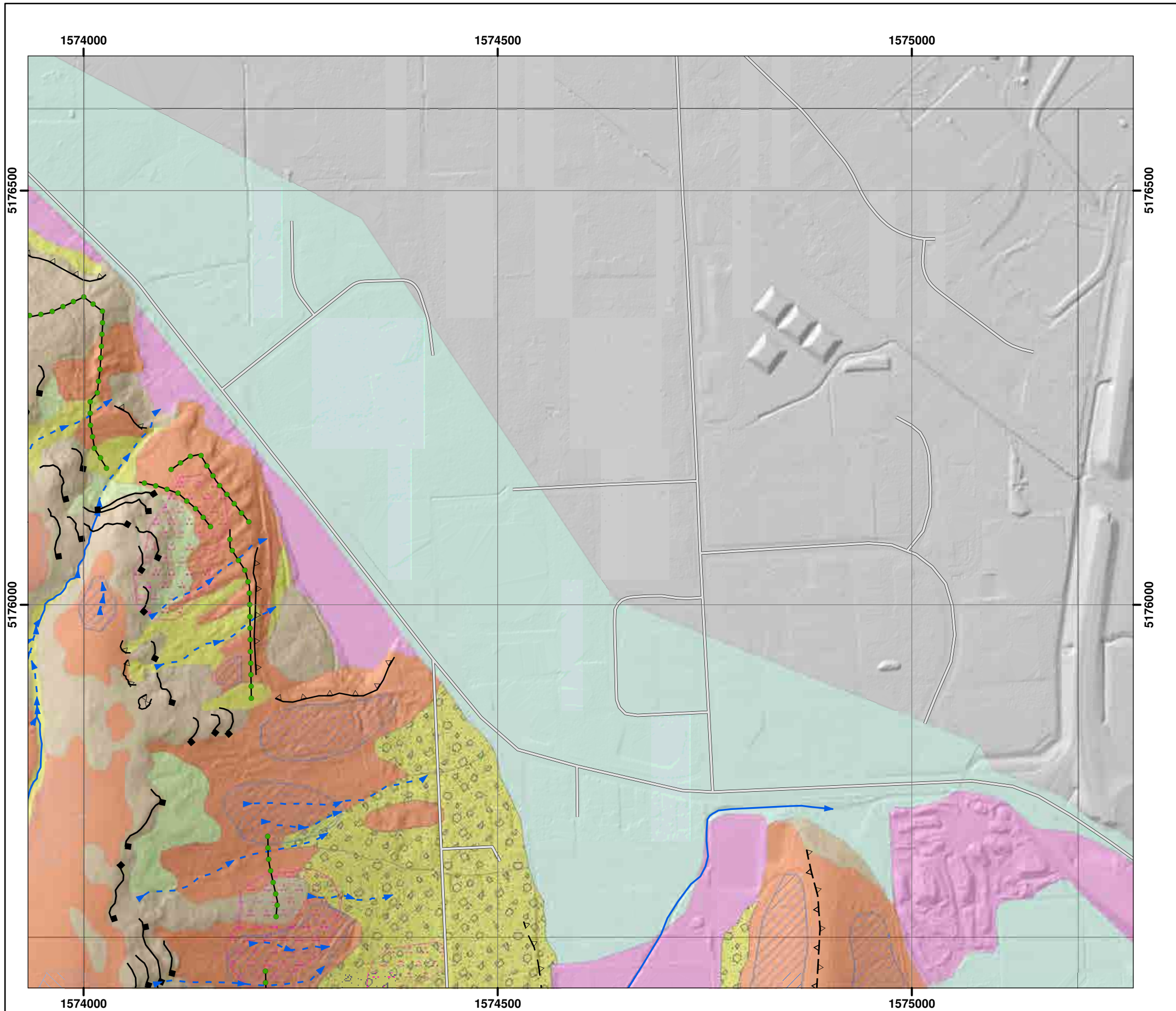
**GEOMORPHOLOGY MAPPING FOR  
ROCKFALL RISK ASSESSMENT**

**Port Hills  
Christchurch**

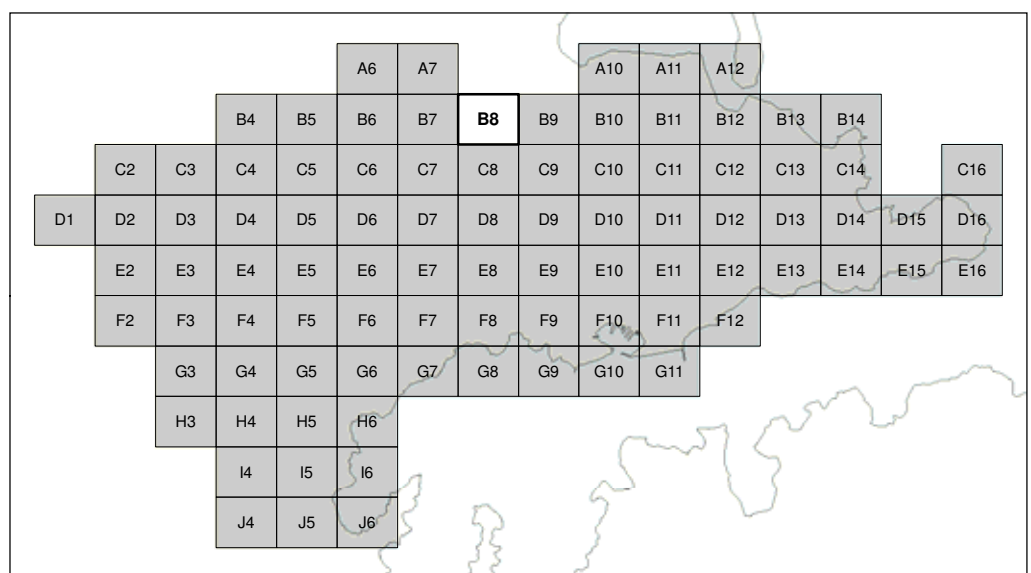
APPENDIX 4  
Map B7

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1:5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



**GEOMORPHOLOGY MAPPING FOR  
ROCKFALL RISK ASSESSMENT**

**Port Hills  
Christchurch**

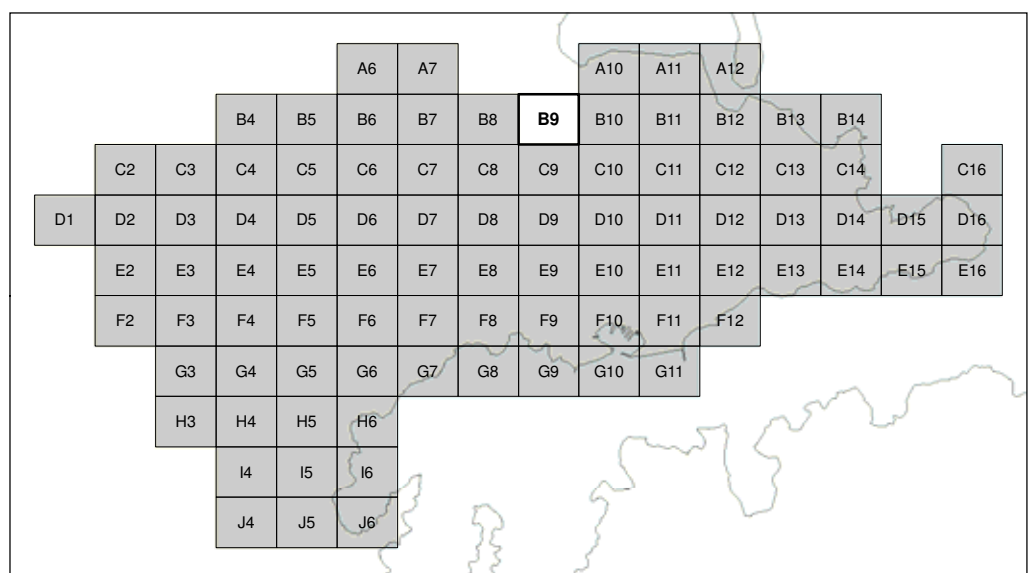
APPENDIX 4  
Map B8

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



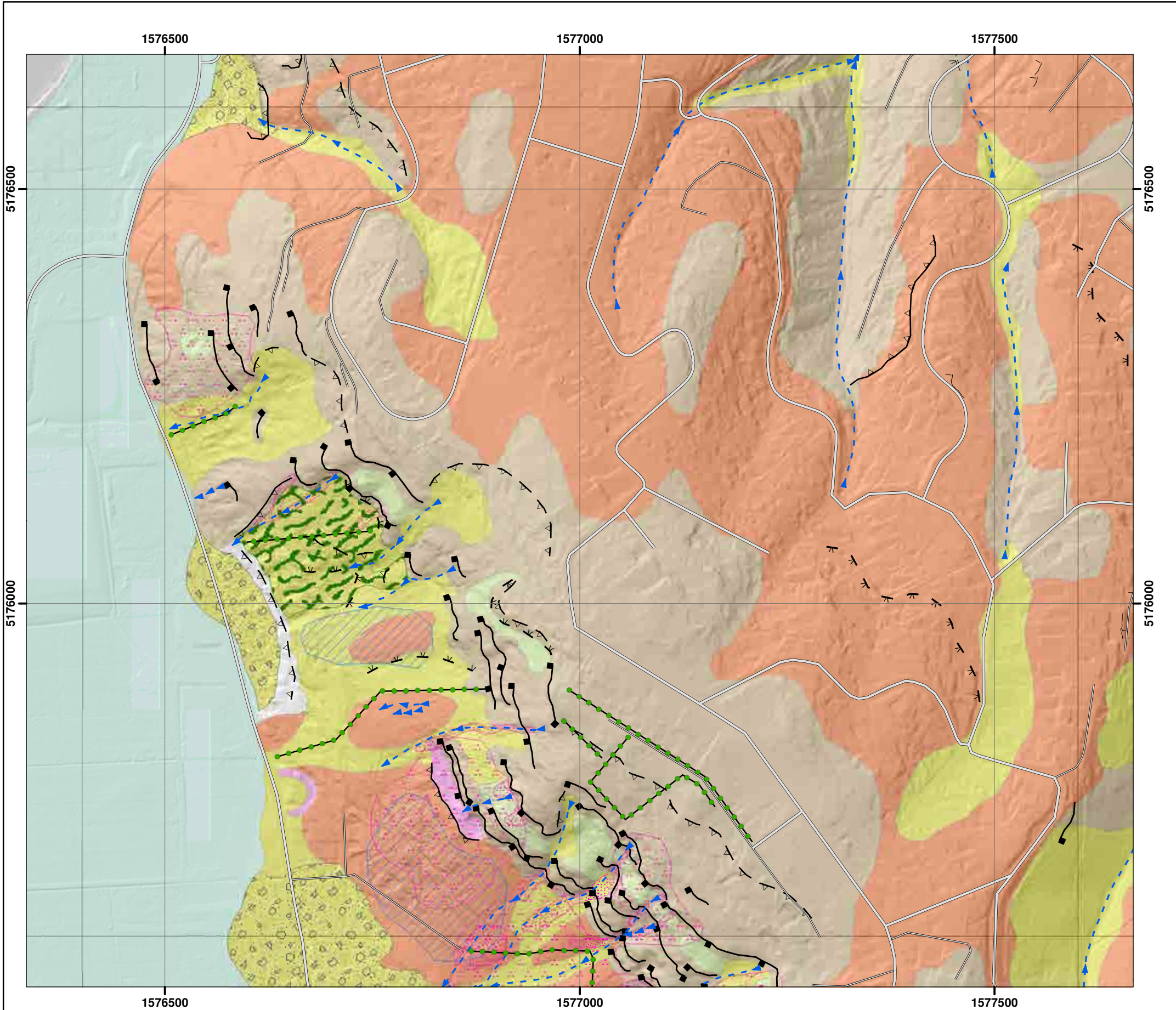
**GEOMORPHOLOGY MAPPING FOR  
ROCKFALL RISK ASSESSMENT**

**Port Hills  
Christchurch**

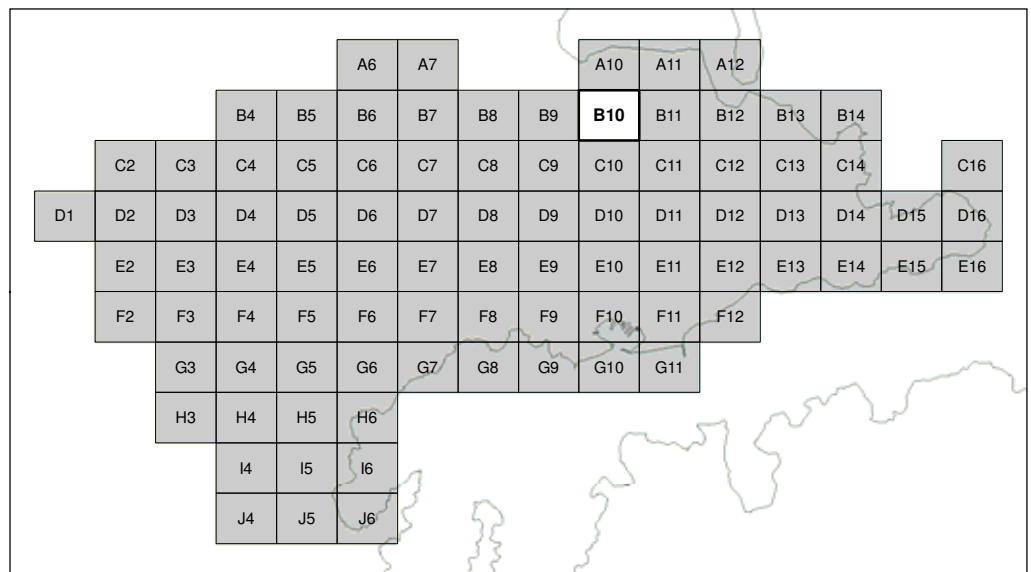
APPENDIX 4  
Map B9

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



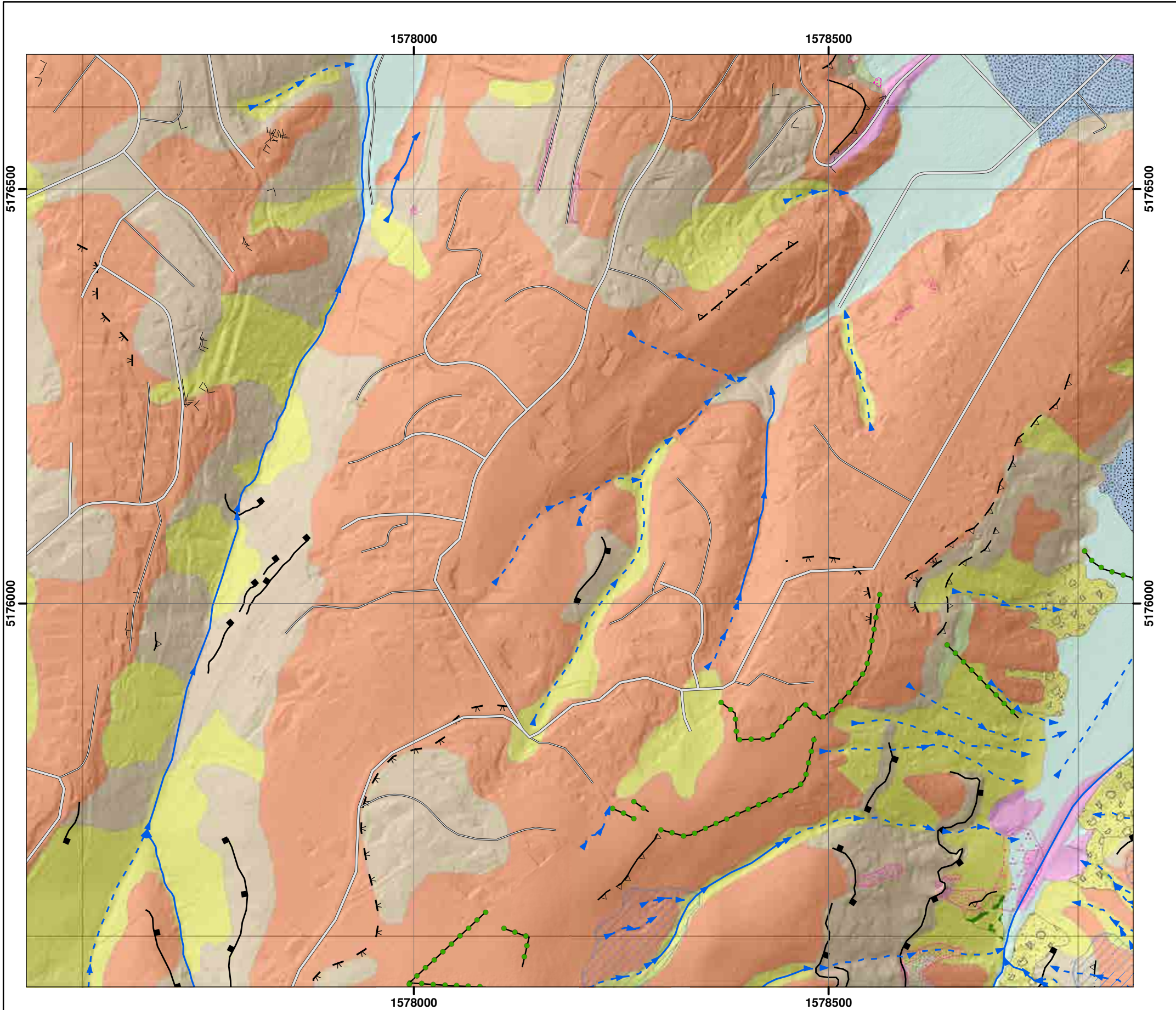
**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

**Port Hills Christchurch**

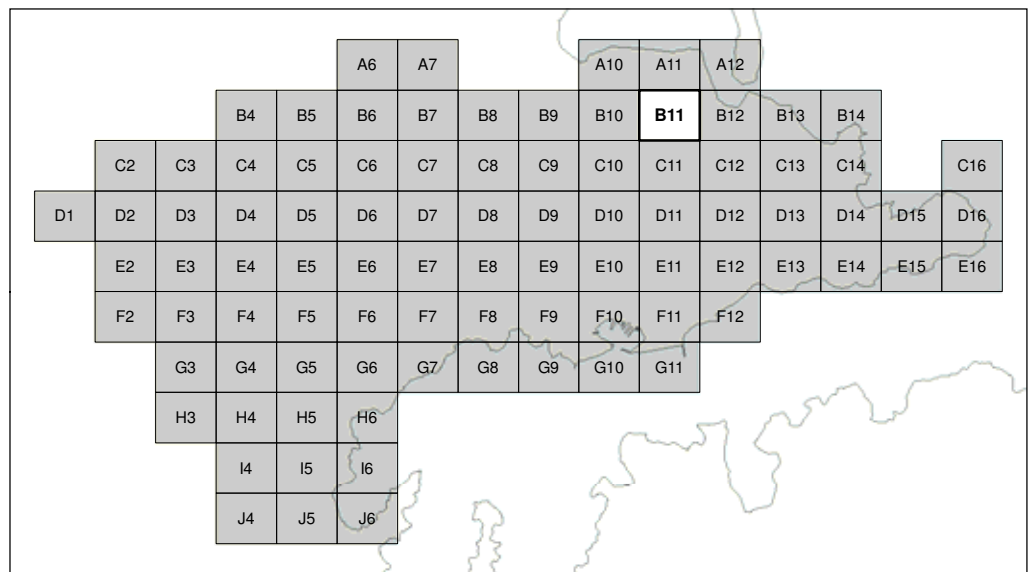
APPENDIX 4  
Map B10

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

**EXPLANATION:**

Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



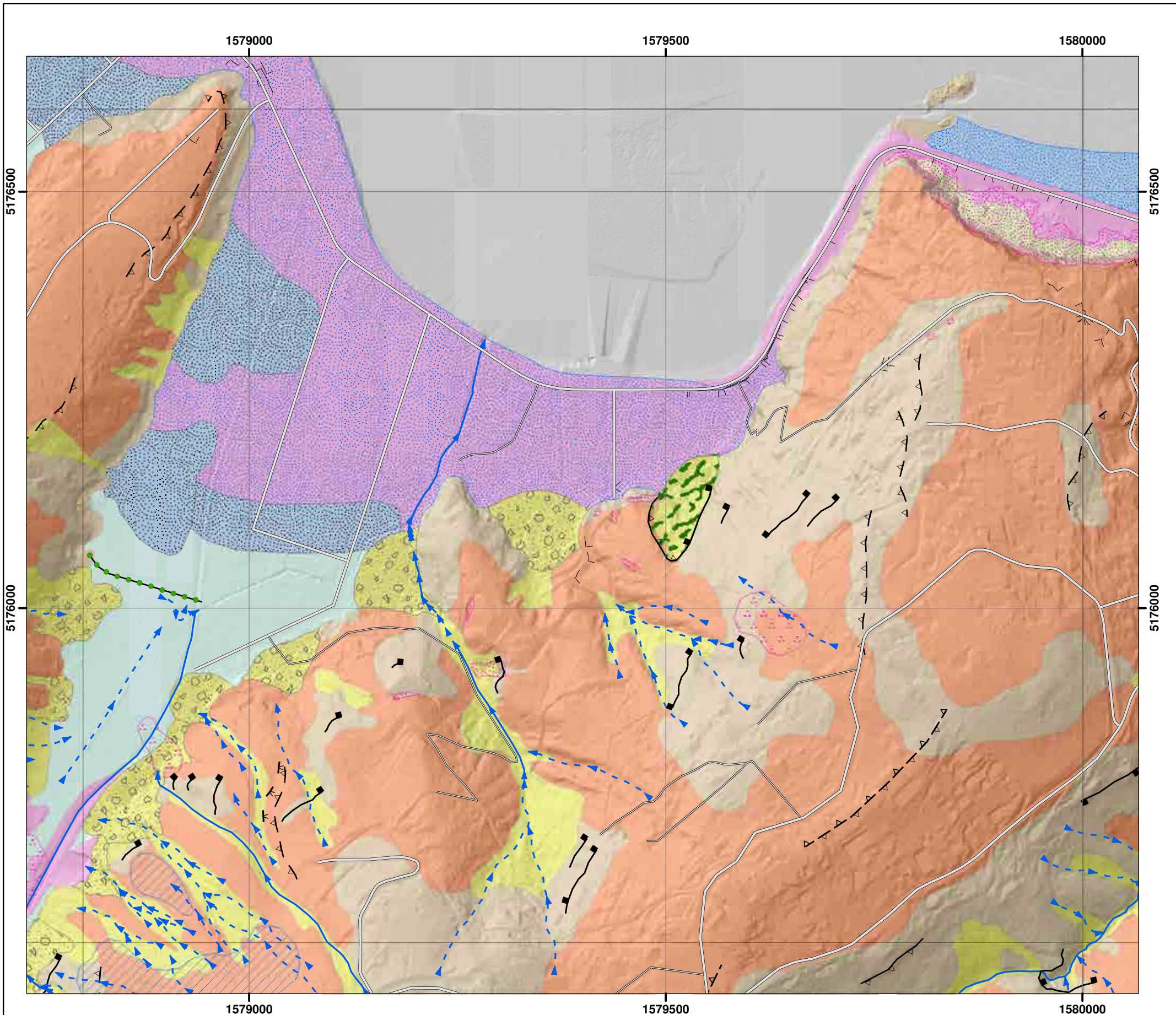
**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

**Port Hills  
Christchurch**

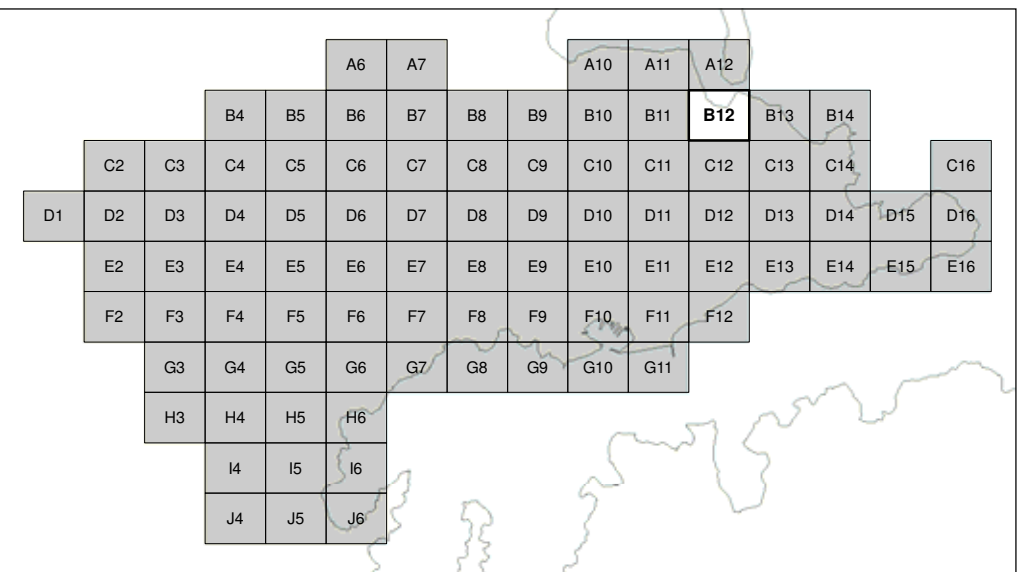
APPENDIX 4  
Map B11

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



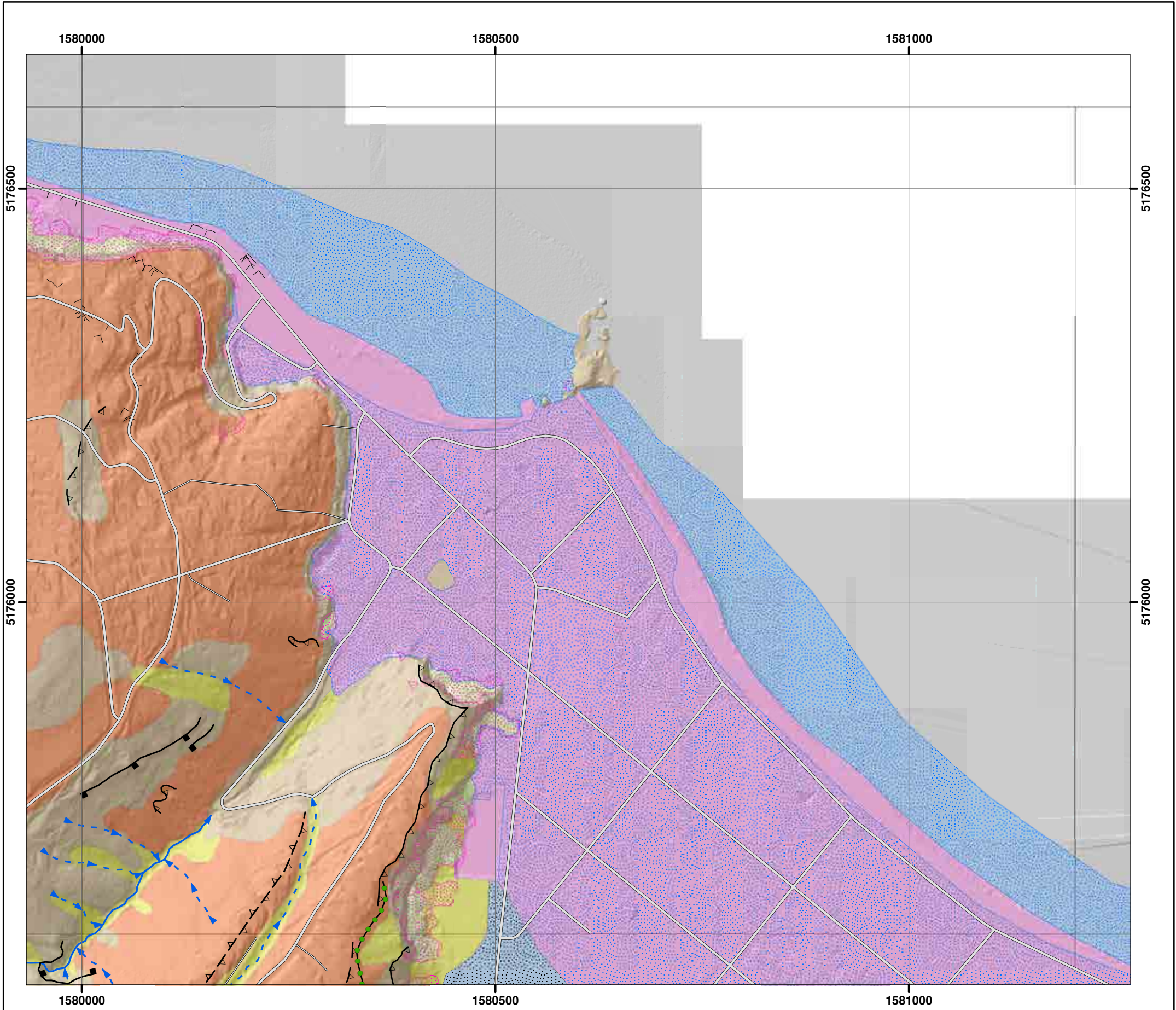
**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

**Port Hills Christchurch**

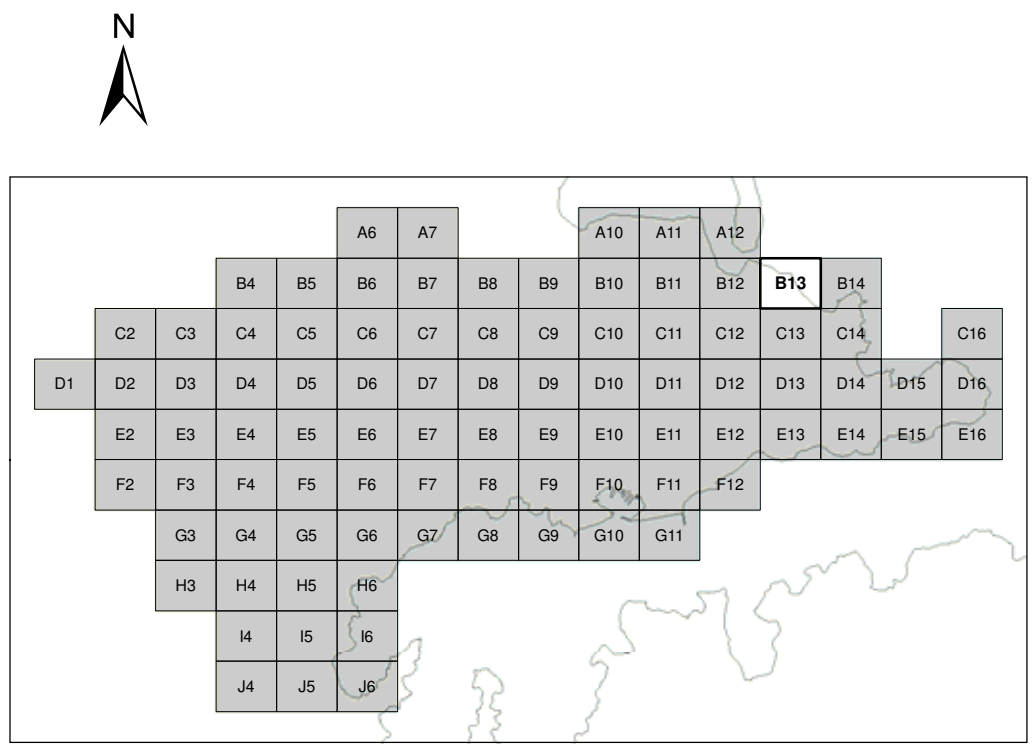
APPENDIX 4  
Map B12

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1:5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



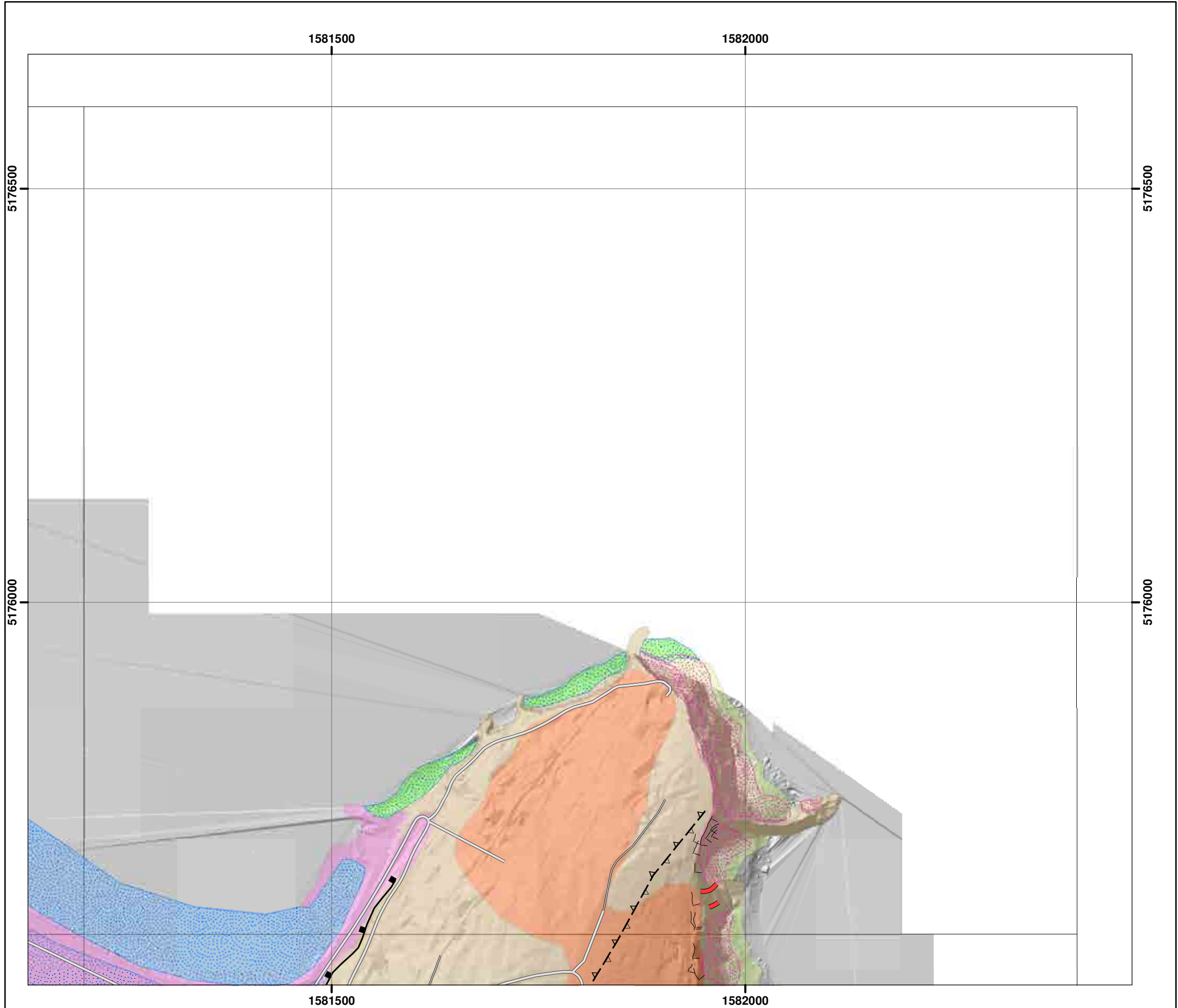
**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

**Port Hills Christchurch**

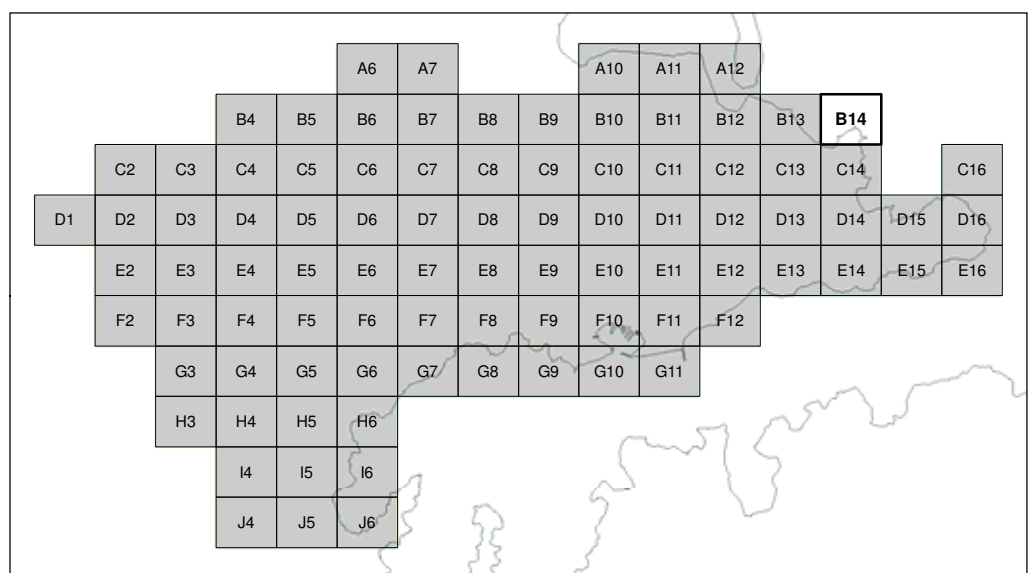
APPENDIX 4  
Map B13

**FINAL**  
 REPORT: CR2012/15 DATE: Sept 2012





Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



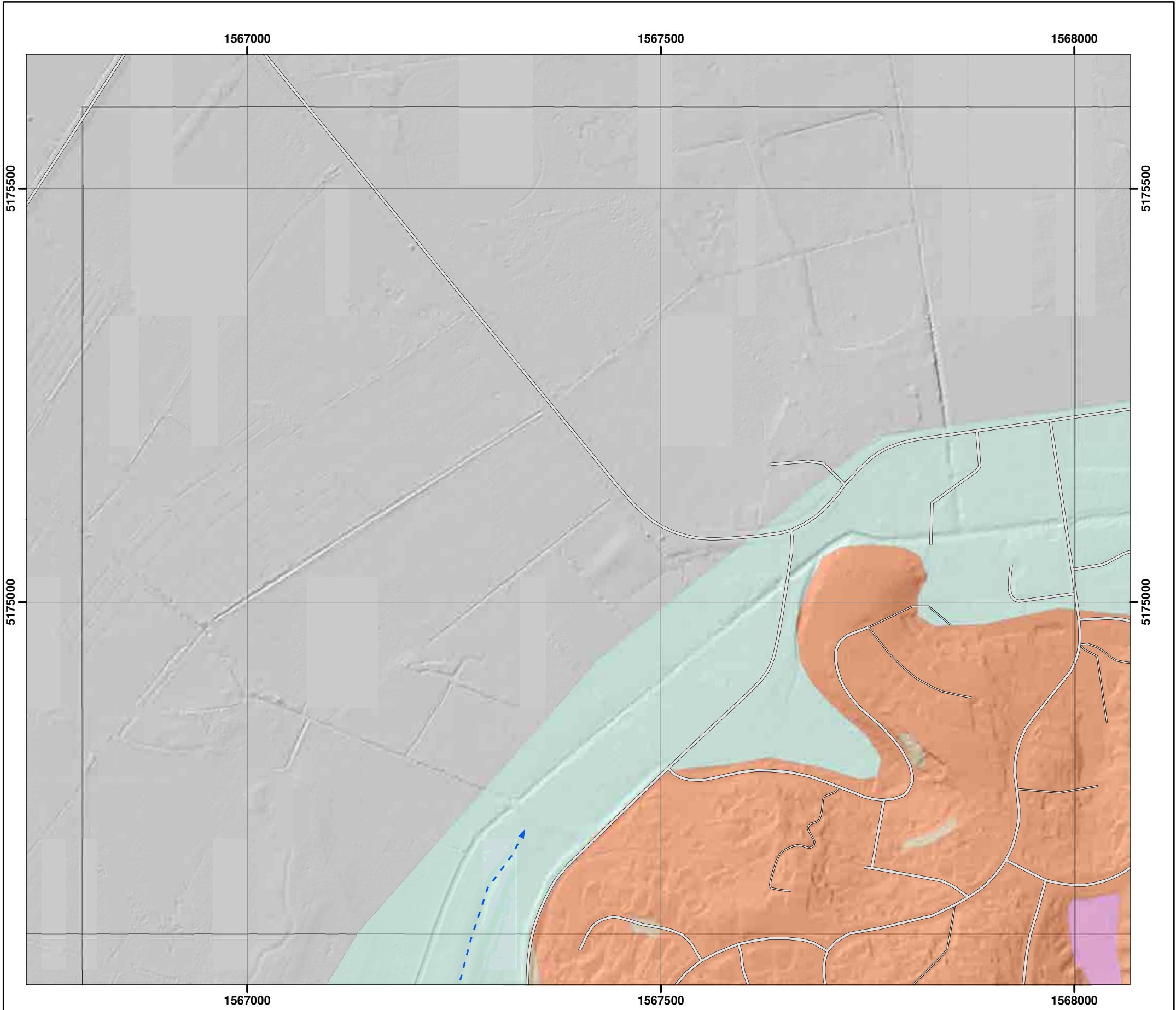
## GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT

Port Hills  
Christchurch

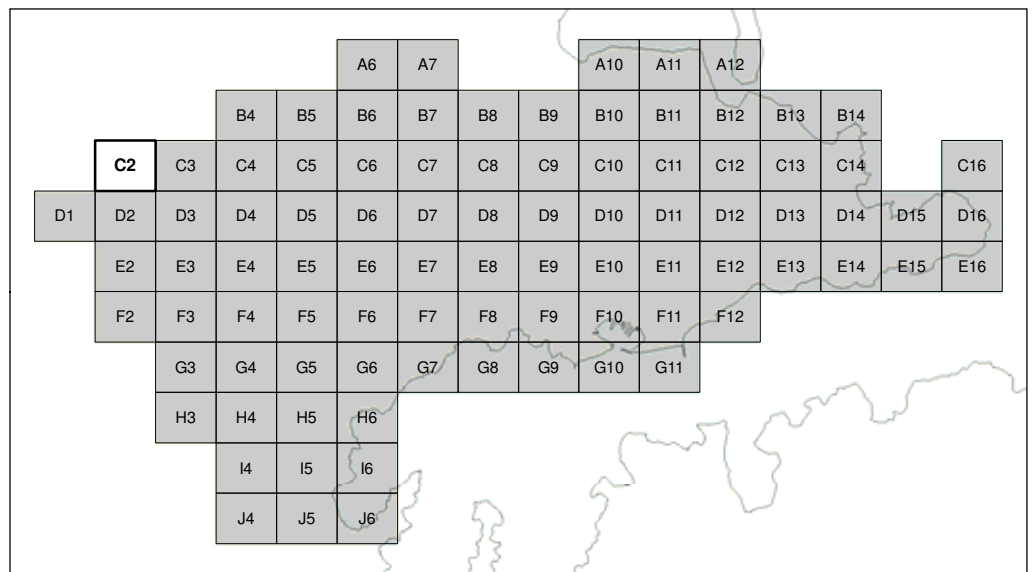
APPENDIX 4  
Map B14

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
 DBT  
 CHK:  
 CM



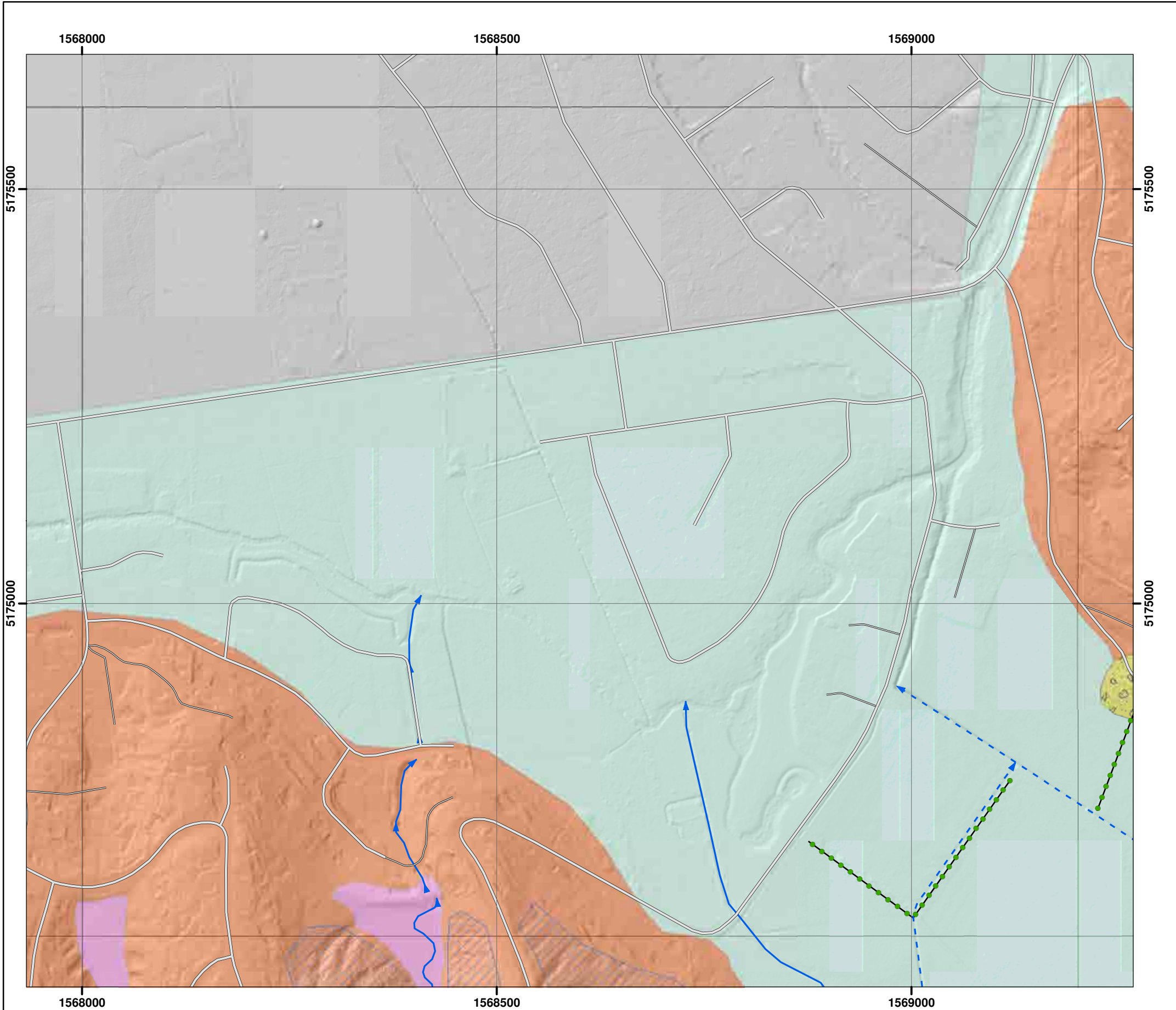
## GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT

**Port Hills  
 Christchurch**

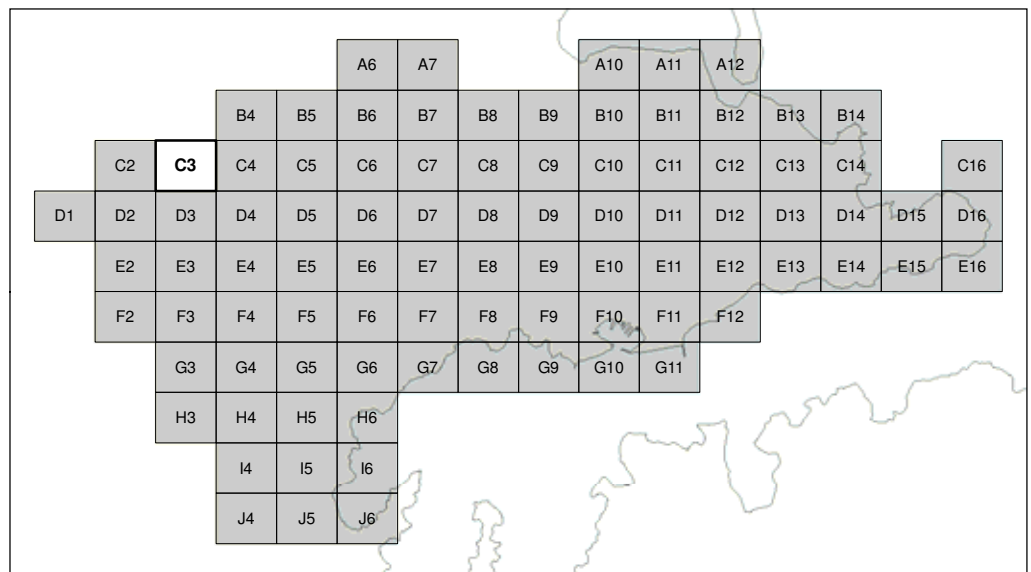
APPENDIX 4  
 Map C2

**FINAL**

REPORT: CR2012/15      DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1:5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



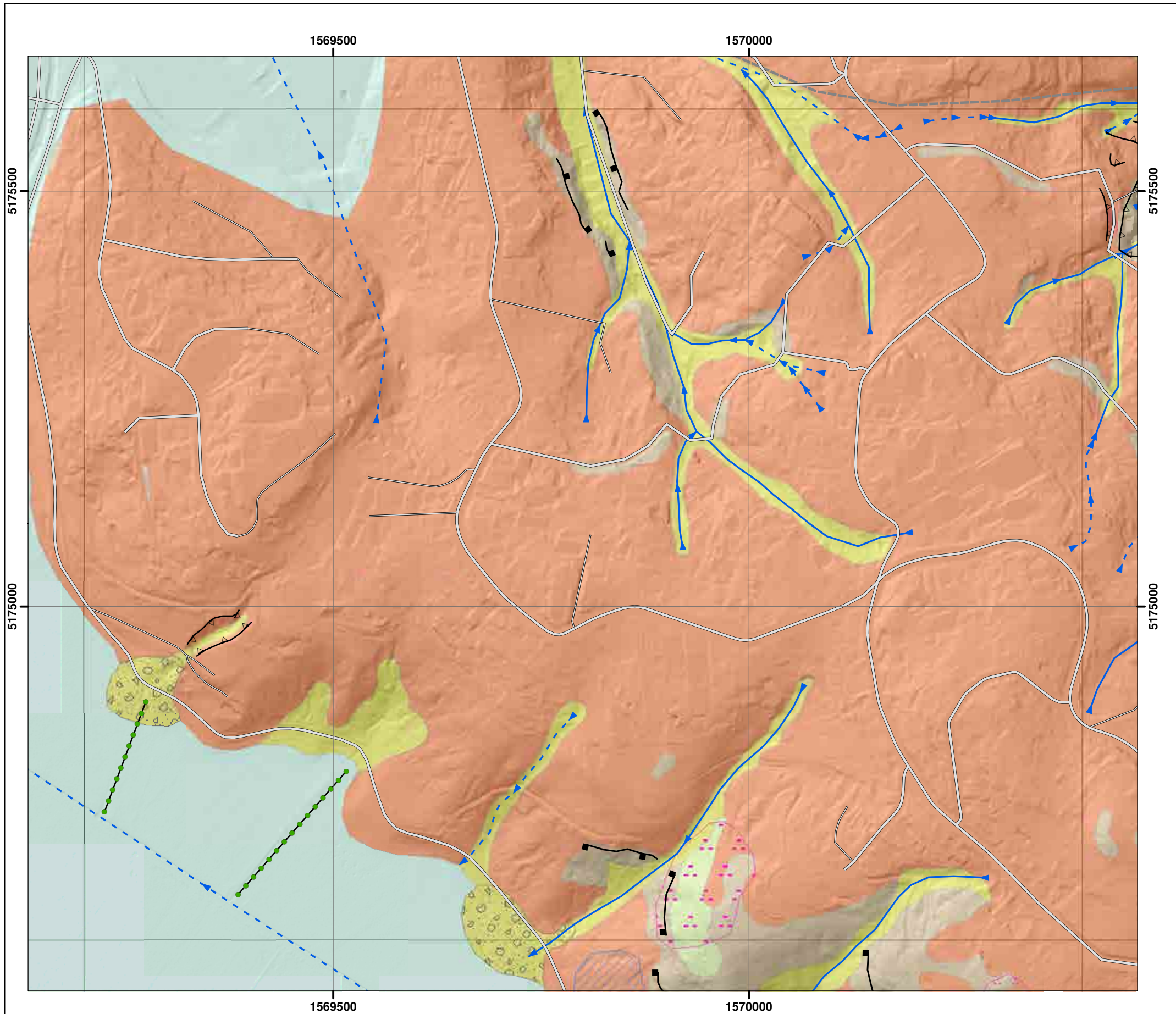
**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

**Port Hills Christchurch**

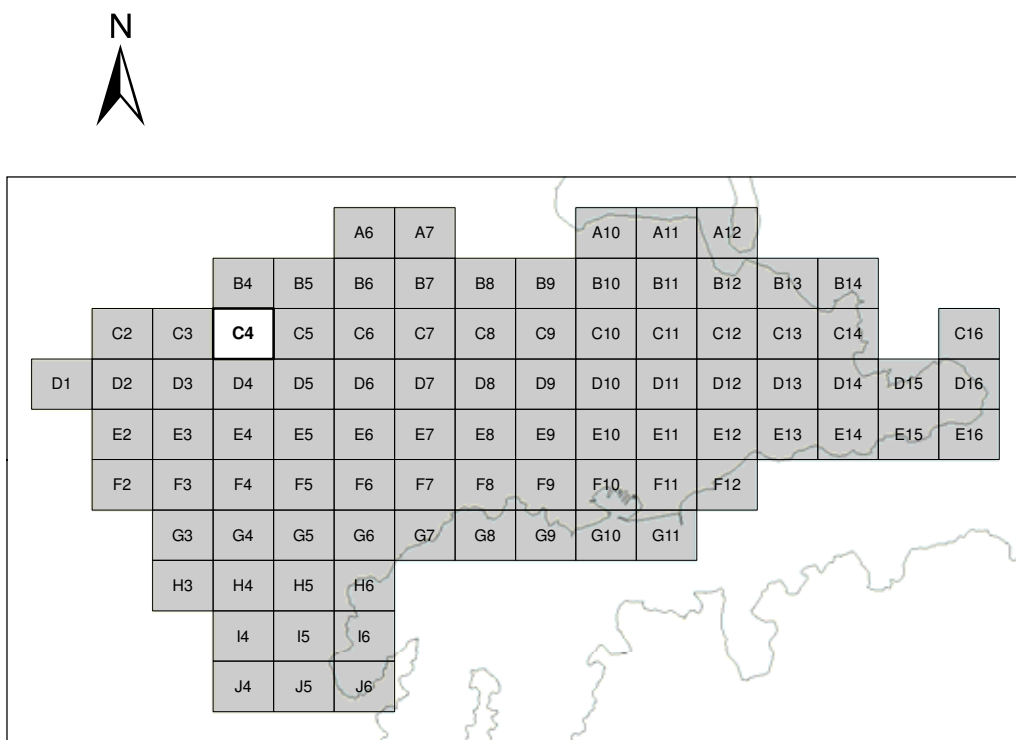
APPENDIX 4  
Map C3

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



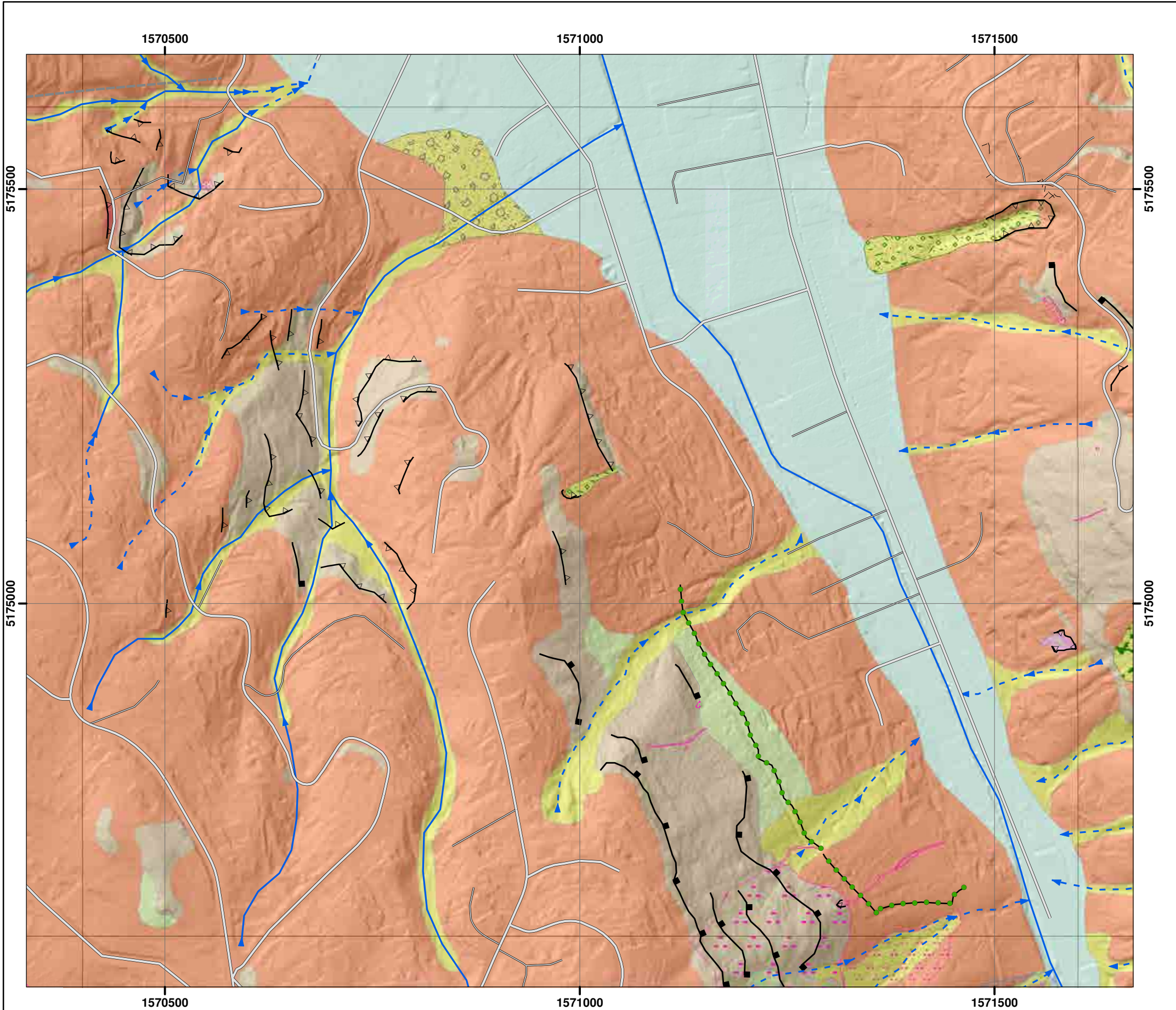
**GEOMORPHOLOGY MAPPING FOR  
ROCKFALL RISK ASSESSMENT**

**Port Hills  
Christchurch**

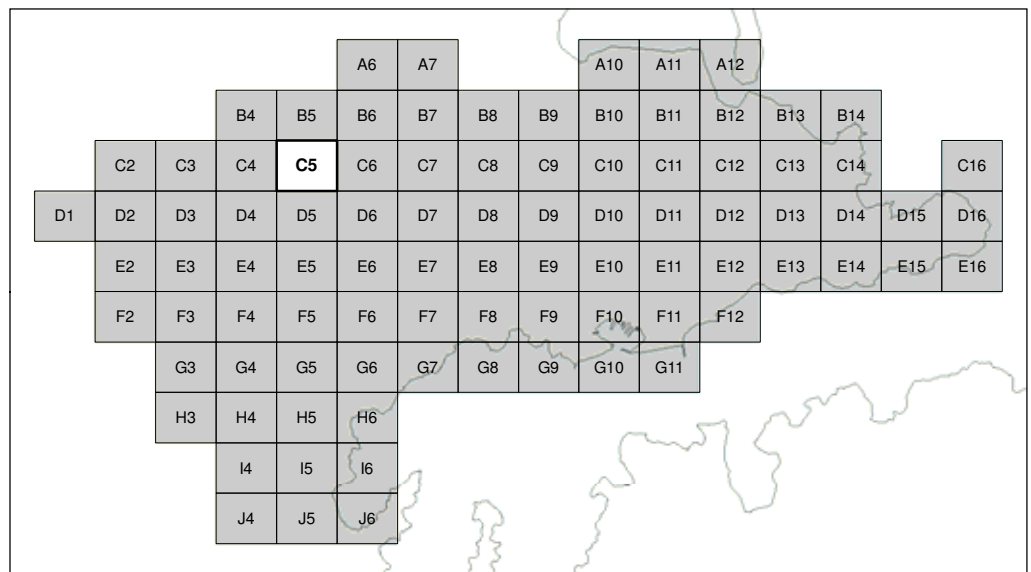
APPENDIX 4  
Map C4

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



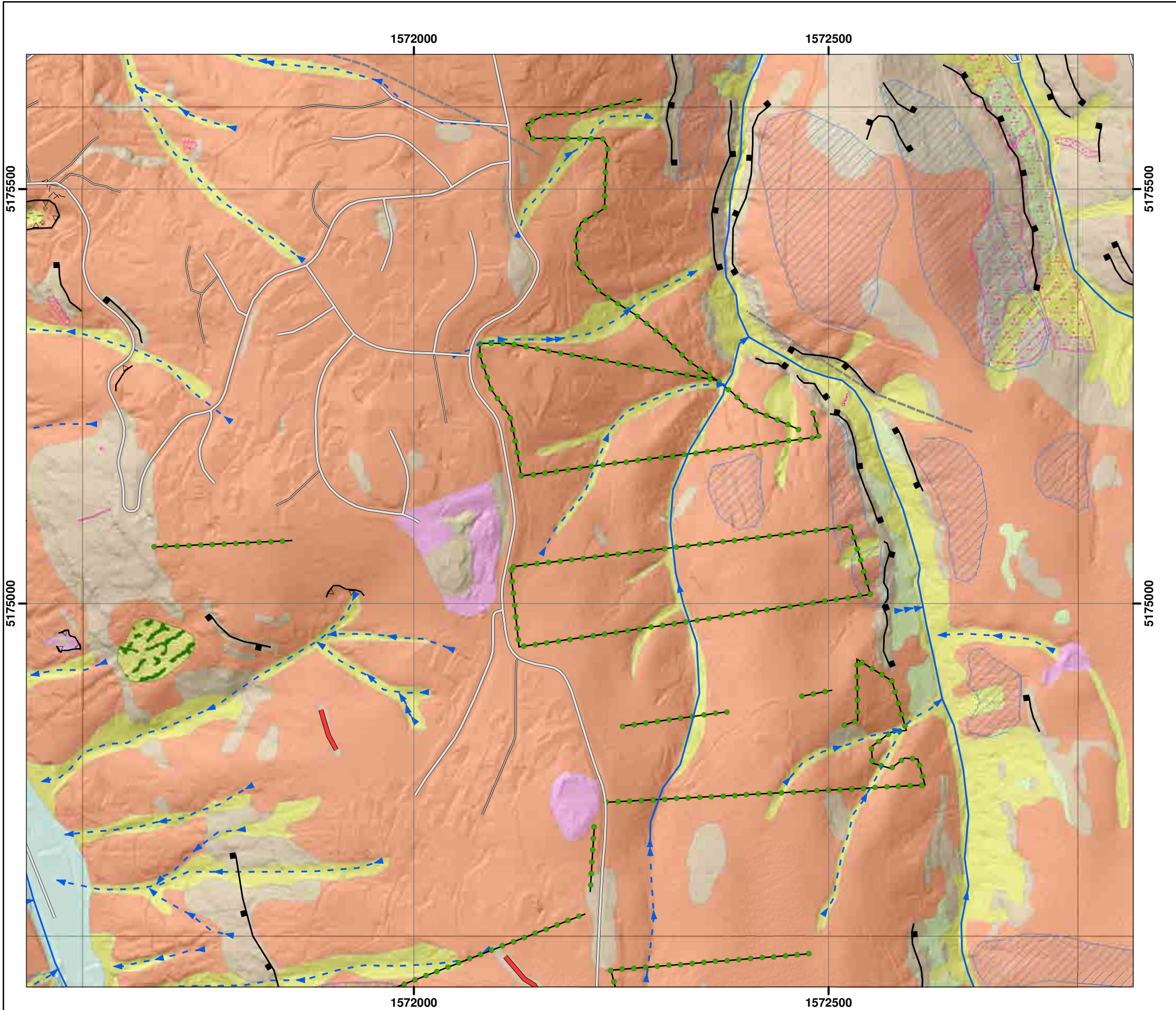
**GEOMORPHOLOGY MAPPING FOR  
ROCKFALL RISK ASSESSMENT**

**Port Hills  
Christchurch**

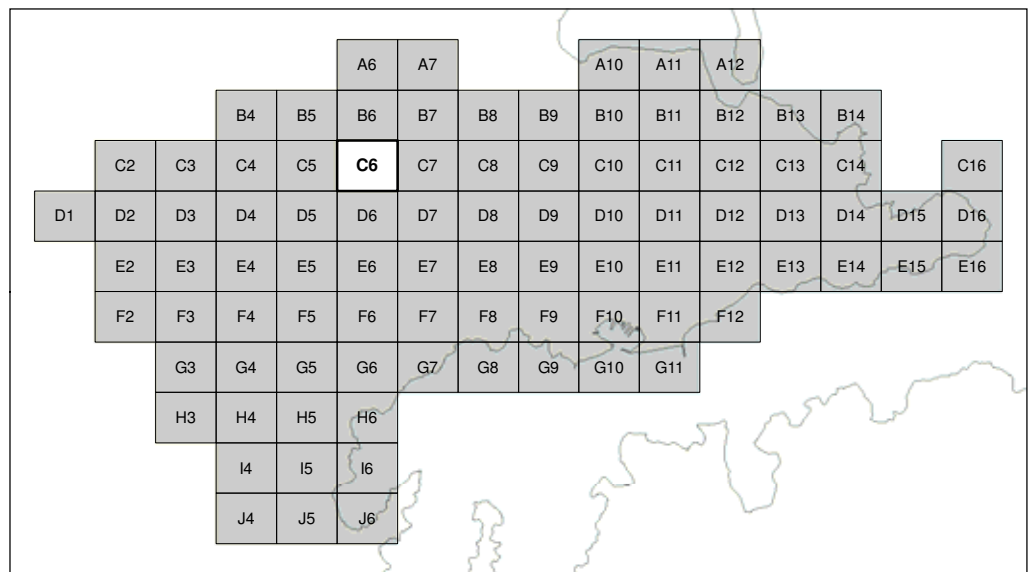
APPENDIX 4  
Map C5

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



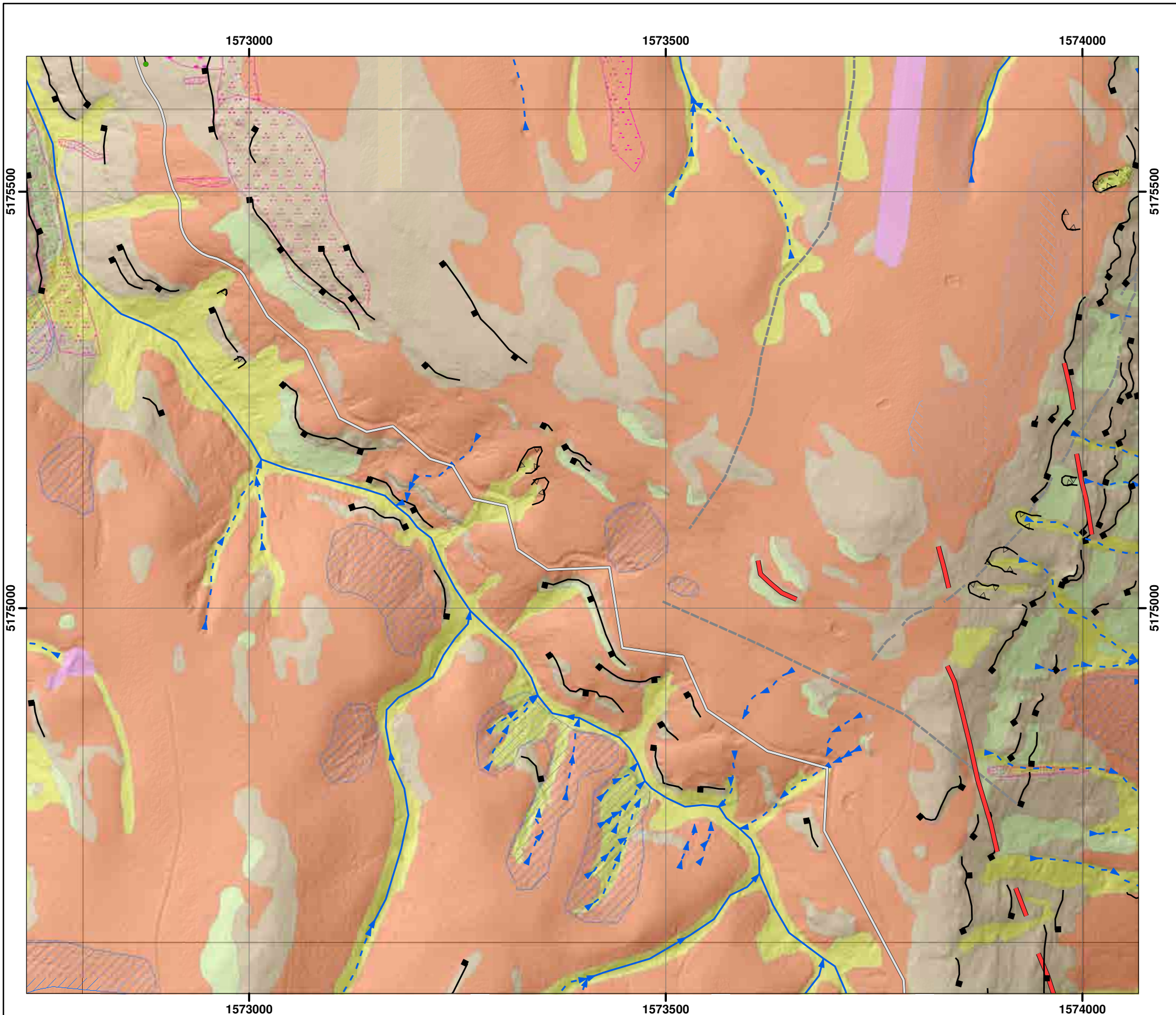
**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

**Port Hills Christchurch**

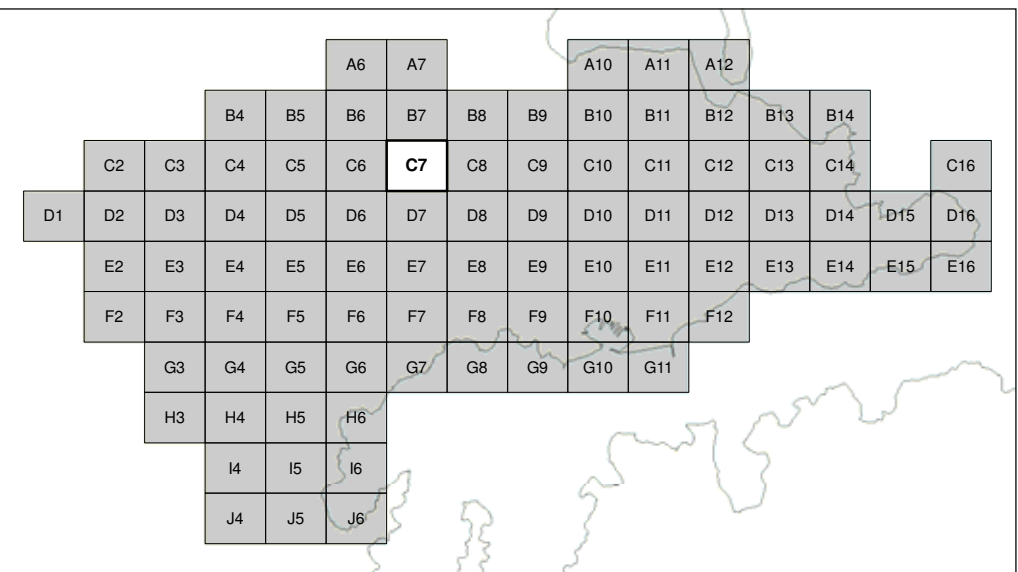
APPENDIX 4  
Map C6

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1:5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



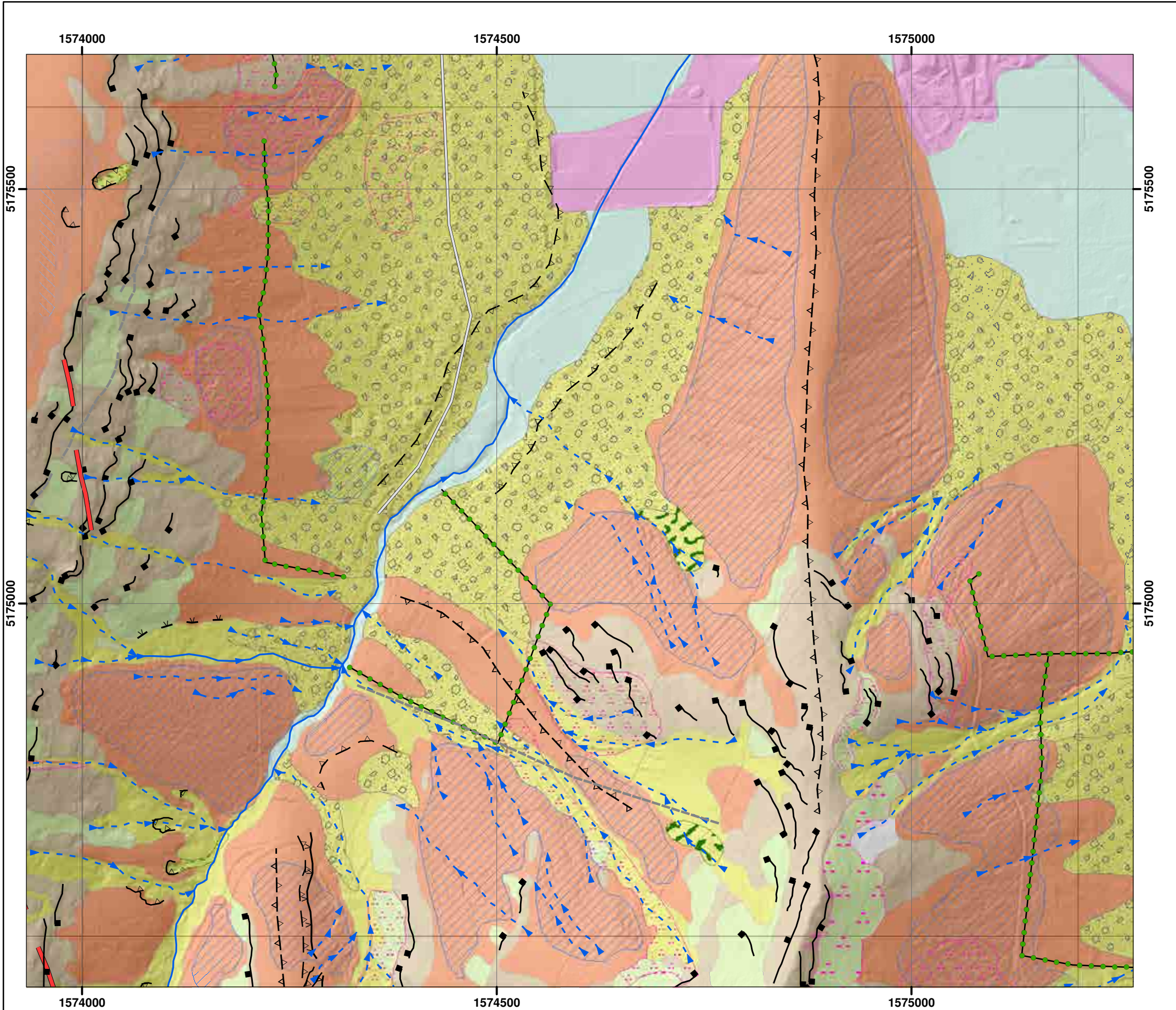
**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

**Port Hills Christchurch**

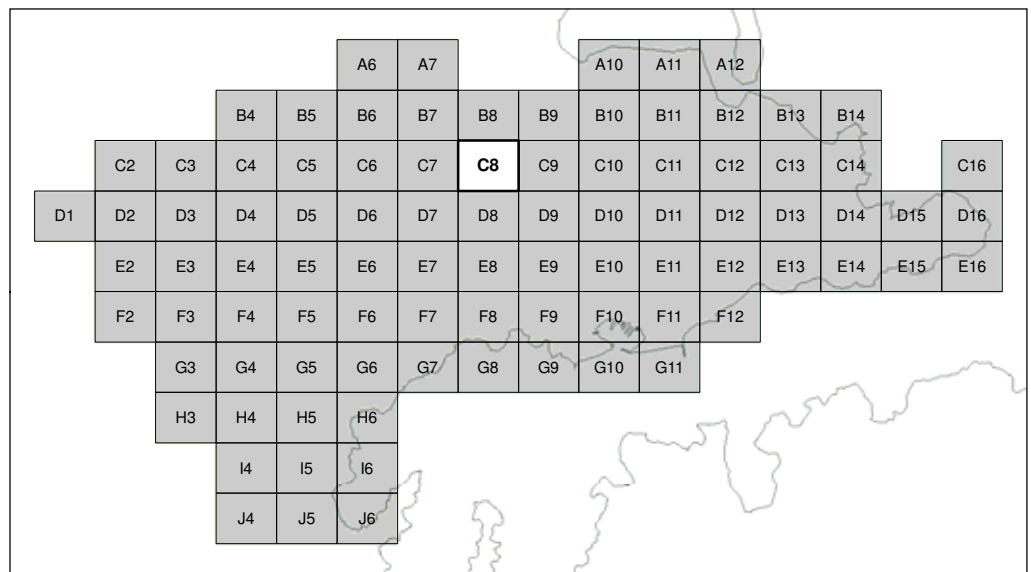
APPENDIX 4  
Map C7

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lination	Sand and gravel	Rills
Sharp lination (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
 DBT  
 CHK:  
 CM



## GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT

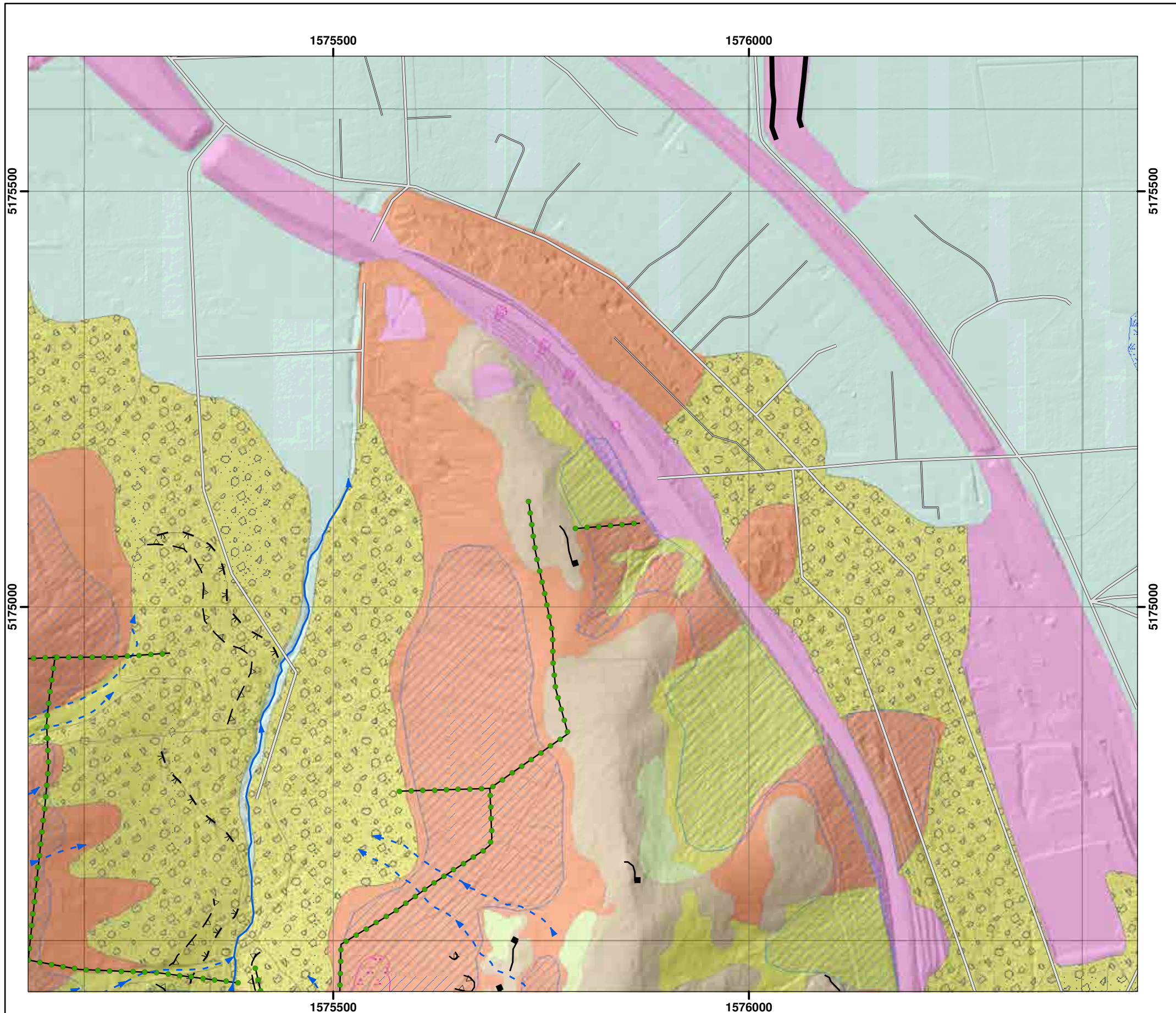
**Port Hills  
 Christchurch**

APPENDIX 4  
 Map C8

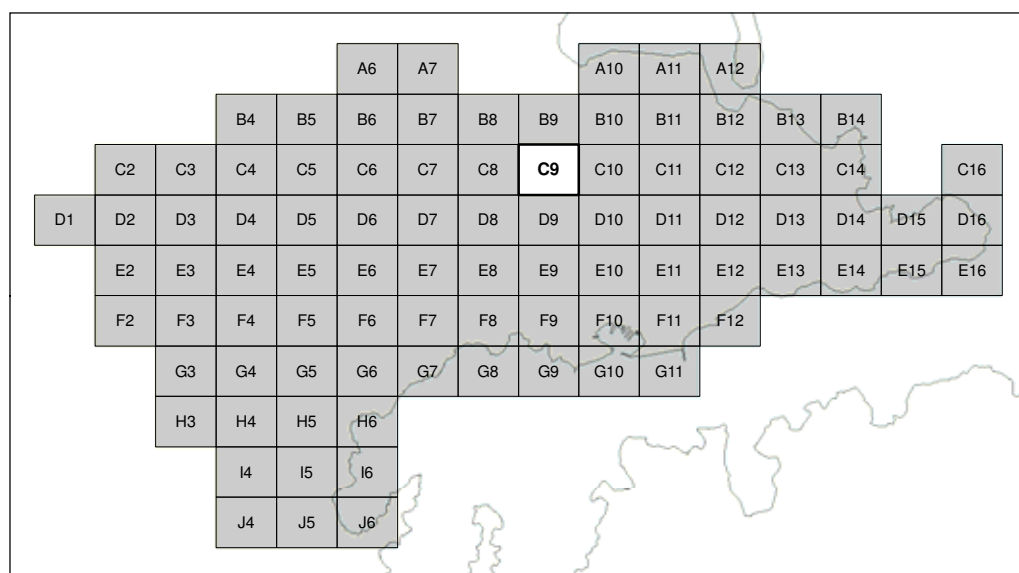
**FINAL**

REPORT: CR2012/15      DATE: Sept 2012





Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 1: 5000  
m

EXPLANATION:  
Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
Roads provided by Christchurch City Council (20/02/2012).  
PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



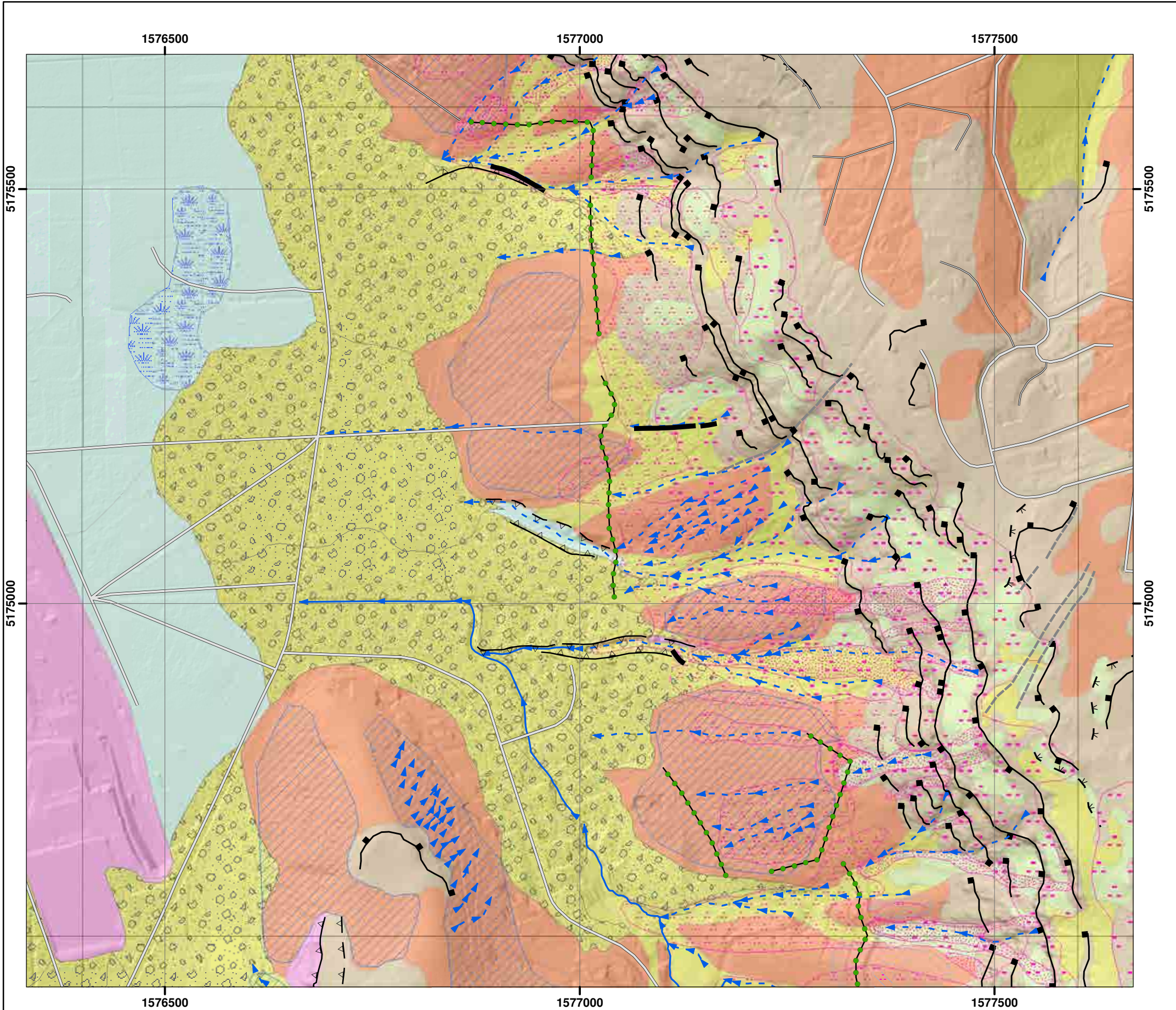
**GEOMORPHOLOGY MAPPING FOR  
ROCKFALL RISK ASSESSMENT**

**Port Hills  
Christchurch**

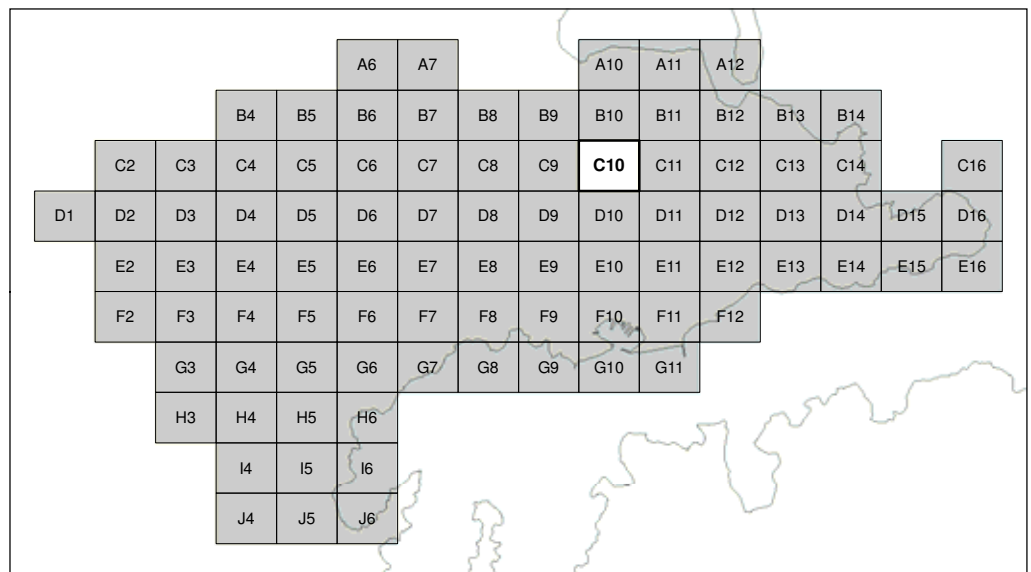
APPENDIX 4  
Map C9

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
 DBT  
 CHK:  
 CM



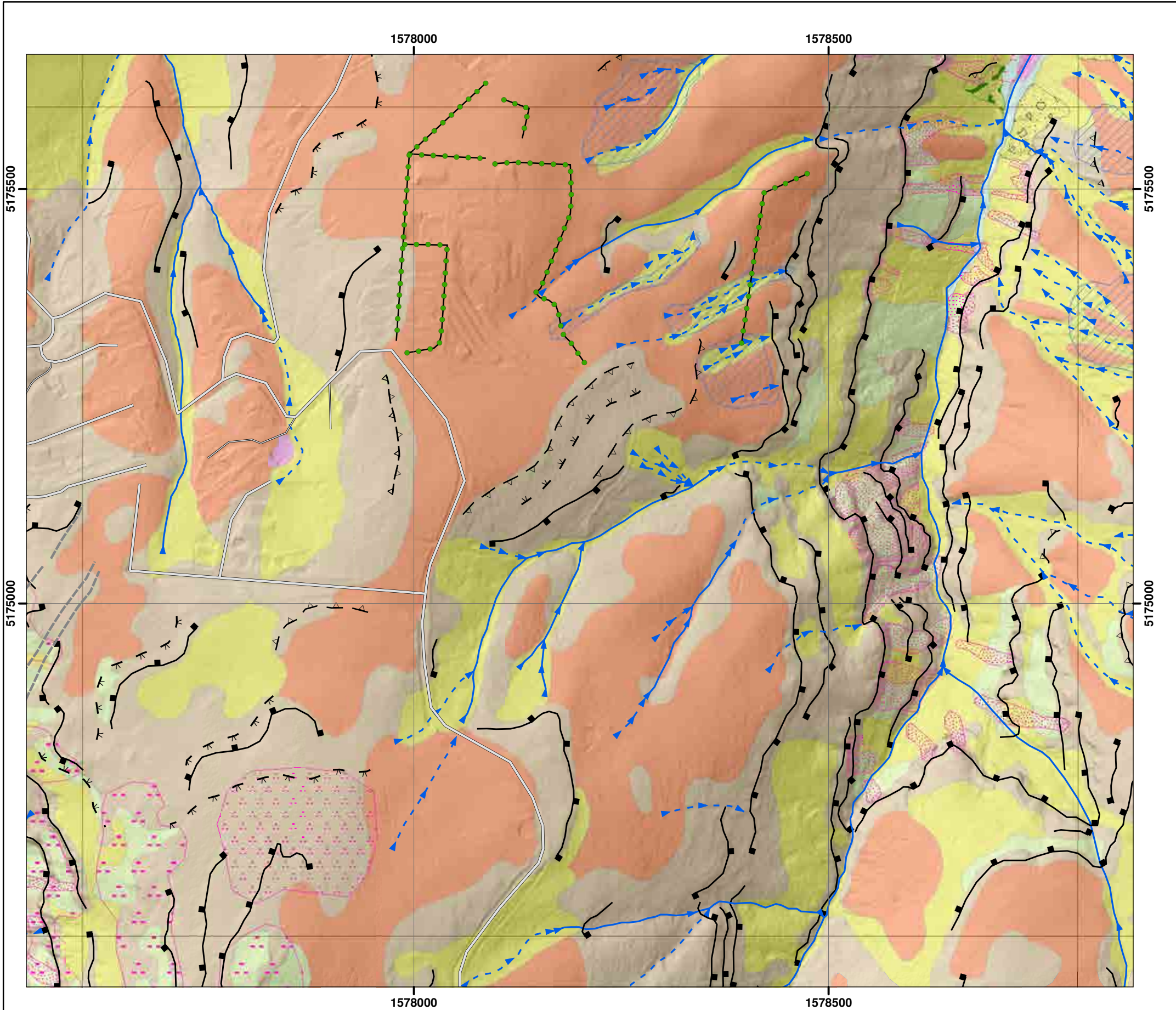
**GEOMORPHOLOGY MAPPING FOR  
 ROCKFALL RISK ASSESSMENT**

**Port Hills  
 Christchurch**

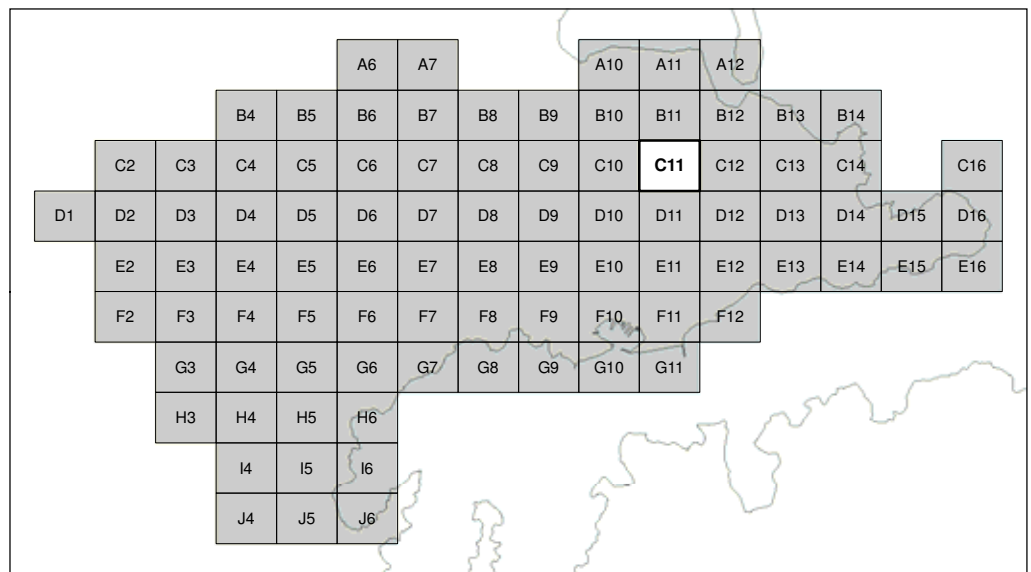
APPENDIX 4  
 Map C10

**FINAL**

REPORT: CR2012/15      DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1:5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



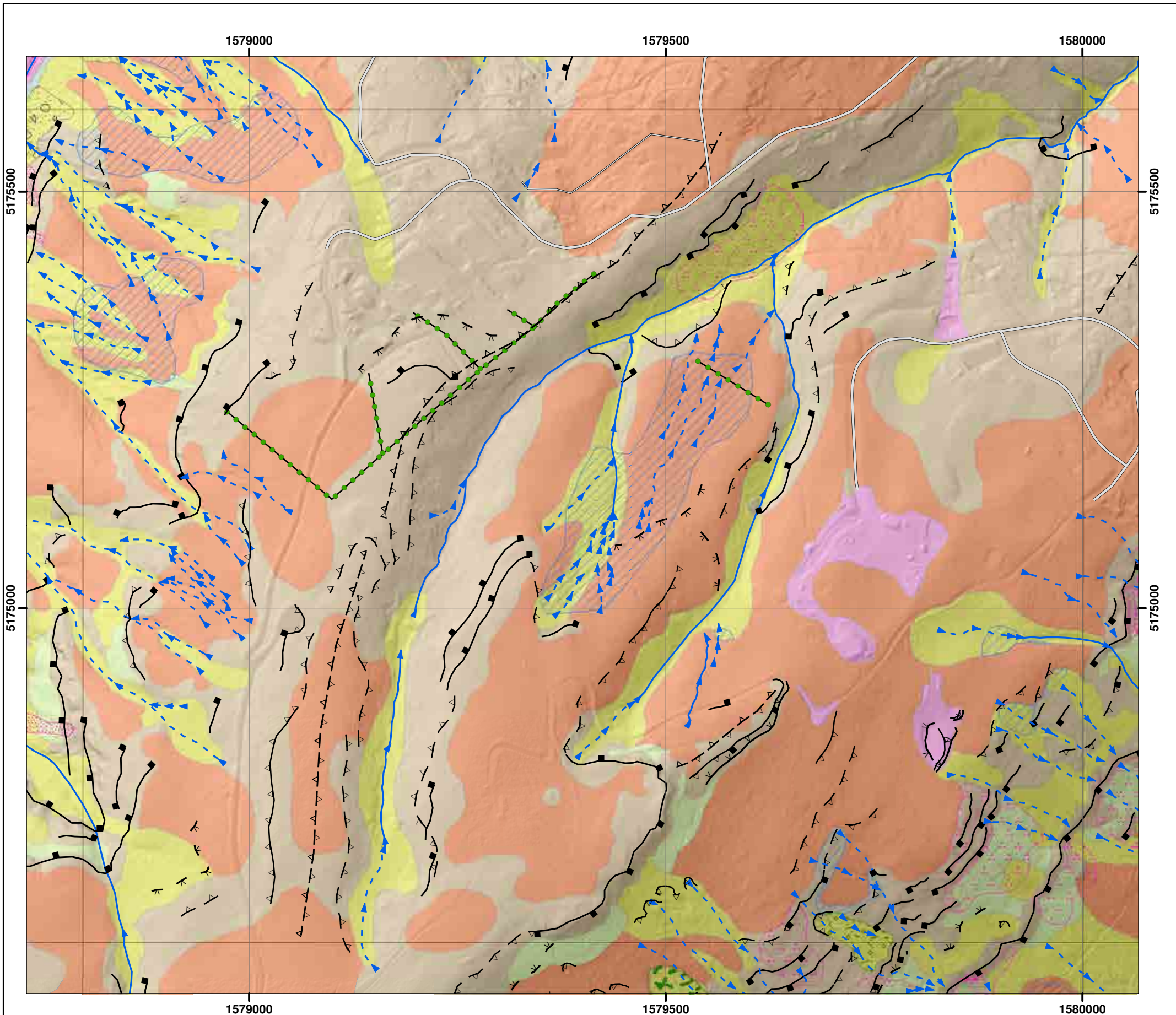
**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

**Port Hills Christchurch**

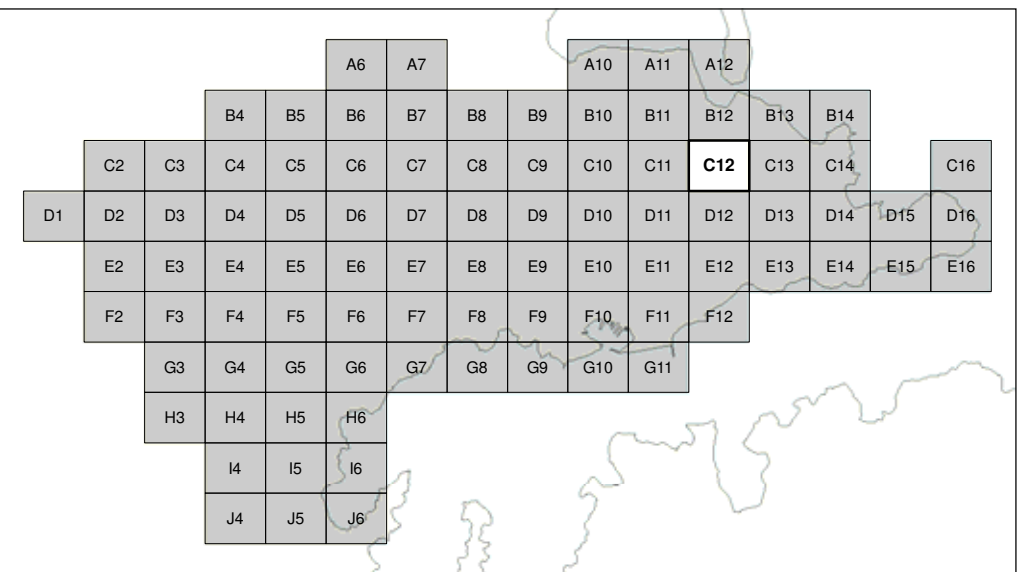
APPENDIX 4  
Map C11

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lination	Sand and gravel	Rills
Sharp lination (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



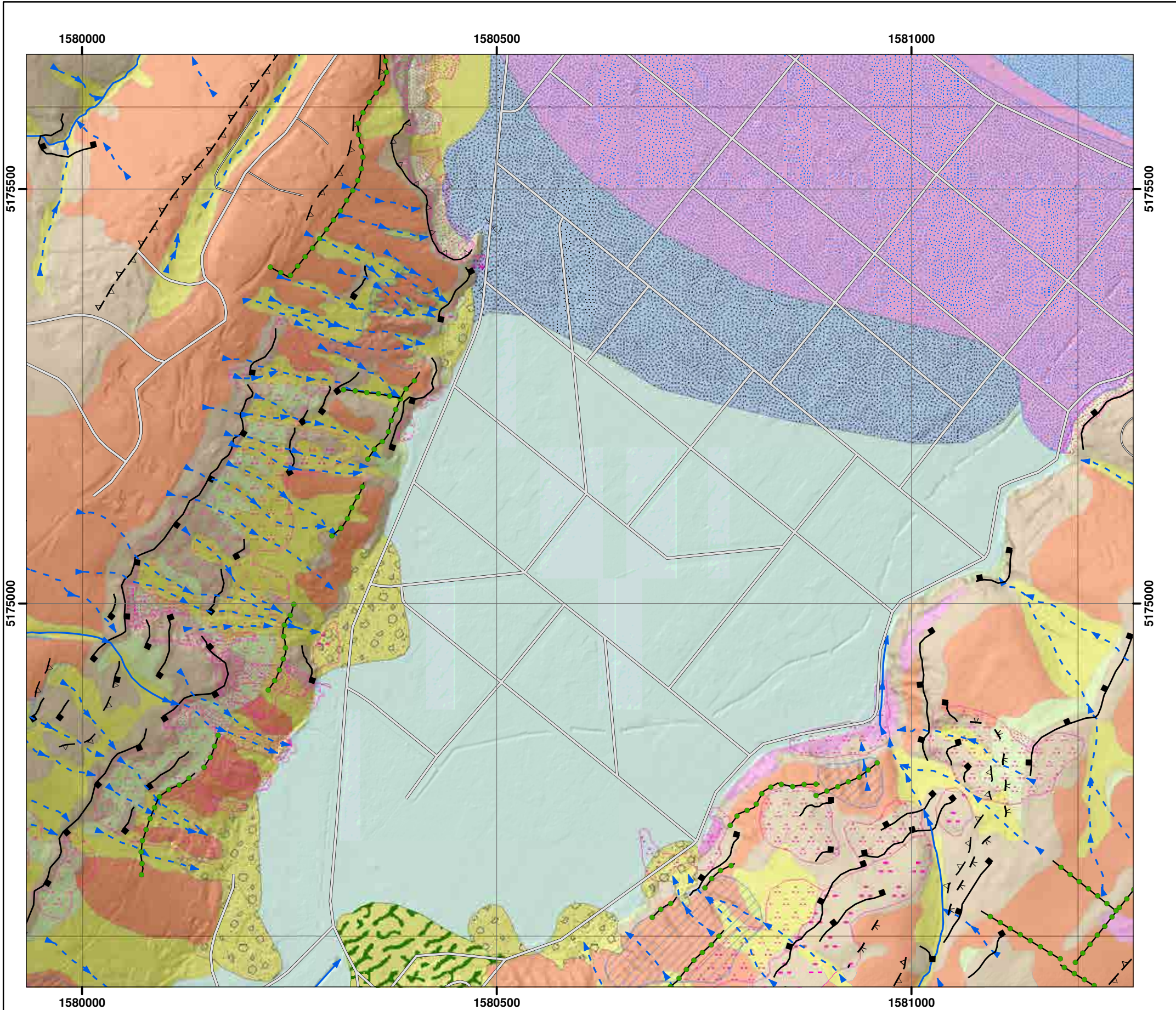
**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

**Port Hills Christchurch**

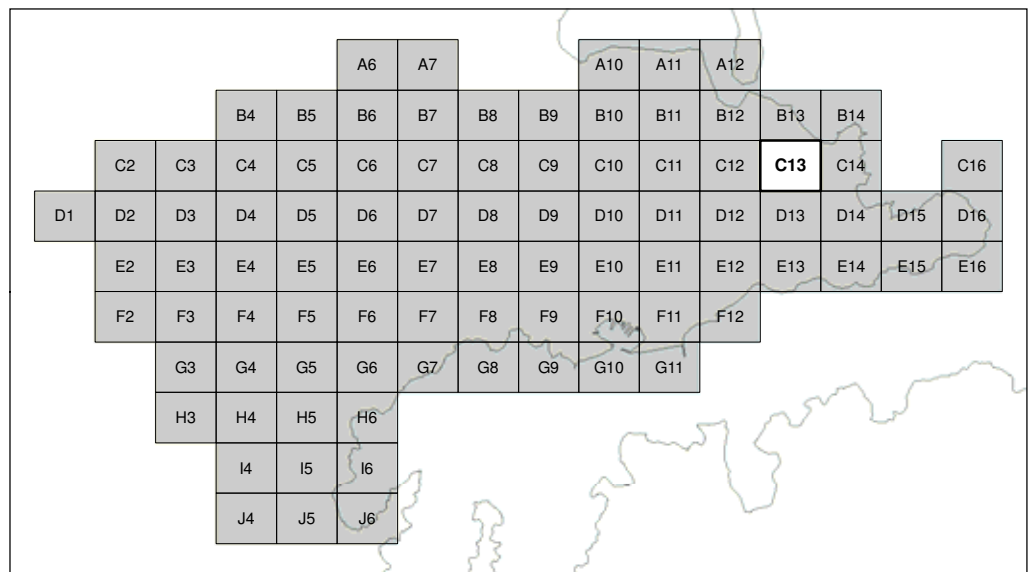
APPENDIX 4  
Map C12

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



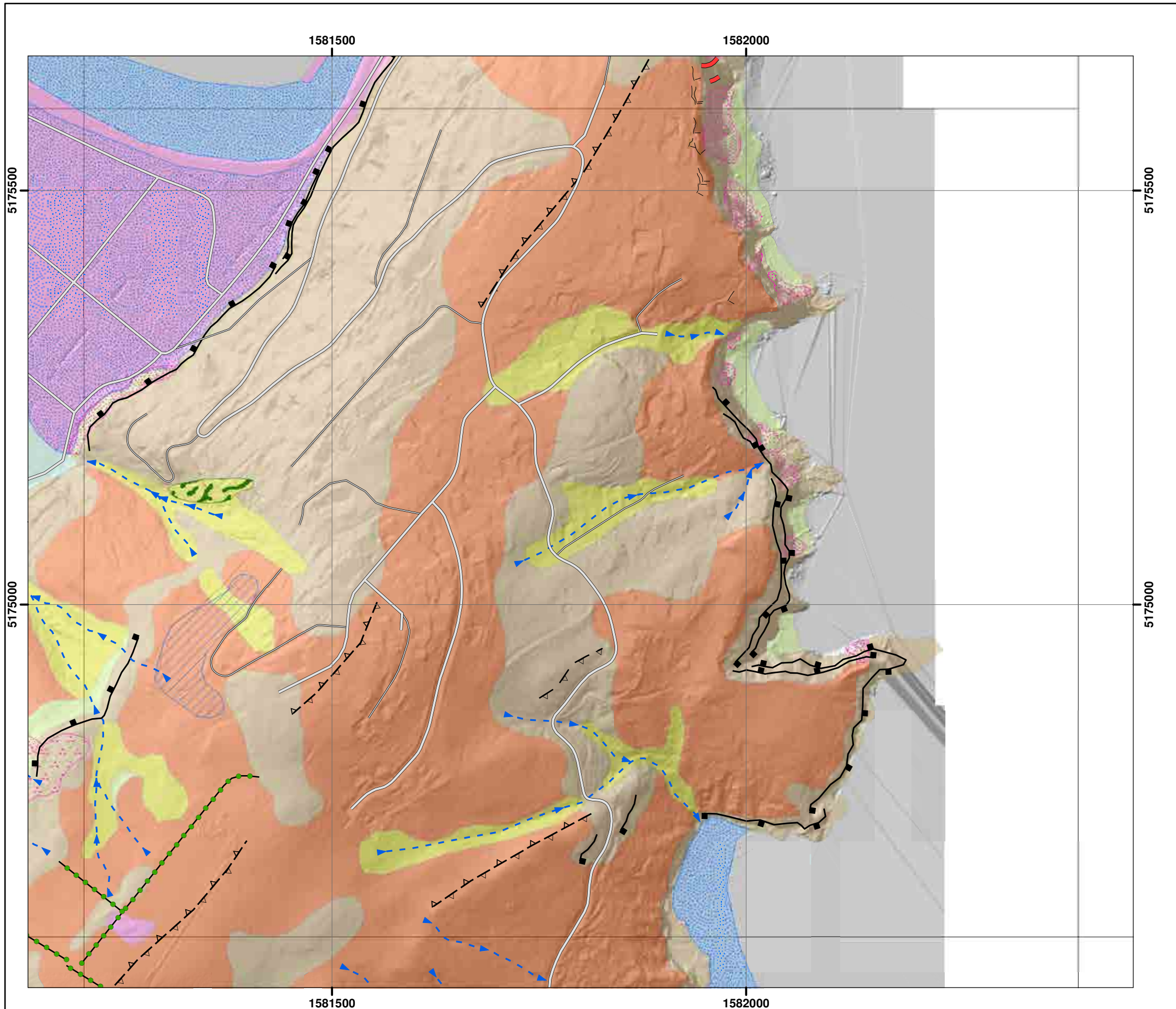
**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

**Port Hills Christchurch**

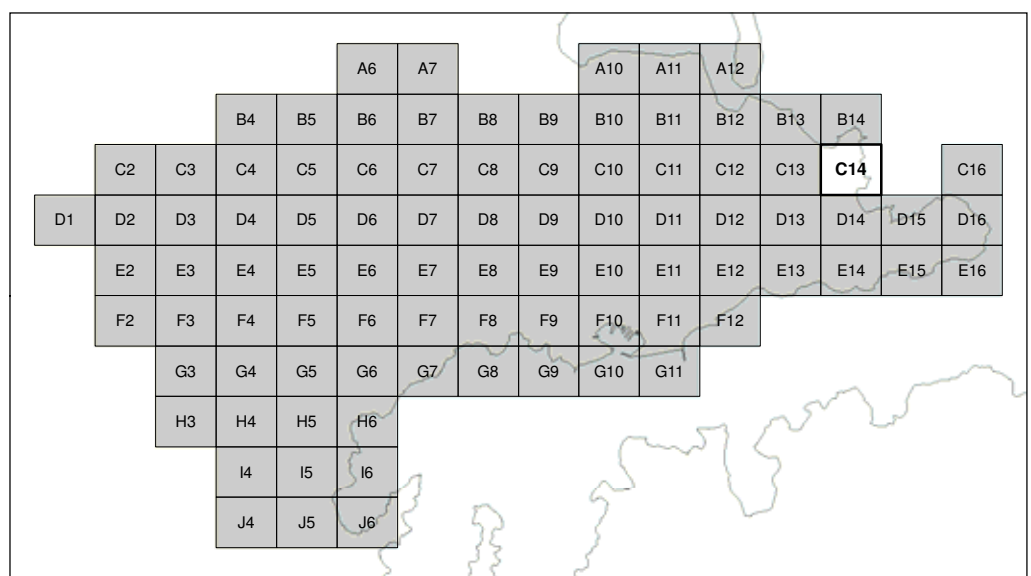
APPENDIX 4  
Map C13

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lination	Sand and gravel	Rills
Sharp lination (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 1: 5000  
m

EXPLANATION:  
Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
Roads provided by Christchurch City Council (20/02/2012).  
PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



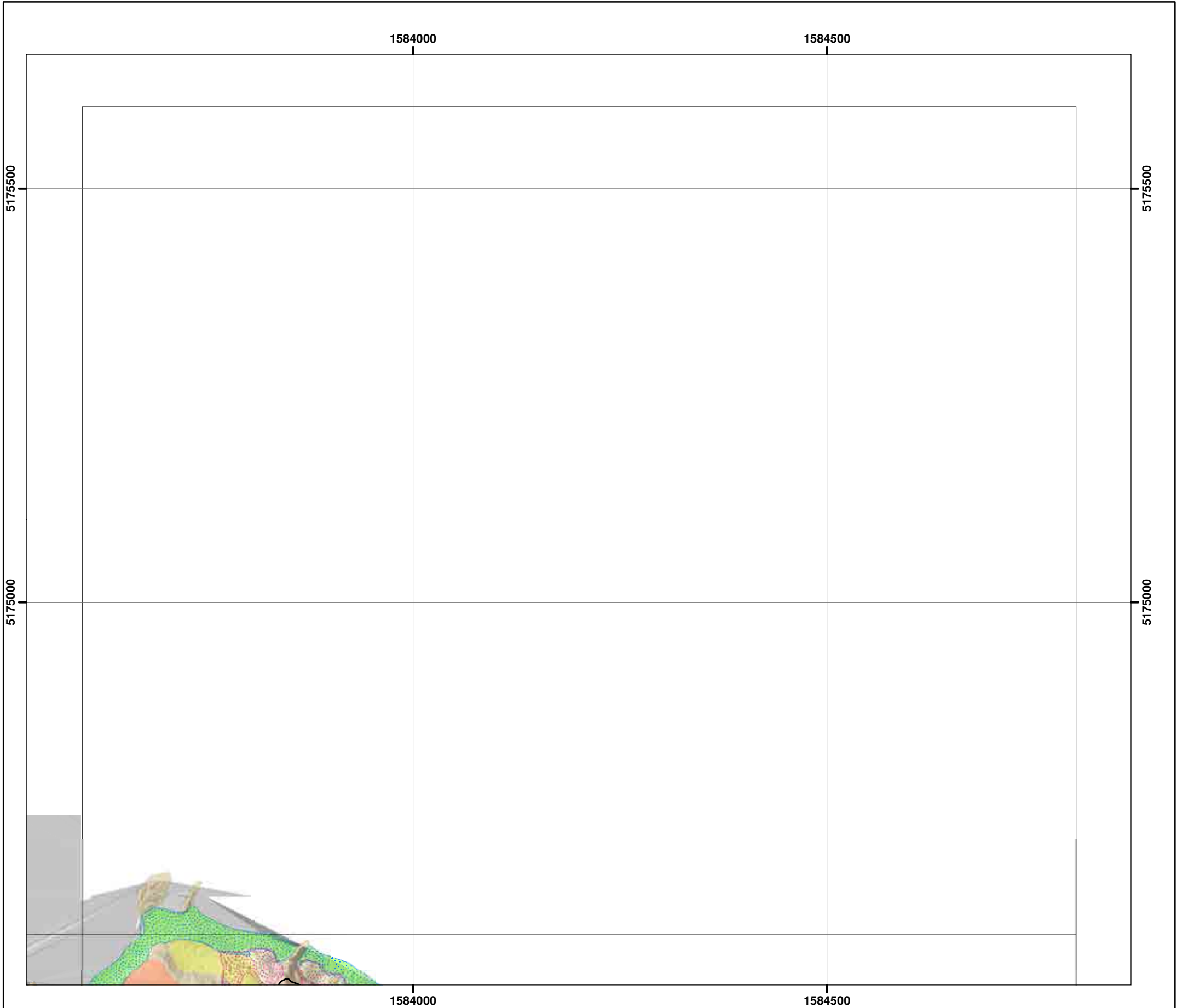
## GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT

Port Hills  
Christchurch

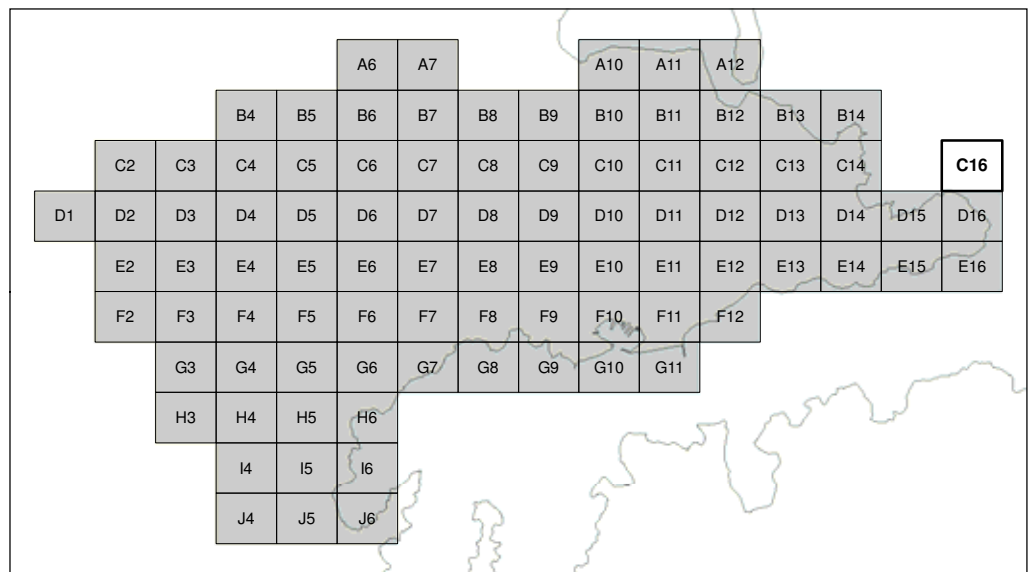
APPENDIX 4  
Map C14

**FINAL**

REPORT: CR2012/15  
DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1:5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



**GEOMORPHOLOGY MAPPING FOR  
ROCKFALL RISK ASSESSMENT**

**Port Hills  
Christchurch**

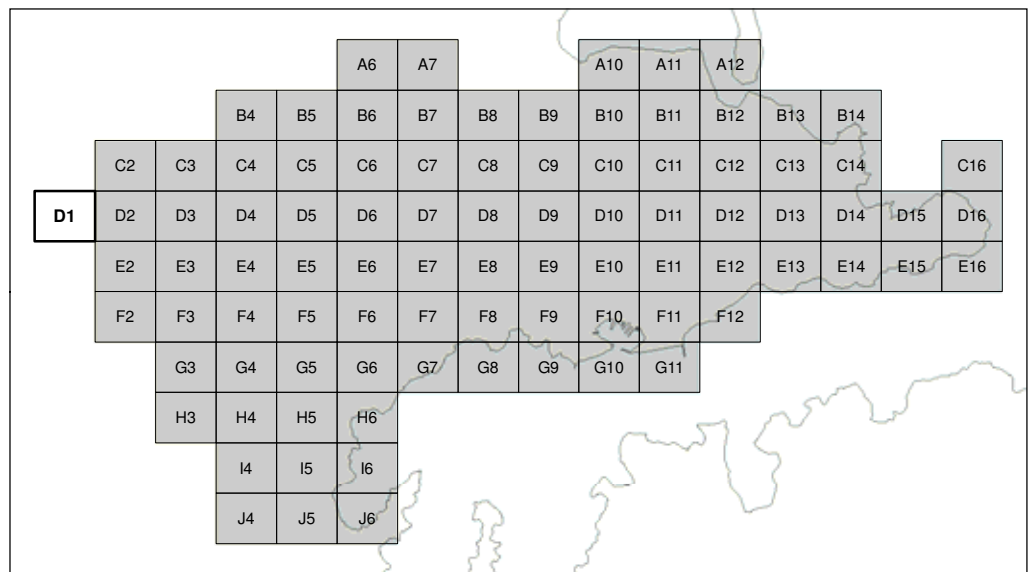
APPENDIX 4  
Map C16

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



**GEOMORPHOLOGY MAPPING FOR  
ROCKFALL RISK ASSESSMENT**

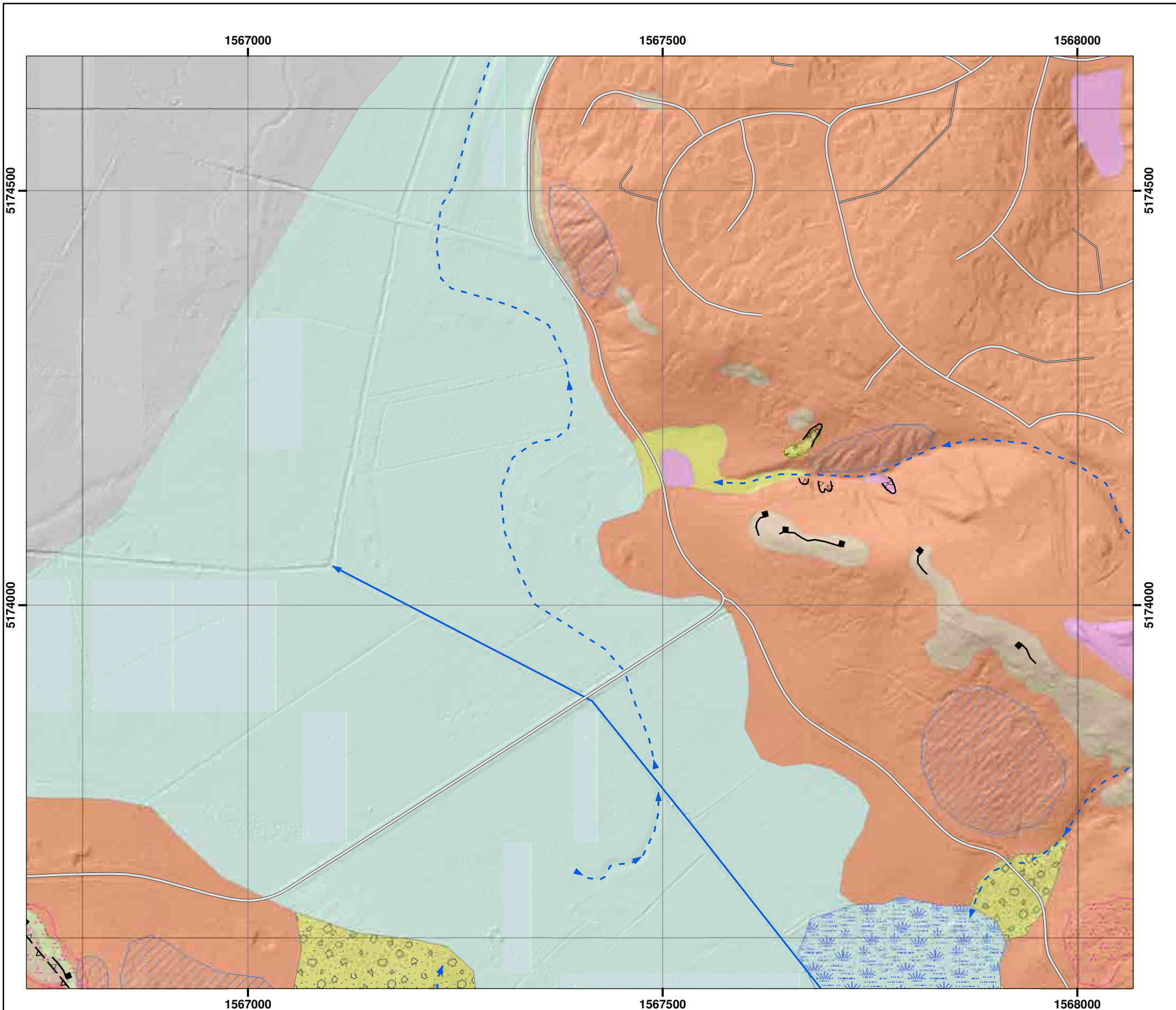
**Port Hills  
Christchurch**

APPENDIX 4  
Map D1

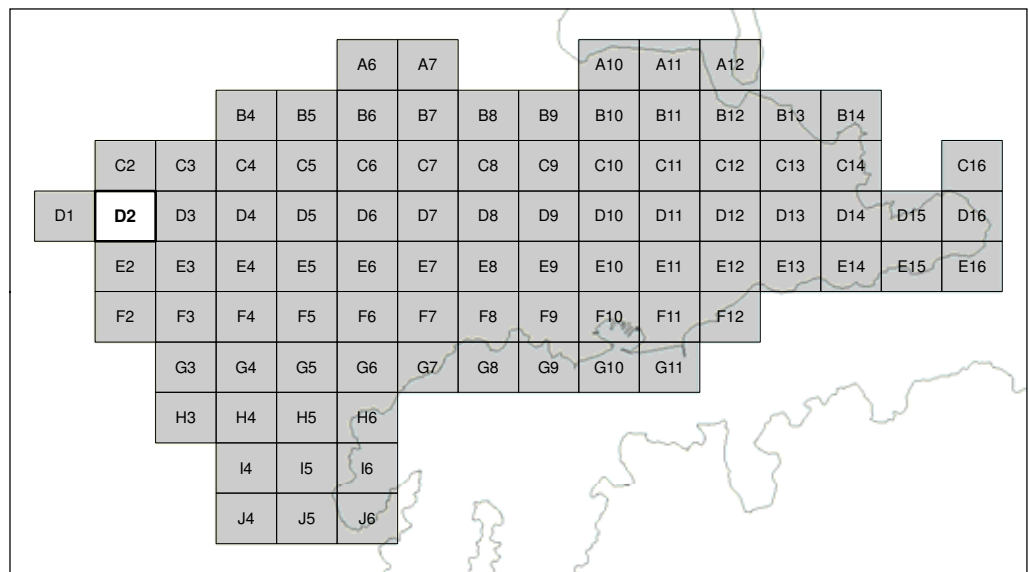
**FINAL**

REPORT: CR2012/15 DATE: Sept 2012





Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
 DBT  
 CHK:  
 CM



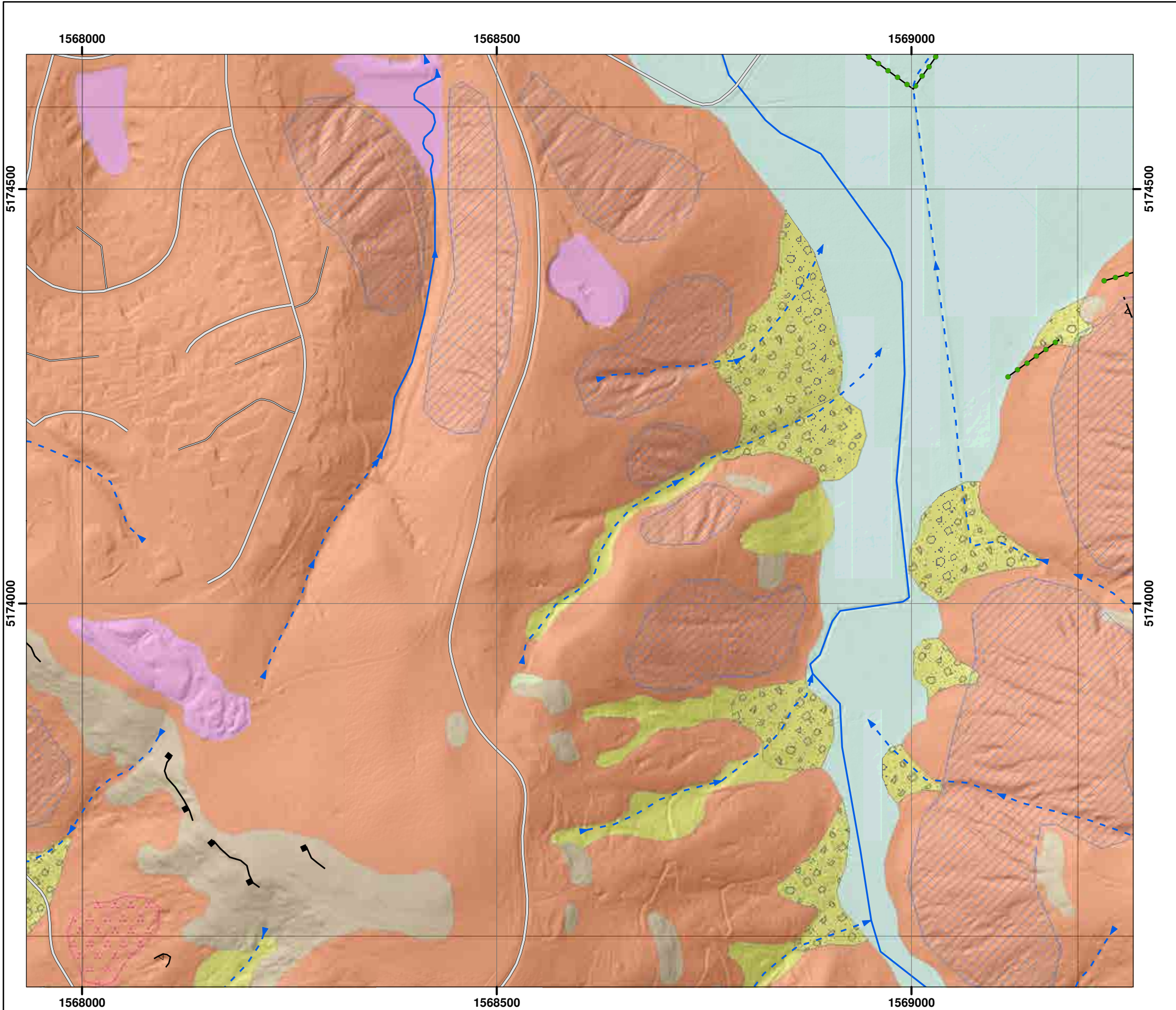
**GEOMORPHOLOGY MAPPING FOR  
 ROCKFALL RISK ASSESSMENT**

**Port Hills  
 Christchurch**

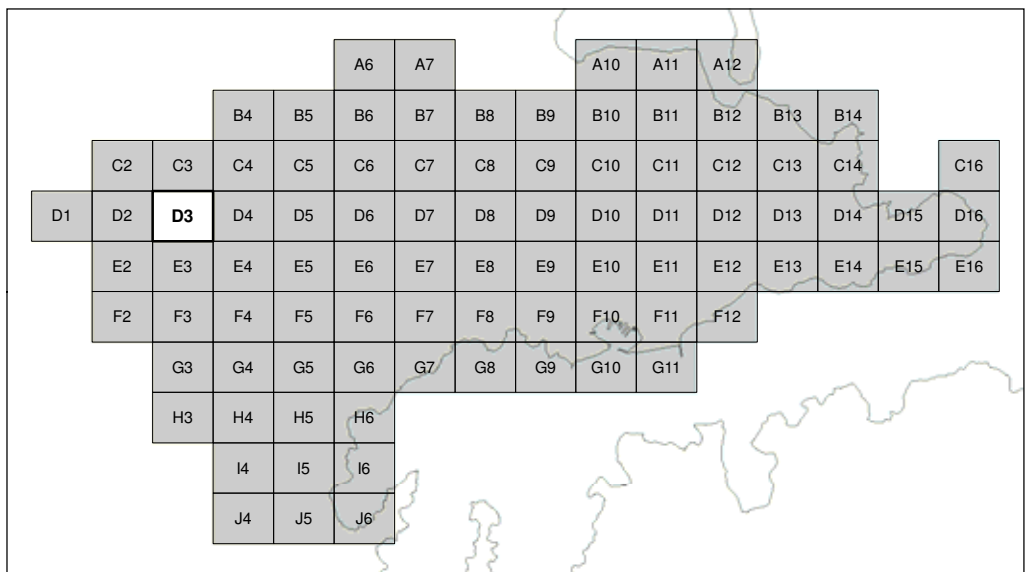
APPENDIX 4  
 Map D2

**FINAL**

REPORT: CR2012/15      DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



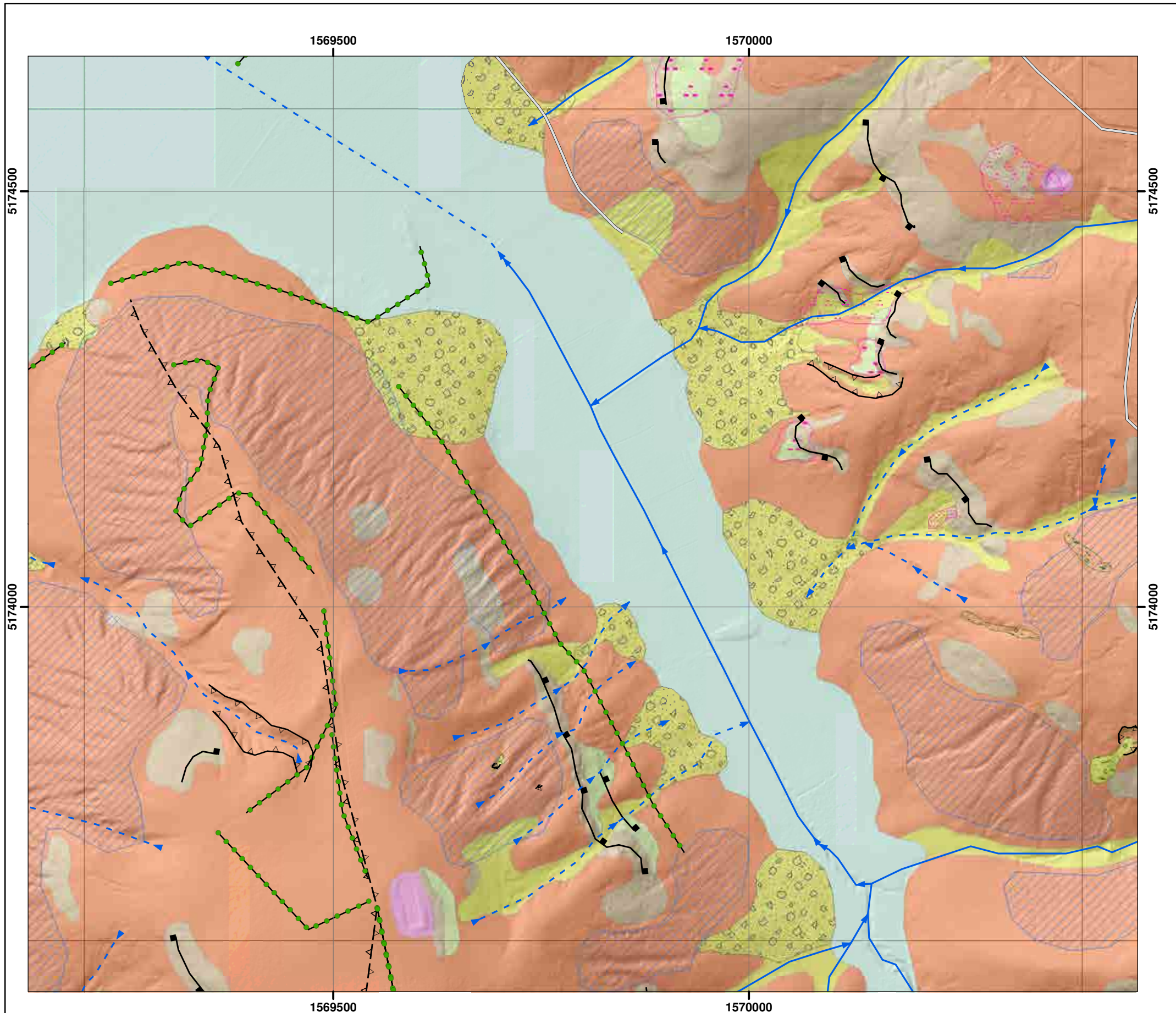
**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

**Port Hills Christchurch**

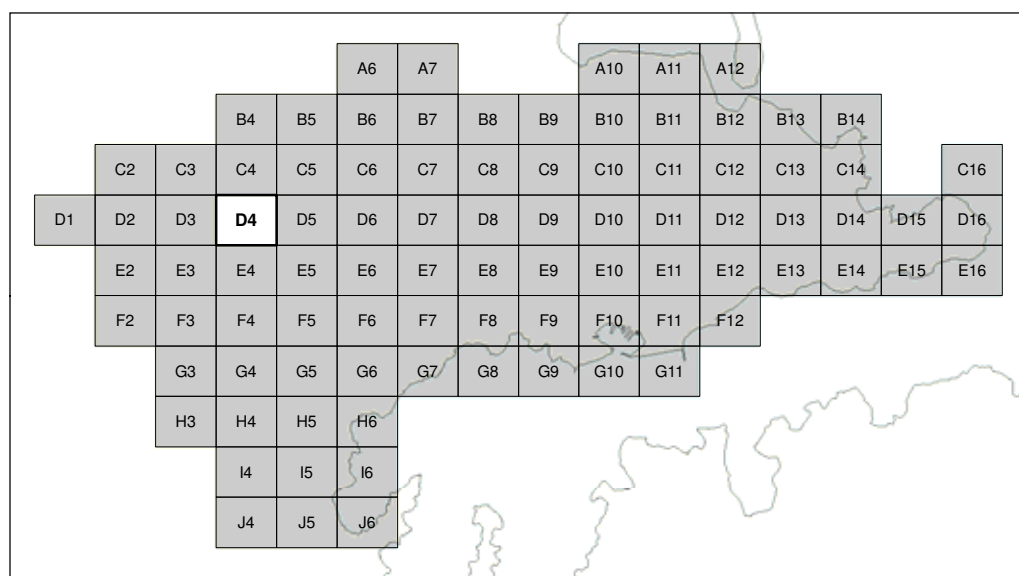
APPENDIX 4  
Map D3

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Liaison	Sand and gravel	Rills
Sharp liaison (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



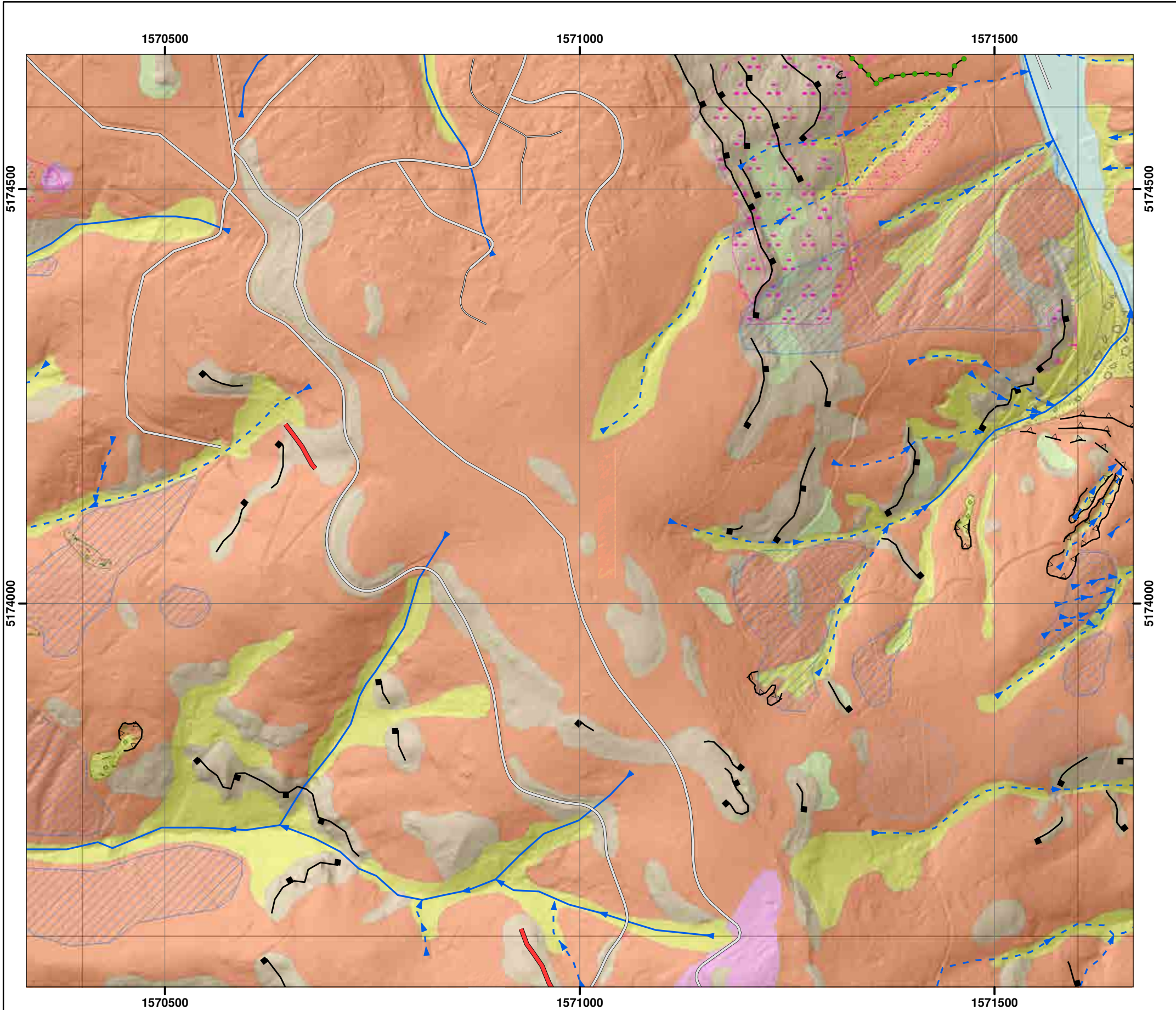
**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

**Port Hills Christchurch**

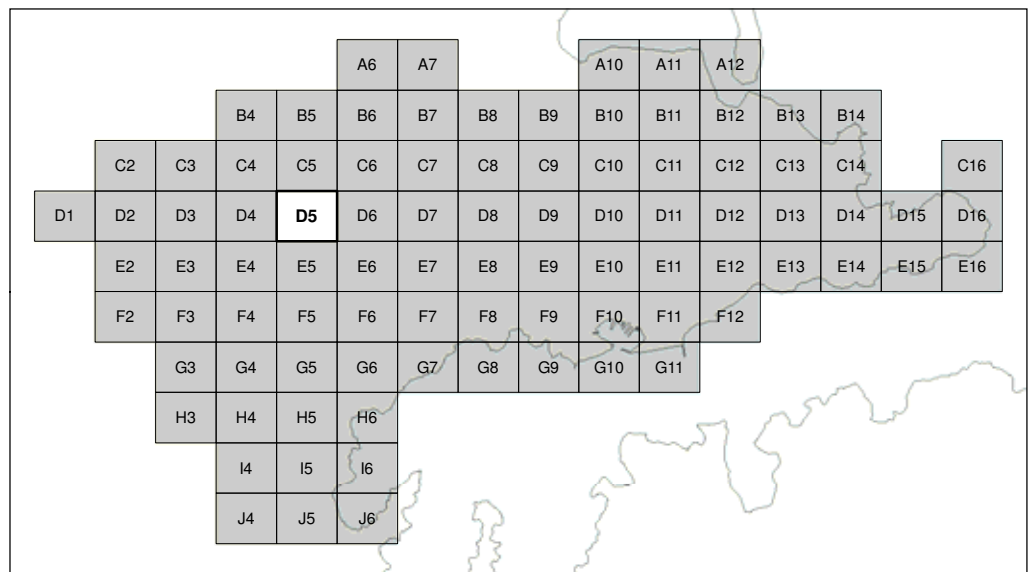
APPENDIX 4  
Map D4

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



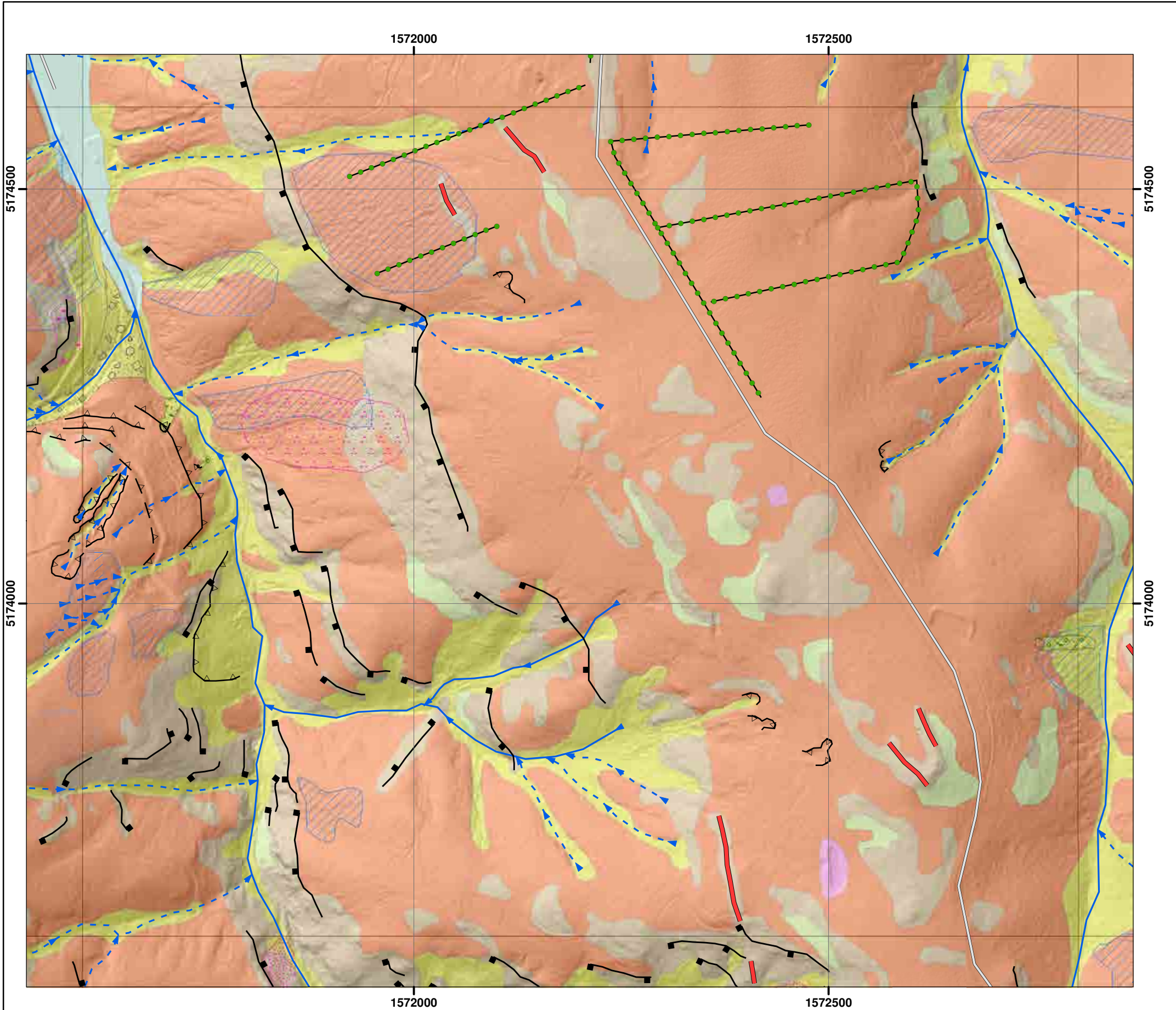
**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

**Port Hills Christchurch**

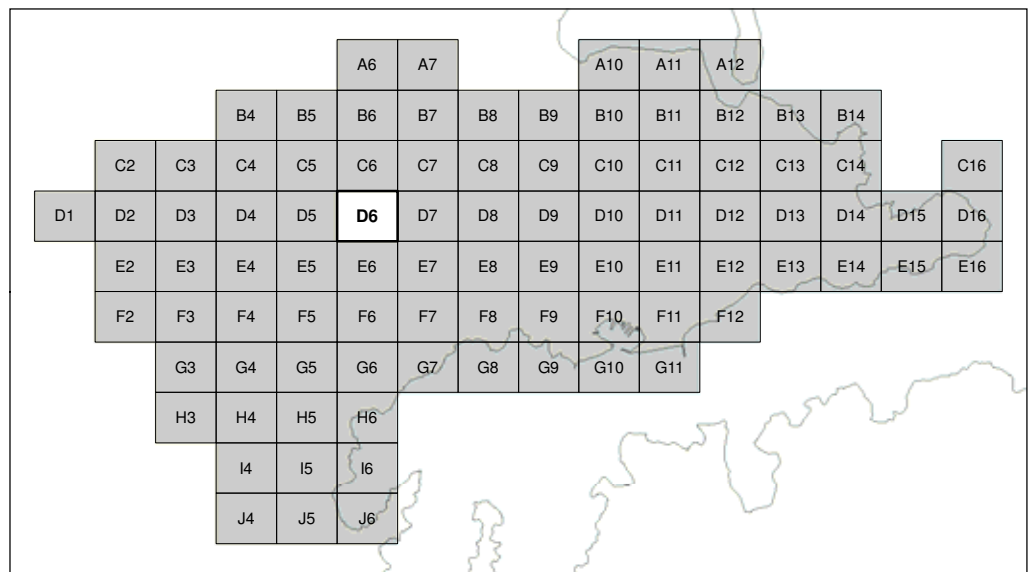
APPENDIX 4  
Map D5

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



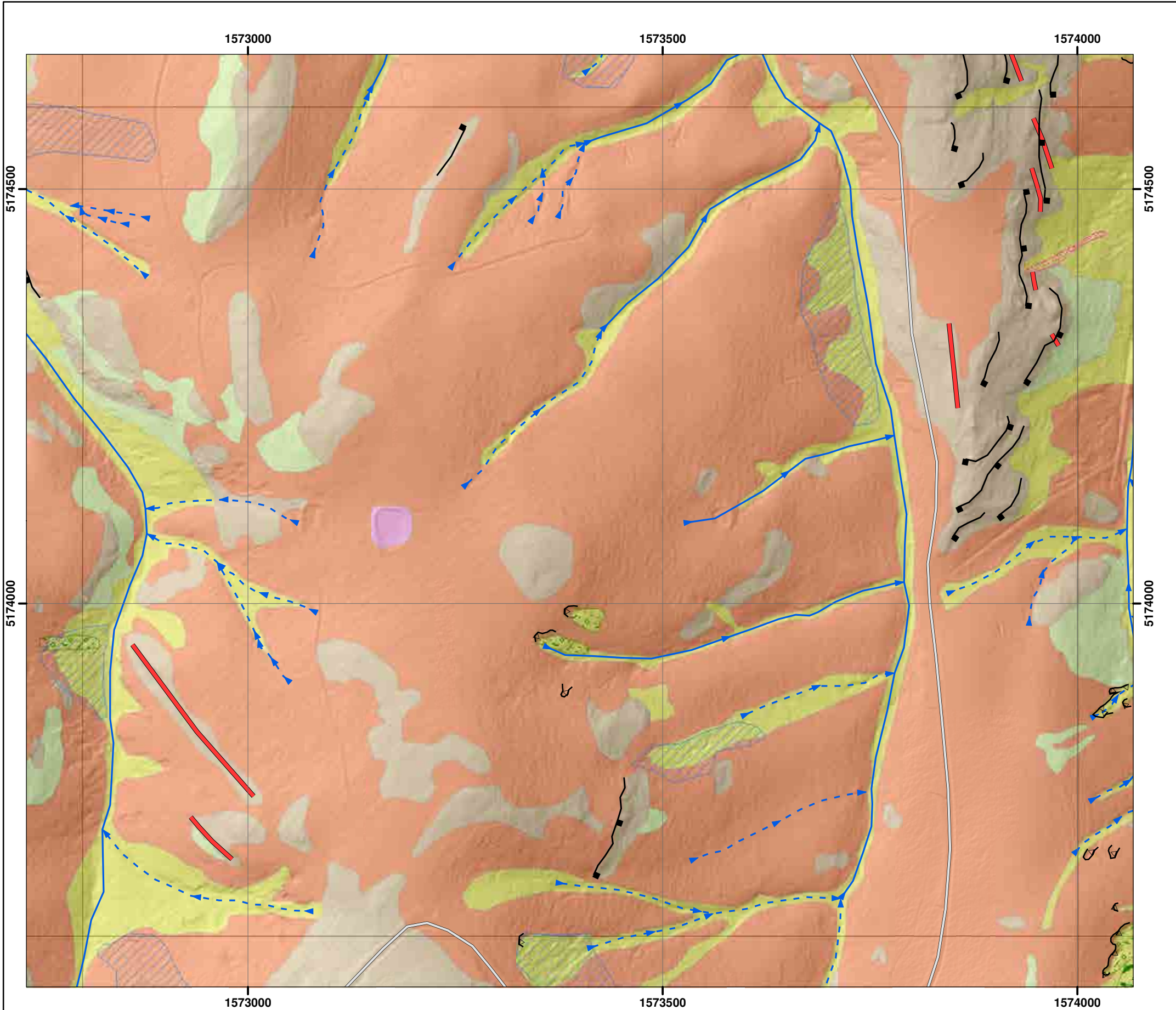
**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

**Port Hills Christchurch**

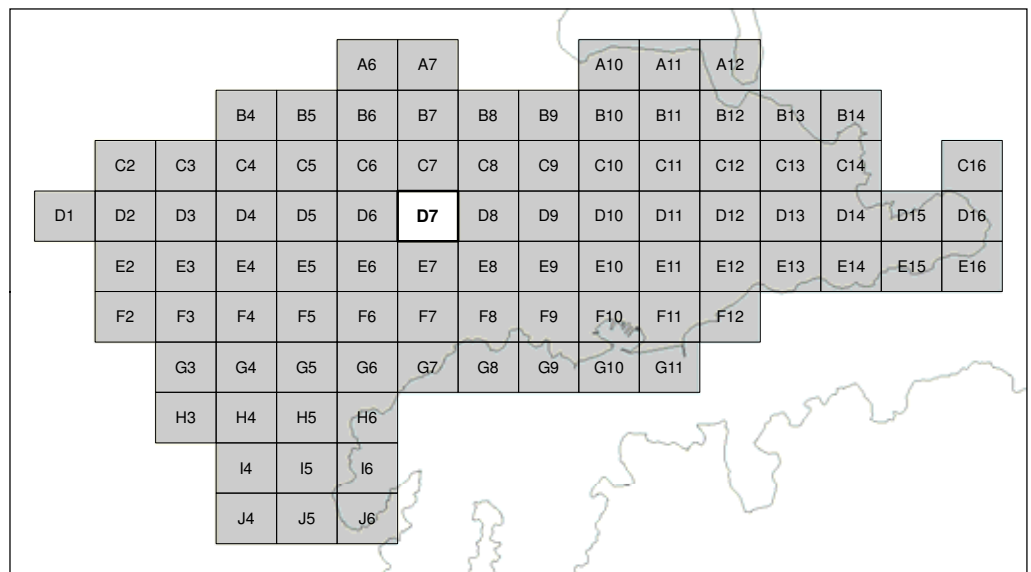
APPENDIX 4  
Map D6

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



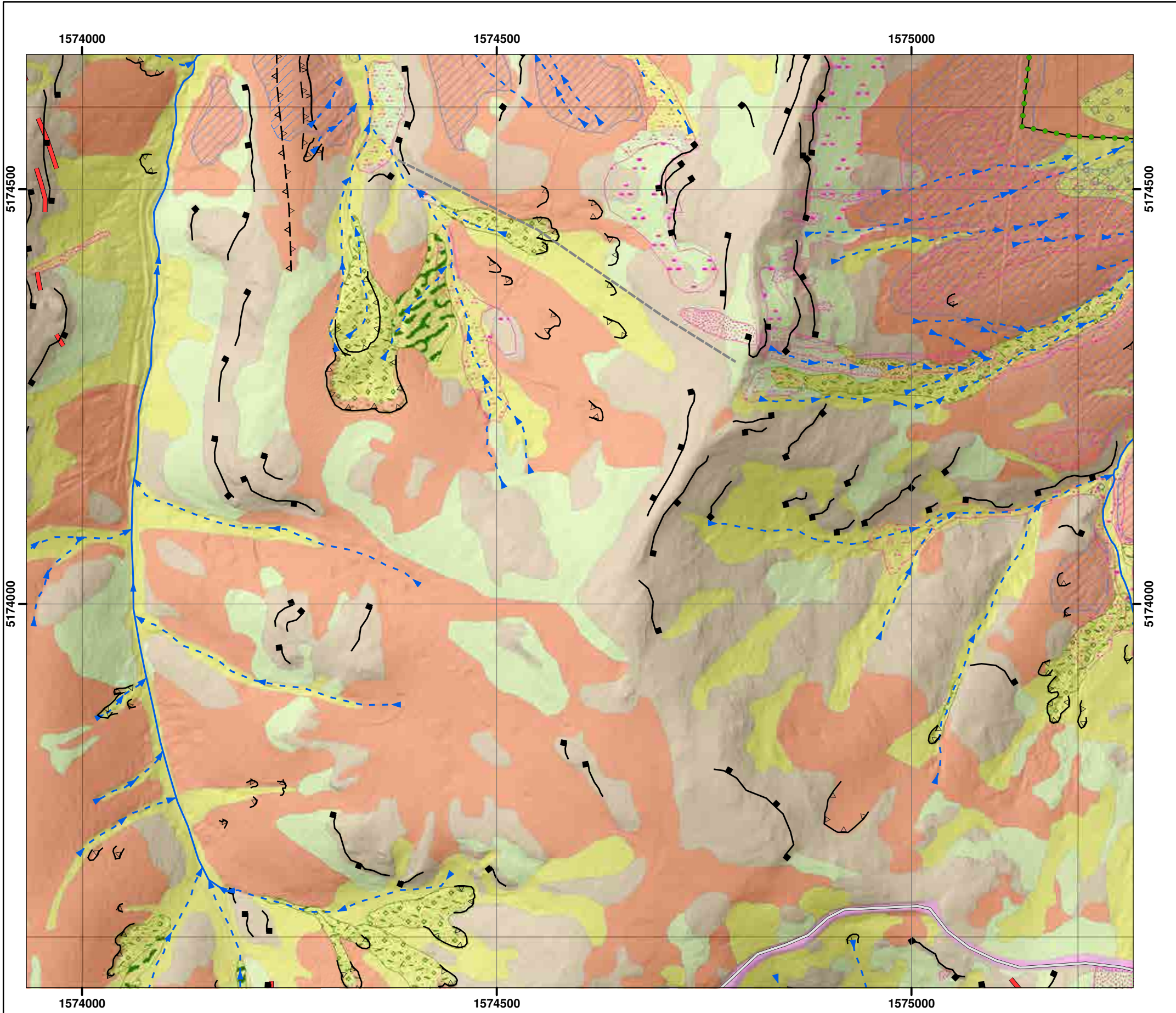
**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

**Port Hills Christchurch**

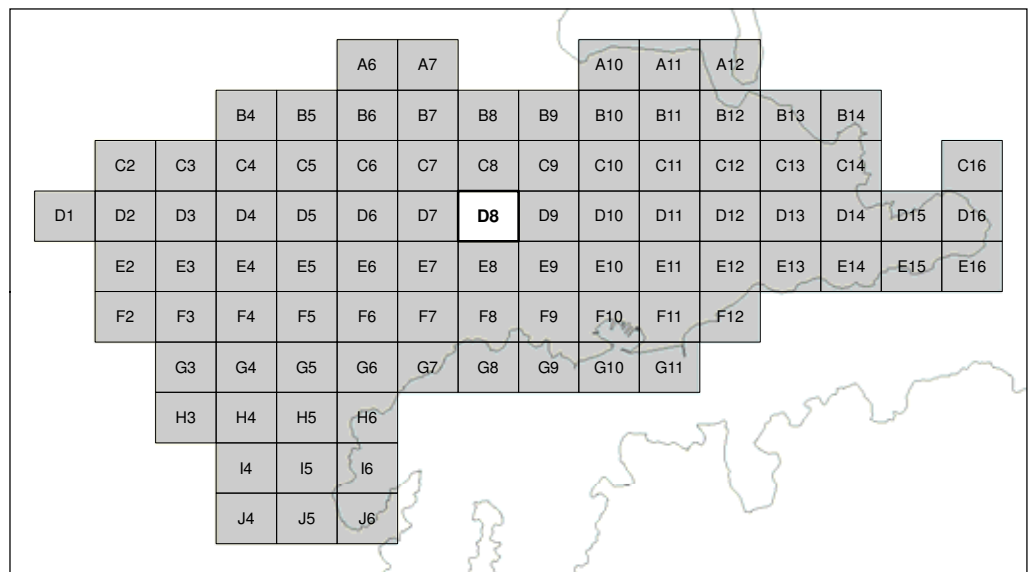
APPENDIX 4  
Map D7

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1:5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



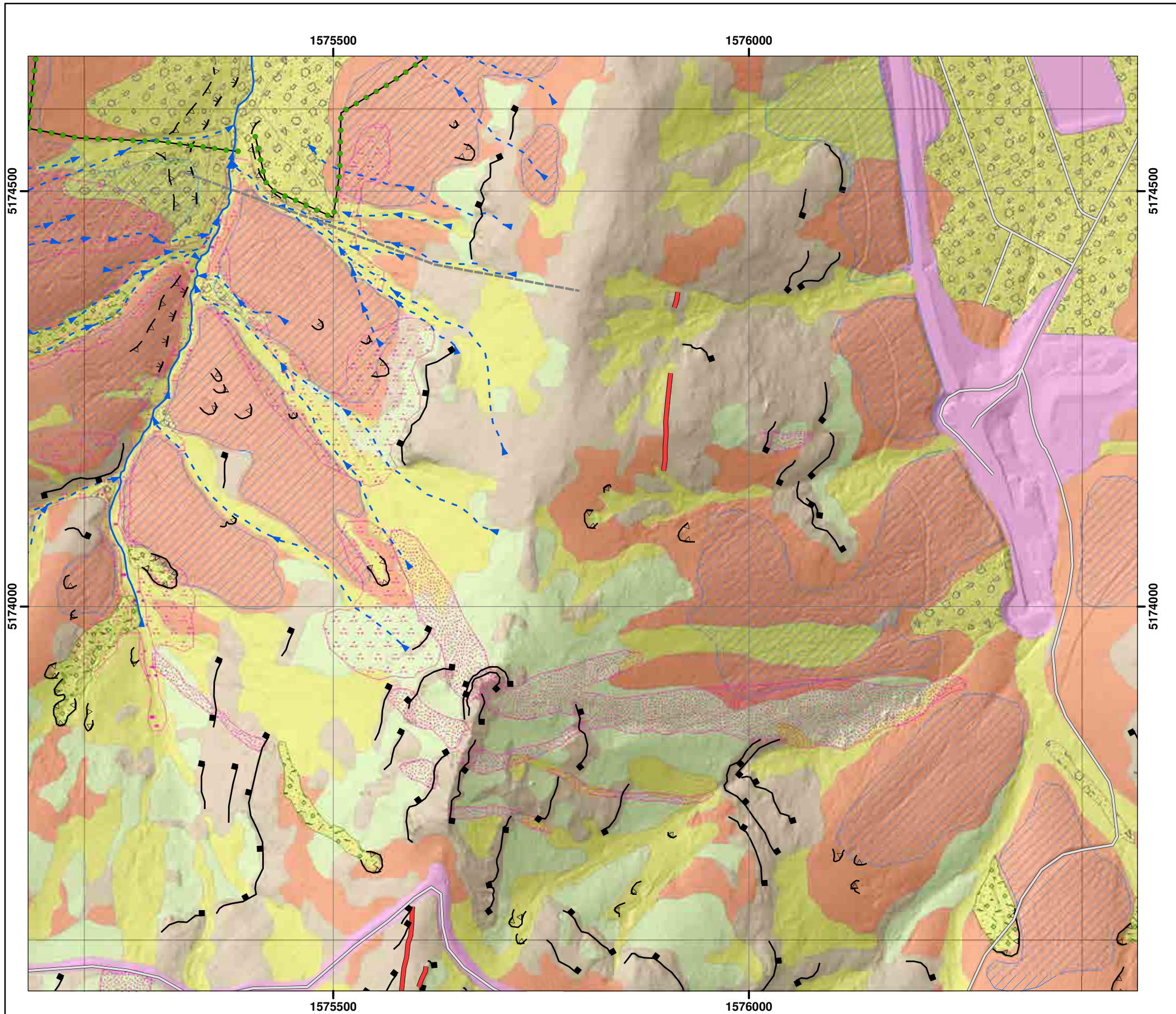
**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

**Port Hills Christchurch**

APPENDIX 4  
Map D8

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:

Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
Roads provided by Christchurch City Council (20/02/2012).  
PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



**GEOMORPHOLOGY MAPPING FOR  
ROCKFALL RISK ASSESSMENT**

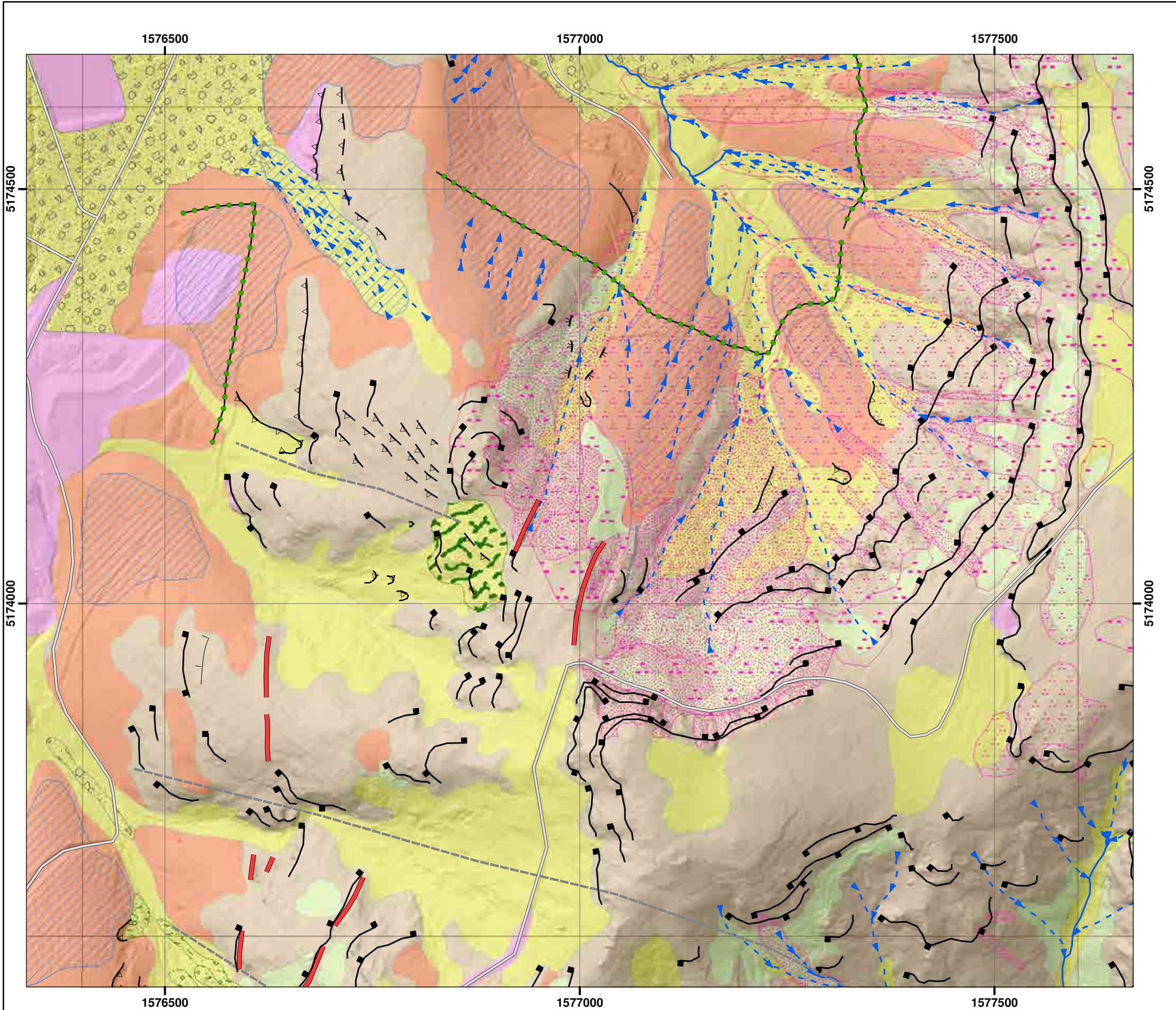
**Port Hills  
Christchurch**

APPENDIX 4  
Map D9

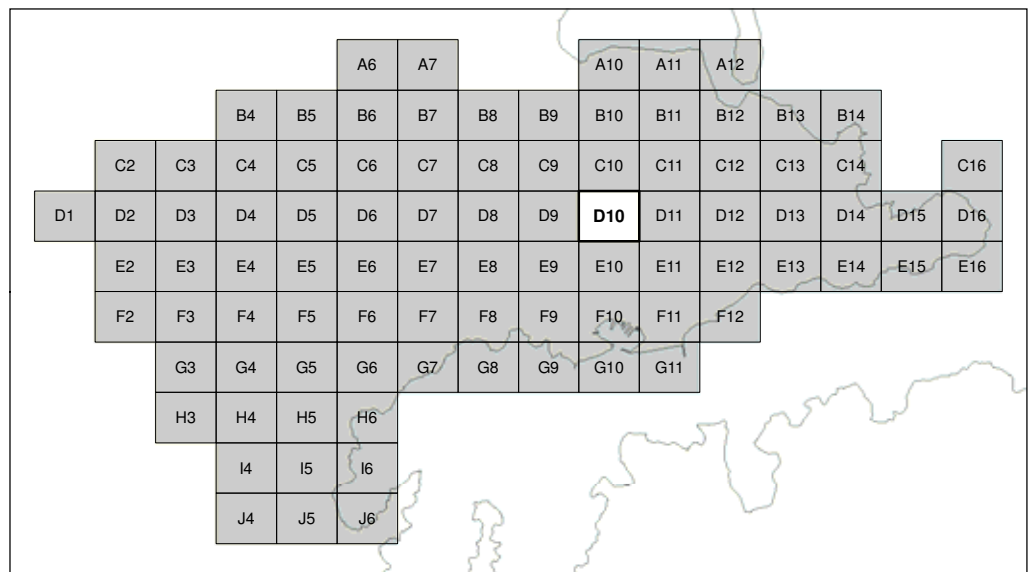
**FINAL**

REPORT: CR2012/15 DATE: Sept 2012





Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 1: 5000  
m

EXPLANATION:  
Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
Roads provided by Christchurch City Council (20/02/2012).  
PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



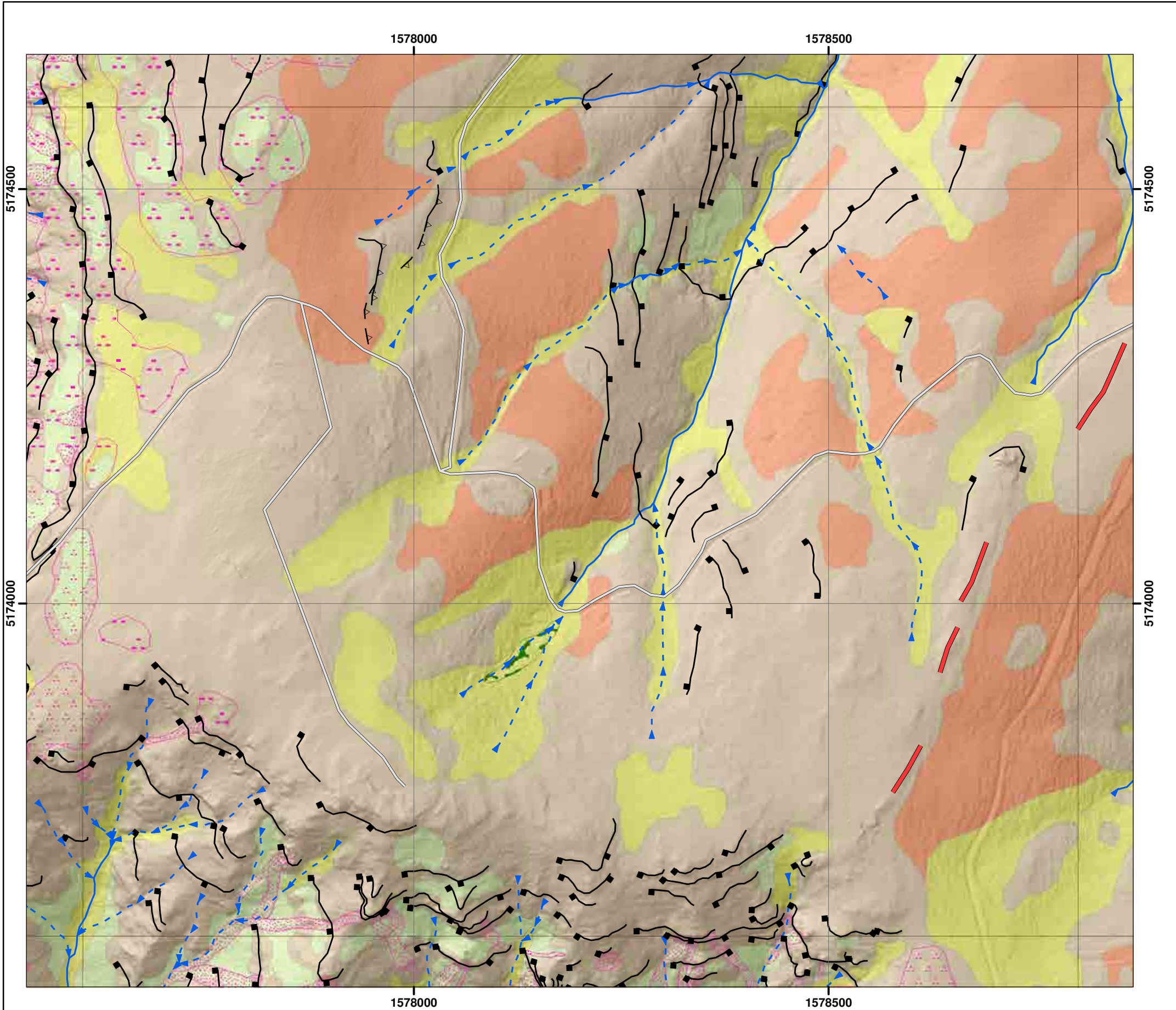
**GEOMORPHOLOGY MAPPING FOR  
ROCKFALL RISK ASSESSMENT**

**Port Hills  
Christchurch**

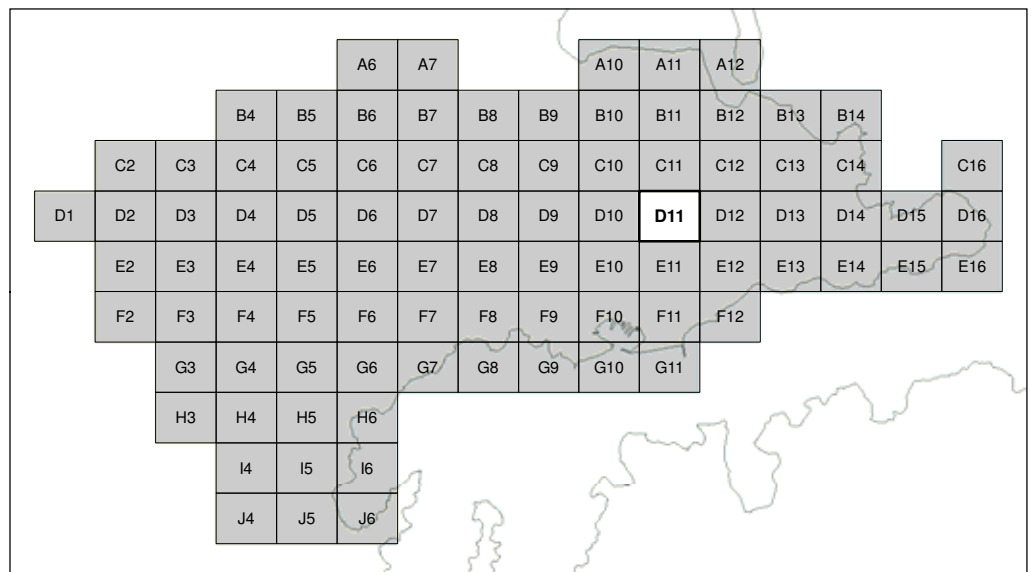
APPENDIX 4  
Map D10

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
 DBT  
 CHK:  
 CM



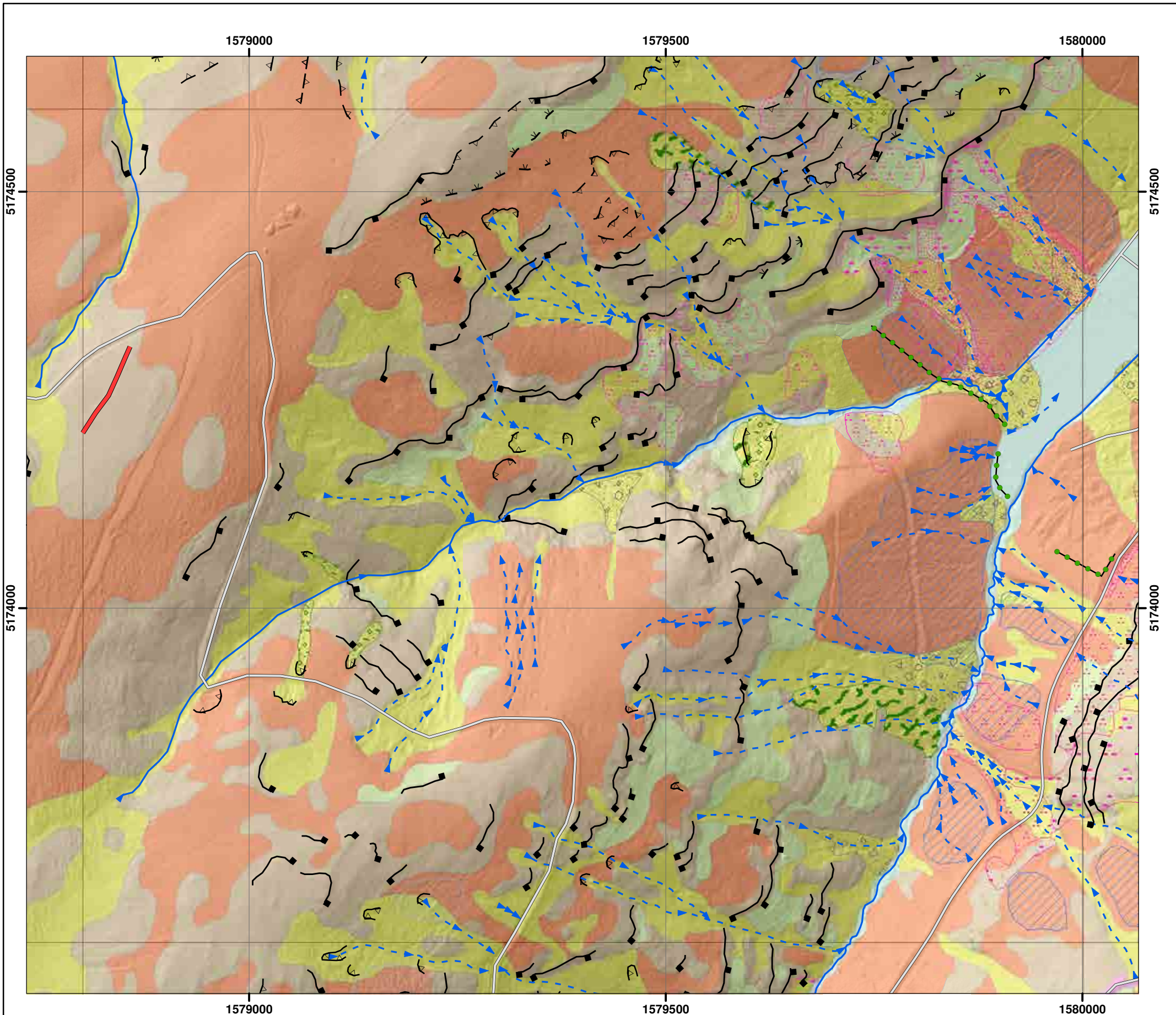
## GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT

Port Hills  
 Christchurch

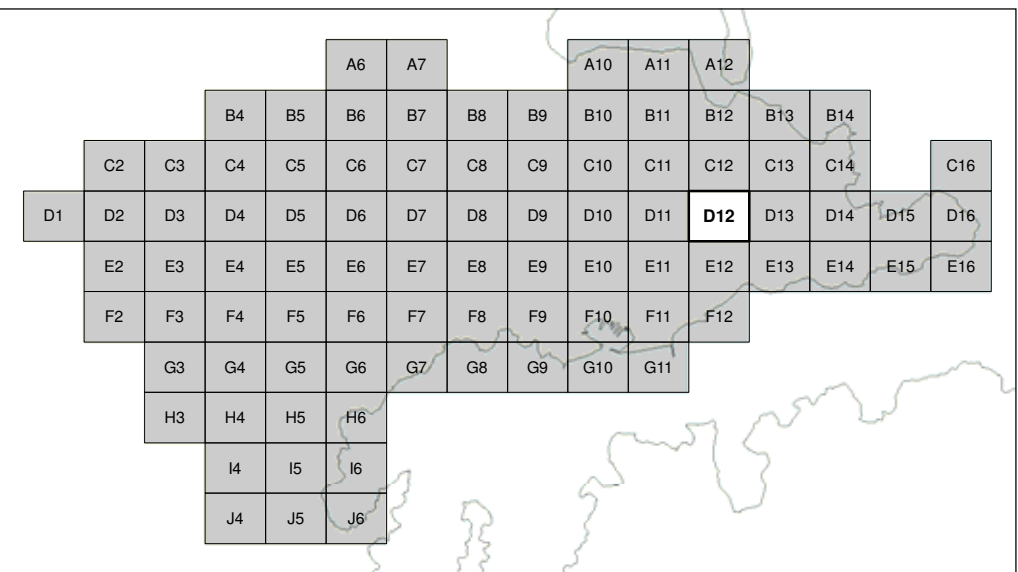
APPENDIX 4  
 Map D11

**FINAL**

REPORT: CR2012/15      DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1:5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



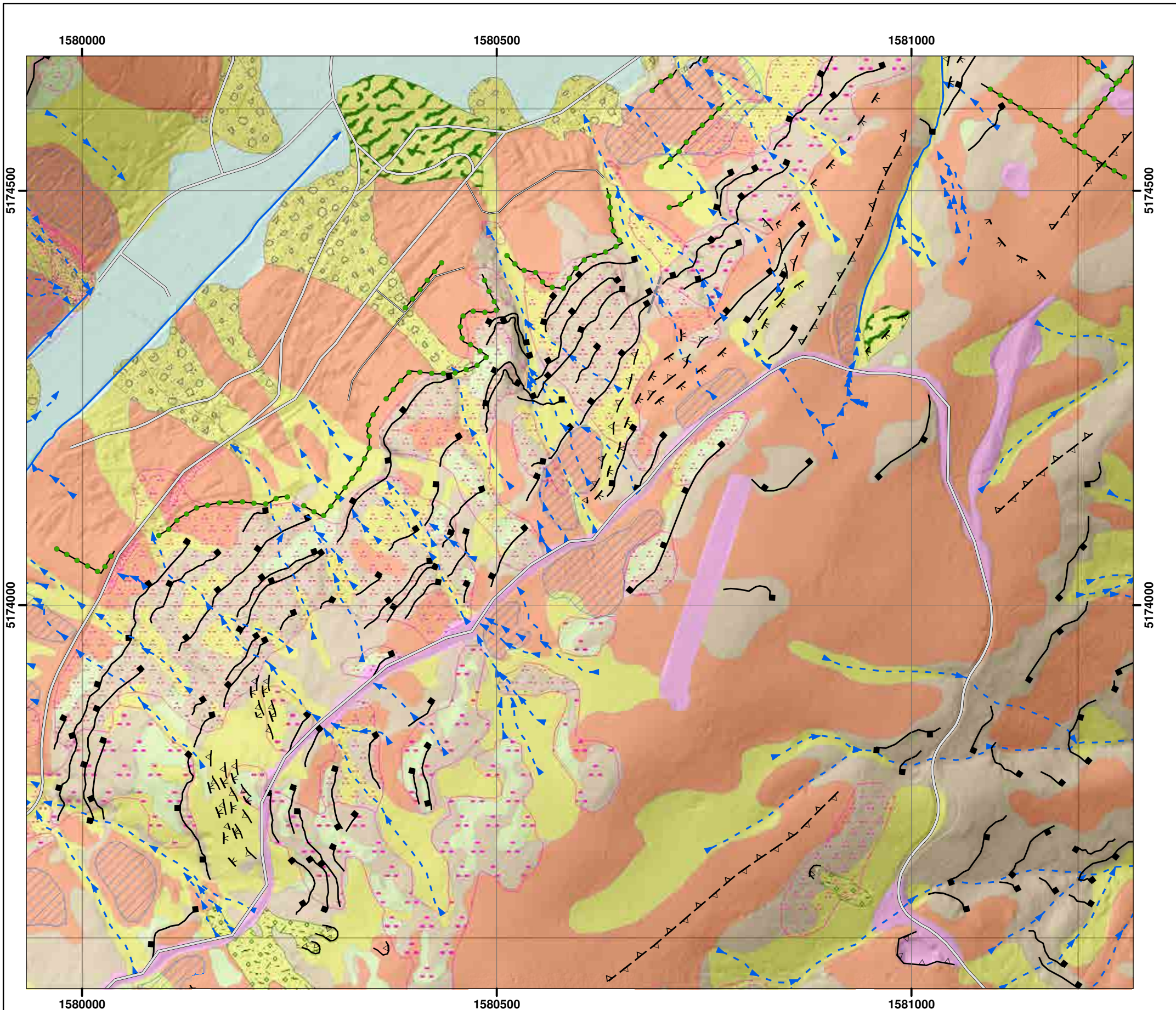
**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

**Port Hills Christchurch**

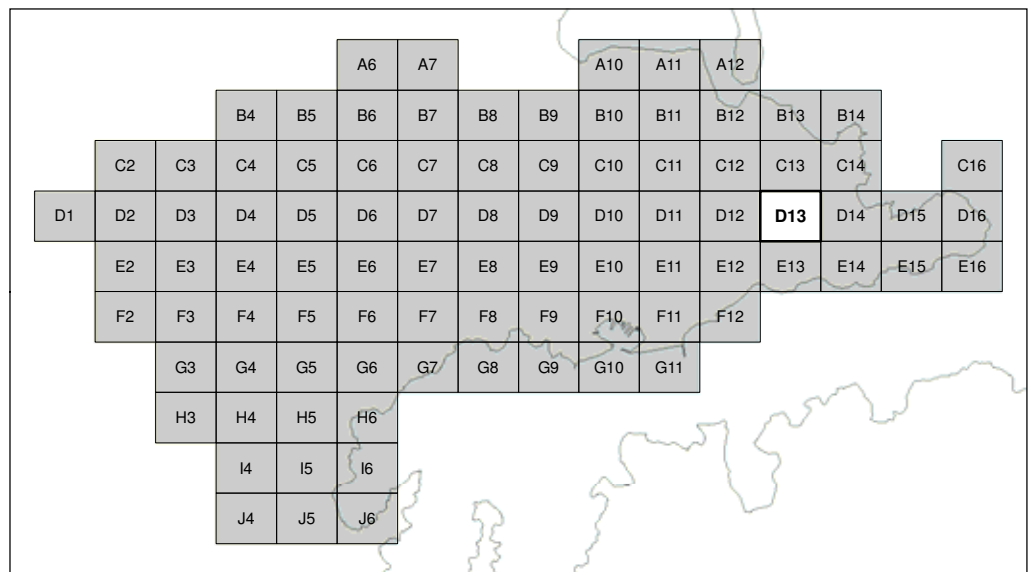
APPENDIX 4  
Map D12

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1:5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



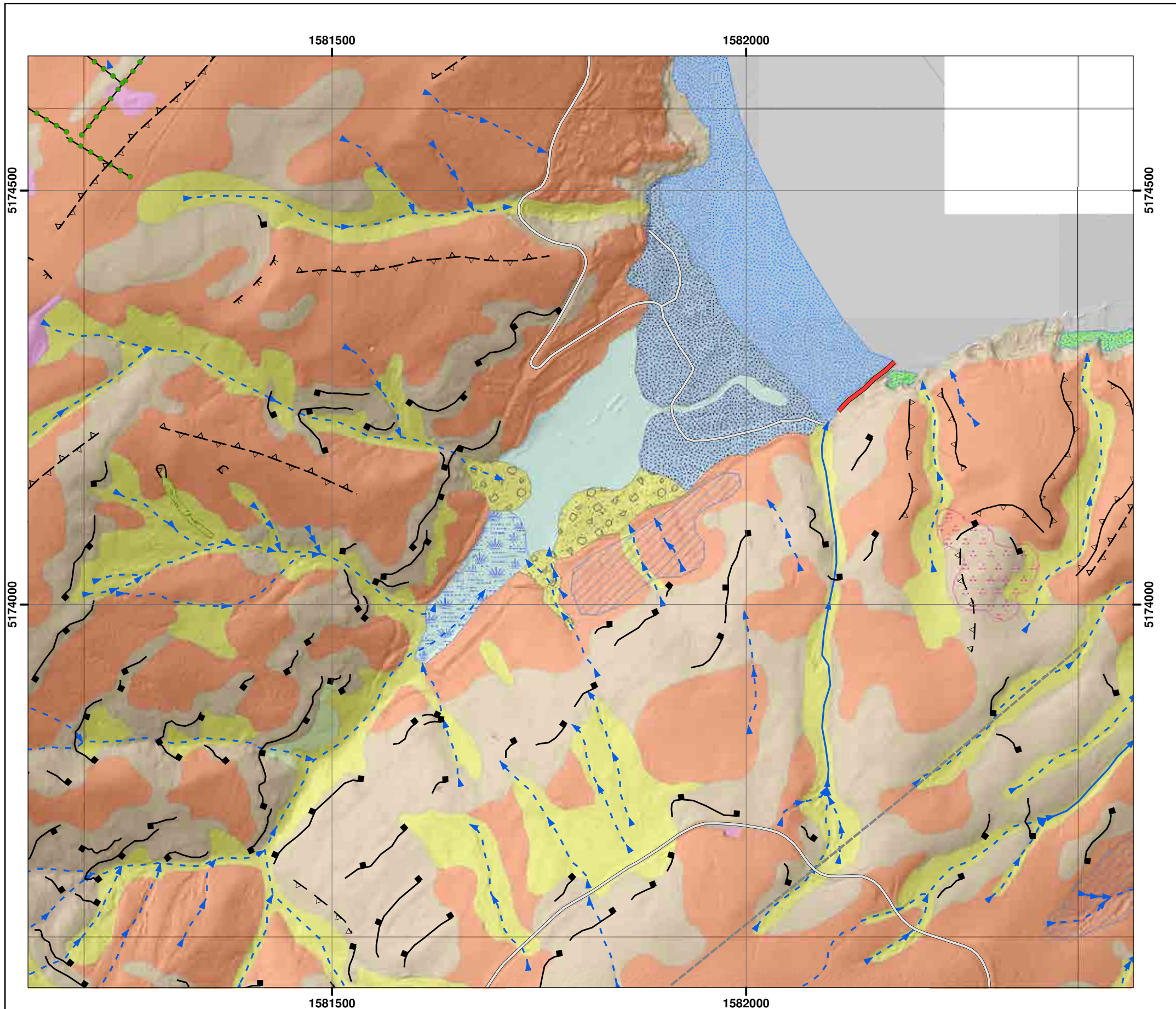
**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

**Port Hills Christchurch**

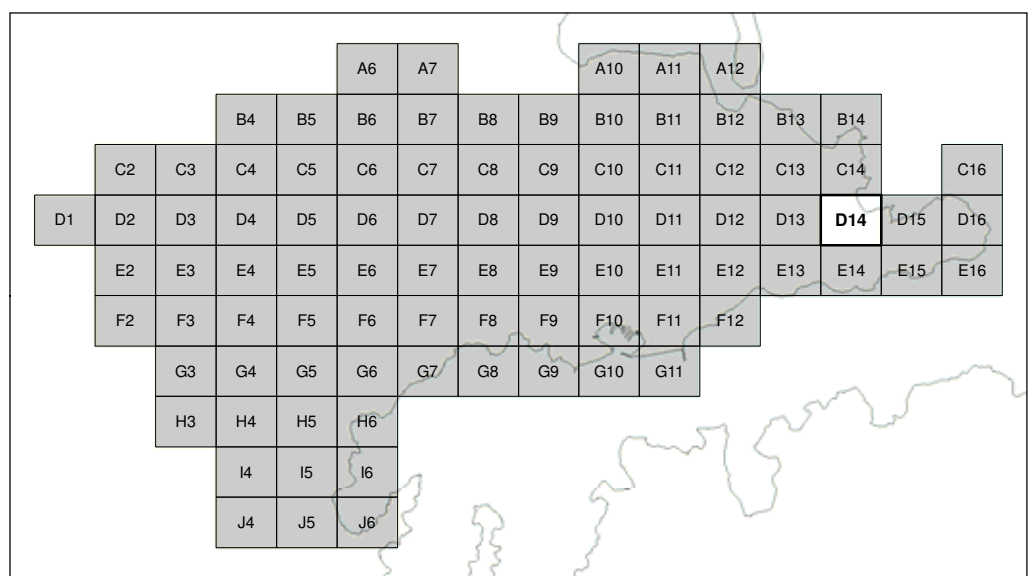
APPENDIX 4  
Map D13

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



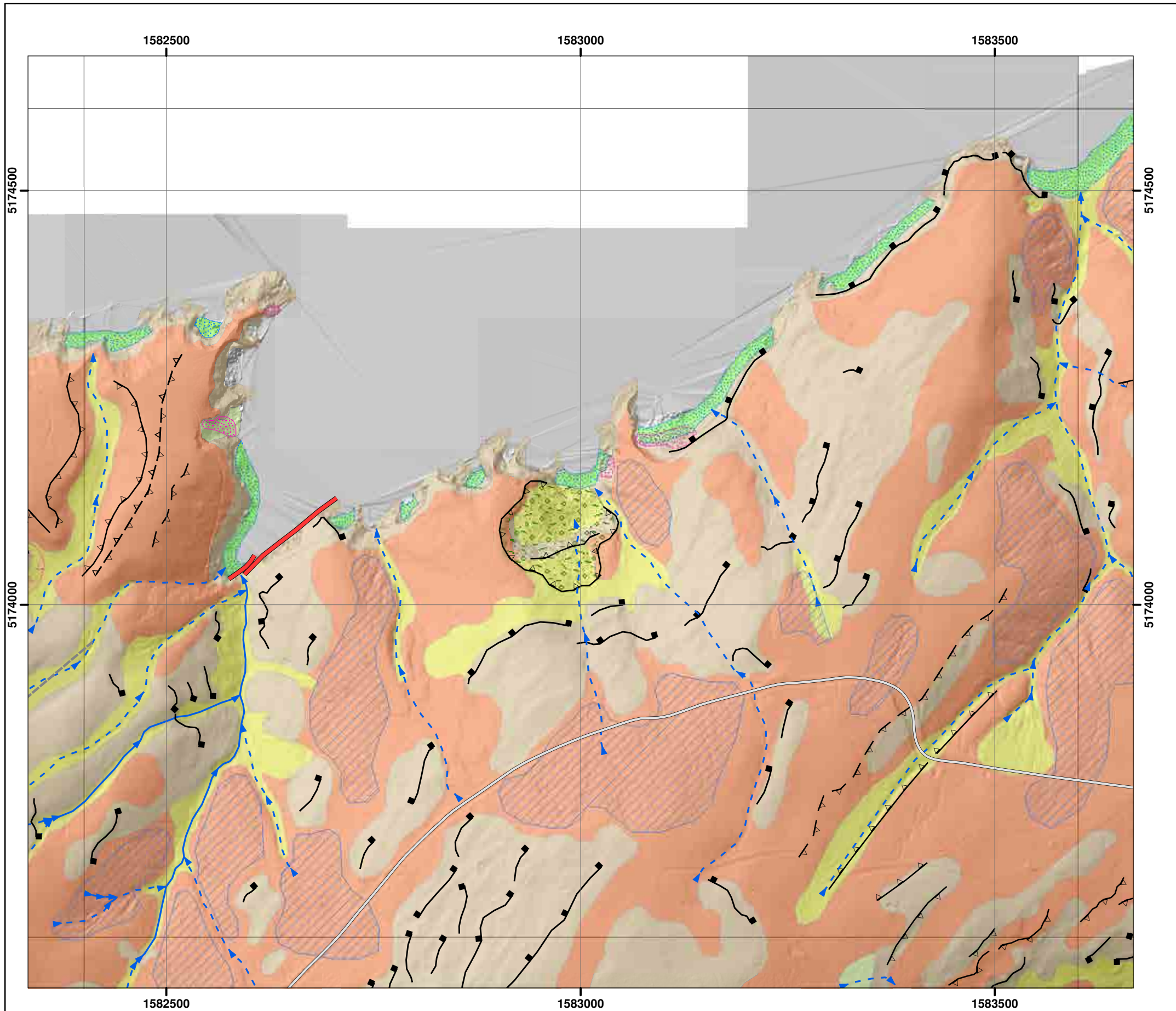
**GEOMORPHOLOGY MAPPING FOR  
ROCKFALL RISK ASSESSMENT**

**Port Hills  
Christchurch**

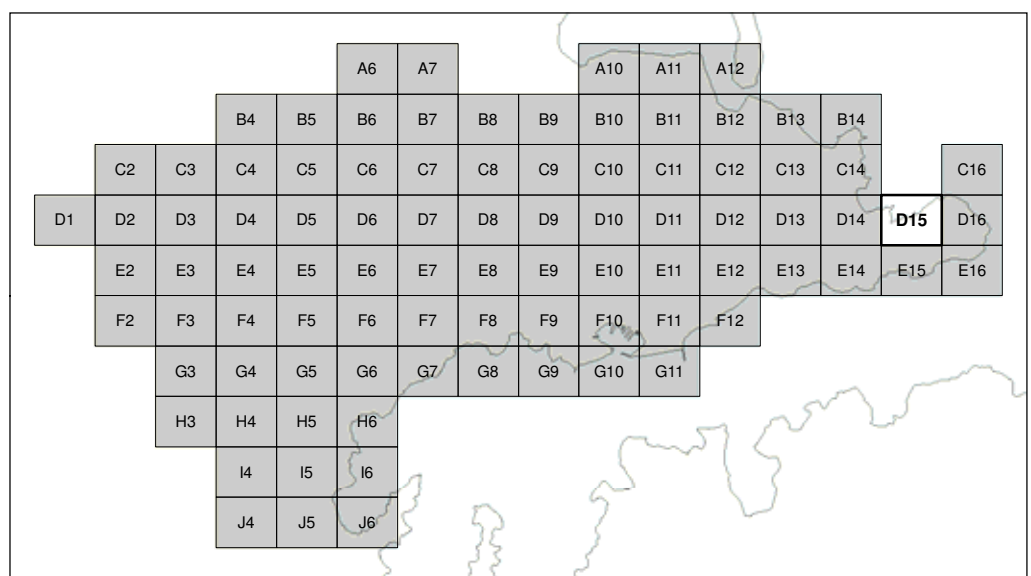
APPENDIX 4  
Map D14

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



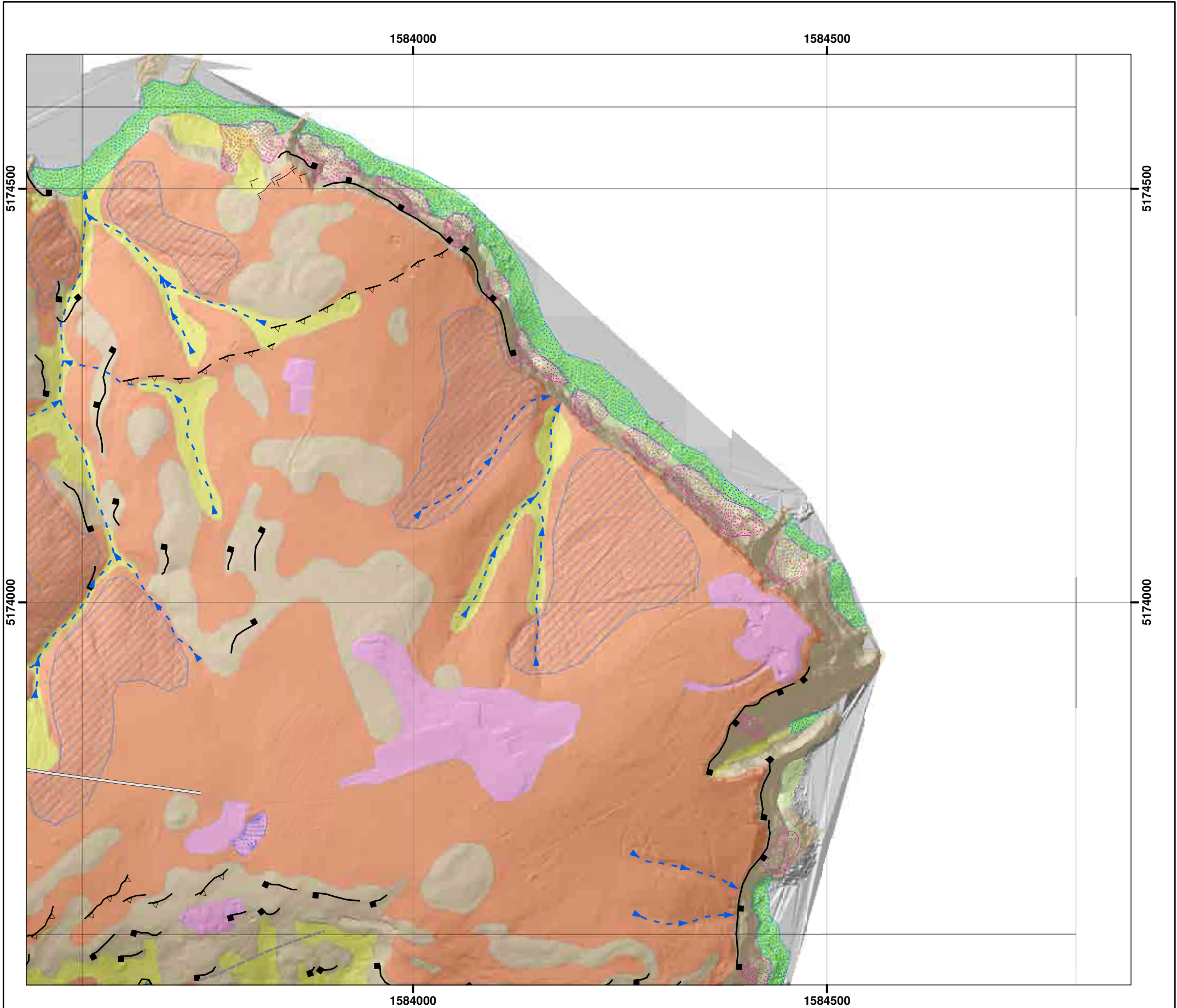
**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

**Port Hills Christchurch**

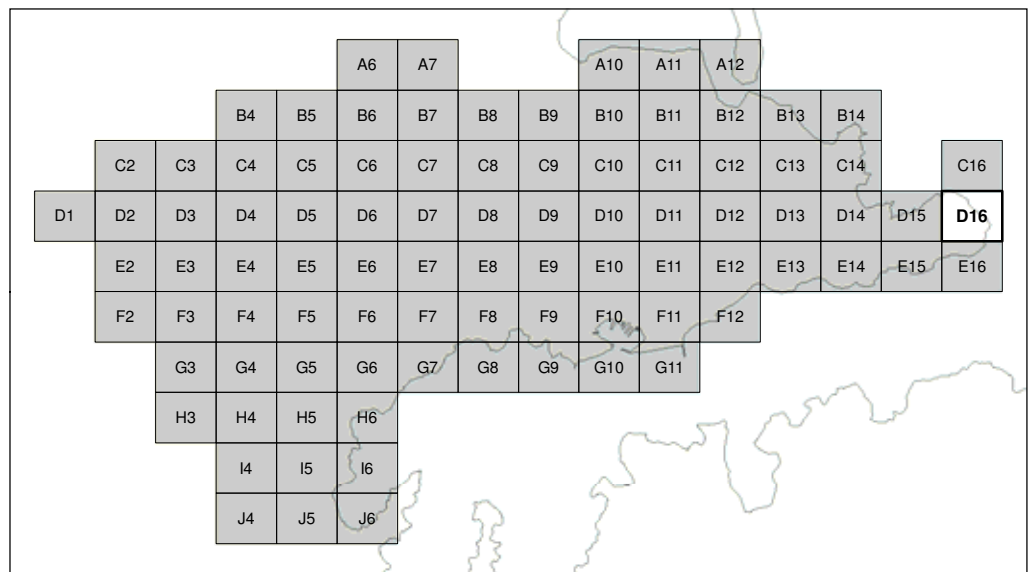
APPENDIX 4  
Map D15

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012



Morphology description	Interpreted Materials type	Genesis type
Boulder trail	Rock at/near surface	Rockfall (recent)
Dike	Talus	Rockfall (many scattered boulders)
Bund	Colluvium	Rockfall (few scattered boulders)
Ephemeral drainage line (well defined)	Loess	Dune
Ephemeral drainage line (poorly defined)	Alluvium	Beach
Lineation	Sand and gravel	Rills
Sharp lineation (crack)	Boulders	Terracettes
Rounded concave break in slope	Fill	Fan
Rounded convex break in slope	Unknown	Landslide scar (recent)
Rounded ridge line		Landslide scar (relict)
Sharp concave break in slope		Swamp/wetland
Sharp convex break in slope		
Cliff		
Shelter belt/trees		



SCALE BAR: 0 100 200 m 1: 5000

EXPLANATION:  
 Background shade model derived from NZAM post-earthquake 2011c (July 2011) LiDAR survey resampled to a 1m ground resolution.  
 Roads provided by Christchurch City Council (20/02/2012).  
 PROJECTION: New Zealand Transverse Mercator 2000.

DRW:  
DBT  
CHK:  
CM



**GEOMORPHOLOGY MAPPING FOR ROCKFALL RISK ASSESSMENT**

**Port Hills Christchurch**

APPENDIX 4  
Map D16

**FINAL**

REPORT: CR2012/15 DATE: Sept 2012